F8L10GW LoRa Gateway
User Manual

FCC ID：2ALUW-F8L10GW

Files Revised Record

Date	Version	Remark	Author
2018.07.19	V1.0.0	Initial version	Cheney/Carolin
2018.10.11	V1.0.1	Add 1-3 system block diagram; Modify document format; Document style adjust; Font size adjustment.	Jim

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Trademark Notice

Pole-mounted Installation

Wall-mounted Installation

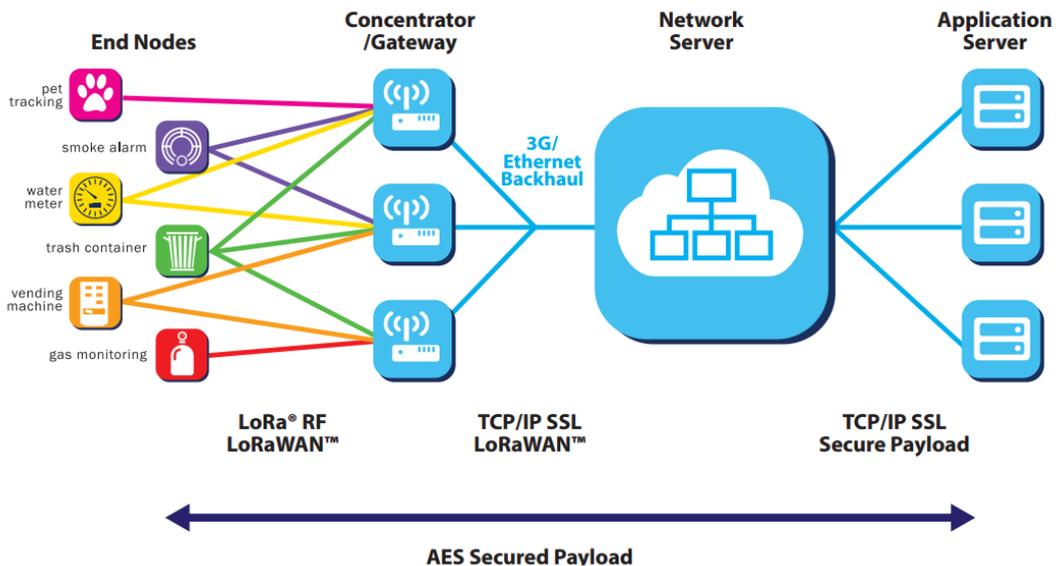Note: Accessories are subject to the purchased model.

Contents

Chapter 1 Brief Introduction

1.1 General

F8L10GW LoRa Gateway is a wireless communication base station based on LoRaWAN protocol. It connects to LoRaWAN terminals of various applications and transmits terminal data to the cloud through 3G/4G or wired Ethernet. Support WiFi wireless configuration management and online upgrade, GPS positioning, AC power supply.

F8L10GW is complied with standard LoRaWAN protocol, it's compatible with LoRaWAN devices and NS. The product has been widely used in M2M industry, smart grid, smart transportation, industrial automation, intelligent buildings, fire control, public security, environmental protection, meteorology, digital medical treatment, telemetry, military, space exploration, agriculture, forestry, water, mining, petrochemical and other fields.

Add：11th Floor, A-06 Area, No.370, Chengyi Street, Jimei, Xiamen, Fujian, China.
http://www.four-faith.com   Tel：+86-592-6307217   Fax: +86-592-5912735

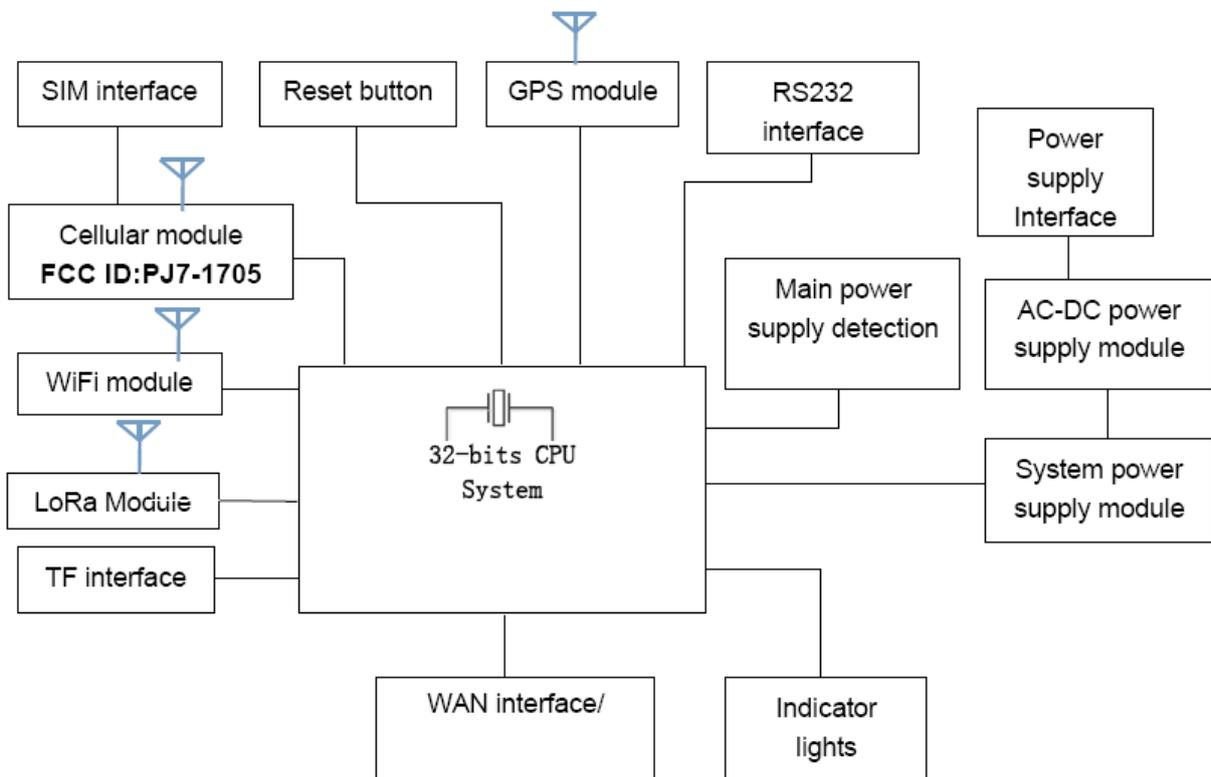## 1.2 Features and Benefits

Design for Industrial Application

◆ High performance industrial wireless communication module.
◆ High performance industrial multi-channel LoRaWAN RF base station chip.
◆ Aluminum housing, IP65 rated.
◆ Support AC Power supply

Stability and Reliability

◆ WDT watchdog design.
◆ Complete anti-drop mechanism ensures data terminal always online.
◆ Built-in 1.5 KV electromagnetic isolation protection in Ethernet interface.
◆ Built-in 15KV ESD protection in SIM/UIM card interface.
◆ Built-in reverse phase protection, over voltage protection and lightning protection.
◆ Antenna lightning protection.

1.3 Working Principle

The principle chart of the F8L10GW LoRa Gatwway is as following:

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1.4 Specifications

◆ Communication Network: Start topology.
◆ Supported LoRaWAN protocol: Class A and Class B*, Class C.
◆ Supported frequency: EU863-870.
◆ Urban communication range: 6km.
◆ Maximum receiving sensitivity: Max -142dbm @LoRa; -70dbm @WIFI.
◆ 8 upstream channels,1 downstream channel.
◆ Safe and reliable, low latency, wireless transmission technology.
◆ Adaptive data rate.
◆ Work mode: support sending and receiving different frequency, same frequency.
◆ Positioning function: GPS.
◆ Network connectivity: 3G / 4G, Ethernet.
◆ Management: WiFi wireless management and upgrade.
◆ TF card local storage supported.
◆ Operating temperature: -35~+50℃.
◆ Dimensions: 289.4*223.62*115 mm.
◆ IP65 rated.
◆ Power supply：100-240V~ 50/60Hz, 0.8A.
◆ Electrical Performance.

No.	Parameter	Technical Data
1	Rated input voltage	100~240V AC
2	Rated output voltage	12V
3	Rated output current	3A
4	Input undervoltage protection	No
5	Output overvoltage protection	Yes
6	Output overcurrent protection	Yes
7	Short circuit protection	Yes
8	Lightning protection level	3KA
9	Input wire diameter	5-7mm

Cellular Specification

ITEM	CONTENT
Frequency Band	FDD-LTE Band 2/4/5/7/17 DC-HSPA/HSPA+/HSDPA/ HSUPA/WCDMA Band 1/8 GSM850 / PCS1900

WIFI Specification

Item	Content
Standard	IEEE802.11b/g/n
Security	WEP, WPA, WPA2, etc.
Frequency Range	2412MHz to 2462MHz

LoRa Specification

Item	Content
Communication Protocol and Band	902MHz to 928MHz(US)

GPS RX Specification

Item	Content
Frequency Band	1559MHz to 1610MHz
Operating Frequency:	1575.42MHz

Power supply

Item	Content
Input Power	100-240V~ 50/60Hz, 0.8A
Output Power	12V=3.0A
Note: The power plug considered as disconnect device of Power Supply.	

Environmental Limits

Item	Content
Operating Temperature	-35~50ºC
Note 1：Do not use the products in the environment at too high or too low temperature. The suitable temperature for the product and accessories is -35℃-50℃.	

Antenna Specification

Item	Content
LoRa antenna	N-type female, Omni-Directional FRP Antenna , 2dBi gain
GPS antenna	N-type female, Omni-Directional FRP Antenna , 2dBi gain
WiFi antenna	N-type female, Omni-Directional FRP Antenna , 2dBi gain.
WWAN antenna	N-type female, Omni-Directional FRP Antenna , 0dBi gain
Note 1: Please ensure to use only the antenna offered by the manufacturer. Using unauthorized antenna may cause danger and violate the authorization Note 2: Antenna connector (N-type) was not unique connector, need installed by trained, professional engineer	

Federal Communication Commission (FCC) Radiation Exposure Statement

The device has been evaluated to meet general RF exposure requirement, The device can be used in portable exposure condition without restriction Federal Communication Commission (FCC) Radiation Exposure Statement Power is so low that no RF exposure calculation is needed.

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTE: The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications or changes to this equipment. Such modifications or changes could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

‐ Reorient or relocate the receiving antenna.

‐ Increase the separation between the equipment and receiver.

-Connect the equipment into an outlet on a circuit different from that to which

the receiver is connected.
 ‐ Consult the dealer or an experienced radio/TV technician for help.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

Chapter 2 Installation Instruction

2.1 General

F8L10GW must be installed correctly in order to achieve the design function. The installation must be conducted by a qualified engineer recognized by the Four-Faith.

➢ *Warning:*
   1. Power off before installation.
   2. Don't remove the cover, power interface, antenna interface.

2.2 Packing List

2.2.1. Wall-mounted Packing List

Item	Qty	Remark
F8L10GW LoRa Gateway	1	
4G Omni-Directional FRP Antenna	1	Optional
WIFI Omni-Directional FRP Antenna	1	
GPS Omni-Directional FRP Antenna	1	
LoRa Omni-Directional FRP Antenna	1	
Bracket	1	
Swelling screw ø14mm	3	
Wire	1	Optional
User manual CD	1	Optional
QC passed card	1	
Warranty card	1	

2.2.2. Pole-mounted Packing List

Item	Qty	Remark
F8L10GW gateway	1	
4G Omni-Directional FRP Antenna	1	Optional
WIFI Omni-Directional FRP Antenna	1	
GPS Omni-Directional FRP Antenna	1	
LoRa Omni-Directional FRP Antenna	1	
Bracket	2	
Wire	1	Optional
User manual CD	1	Optional

QC passed card	1	
Warranty card	1	

2.3 Installation
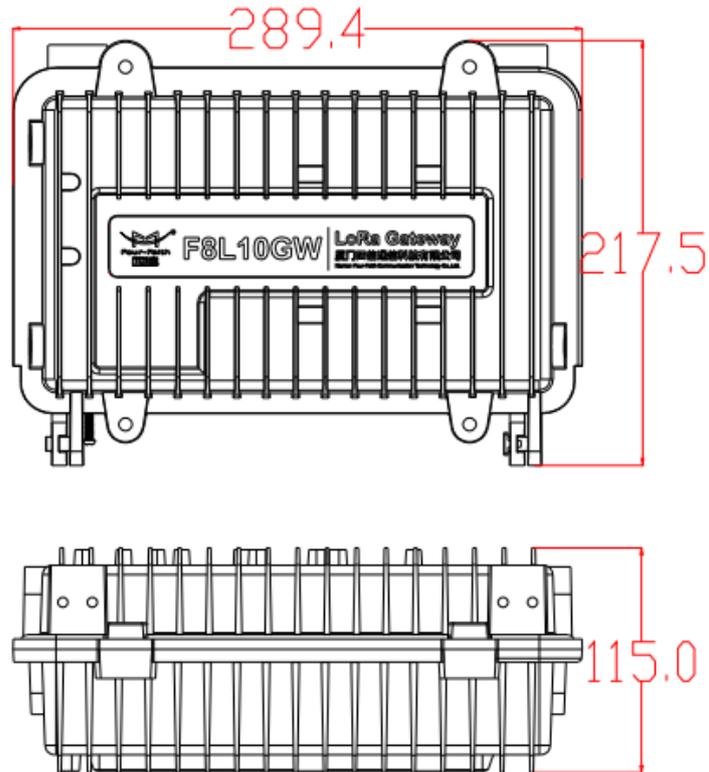
F8L10GW Dimensions

2.3.1 SIM/UIM Installation

1. Cut off the power.
2. Unscrew the M6 screws, **figure. 2.3.1** as below.
3. Insert SIM/UIM card, **figure 2.3.2** as below.
4. Push the SIM/UIM card and the card will pop up automatically.
5. Tighten M6 screws.

Warning:

1. Power must be off before installing SIM/UIM card.

2. M6 screws must be tightened and fixed.
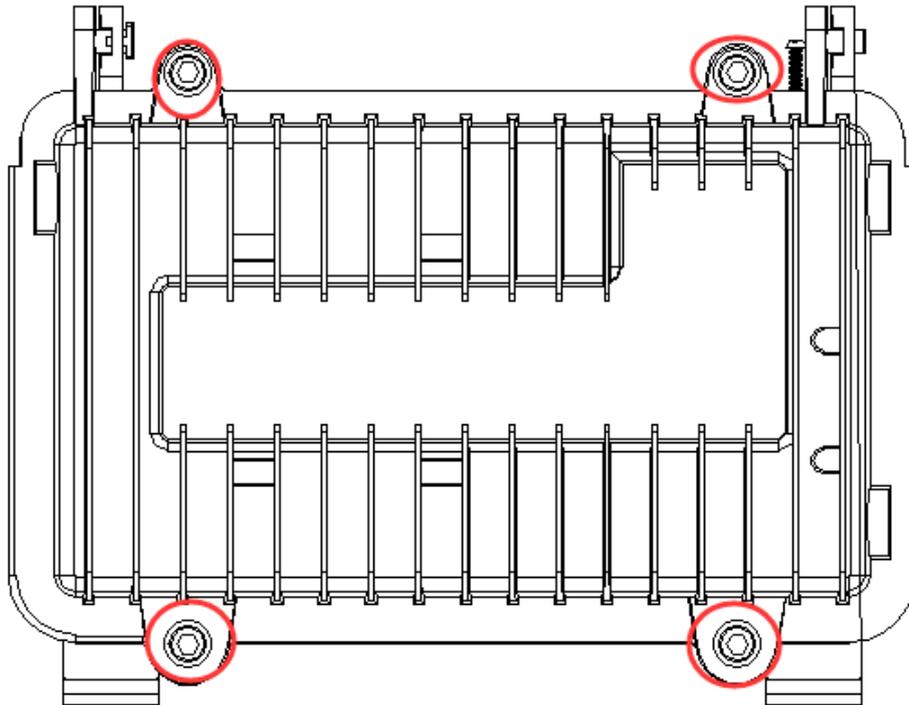
Figure 2-3-1 Unscrew the M6 screws

Figure 2-3-2 Insert SIM/UIM card

2.3.2 Wall-mounted Installation

➢ Step 1: The wall where the gateway is installed must be flat and open-sided, make sure no shield within 5 meters around LoRa antenna. Drill 3 holes of ø14mm diameter, 60 mm depth (swelling screw is about 50mm long) according to the position of the bracket mounting holes, Figure 2-3-3.
(Note: Press the shelf against the wall, mark it, and then punch the hole in the wall.)
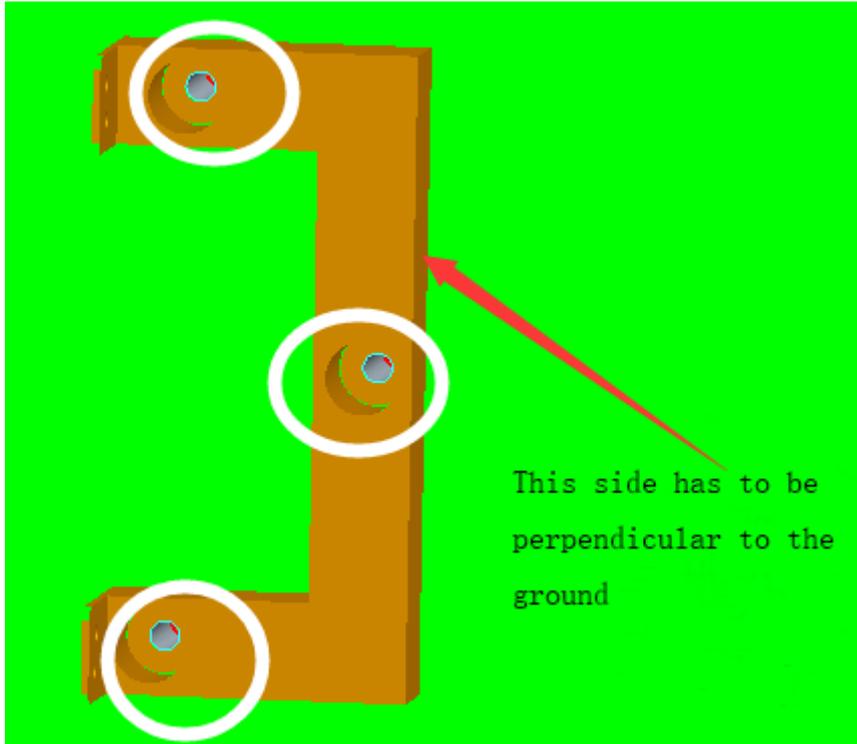
Figure 2-3-3 Hole Location Diagram

➤ Step 2: Fix the swelling screws in the bracket, Figure 2-3-4.
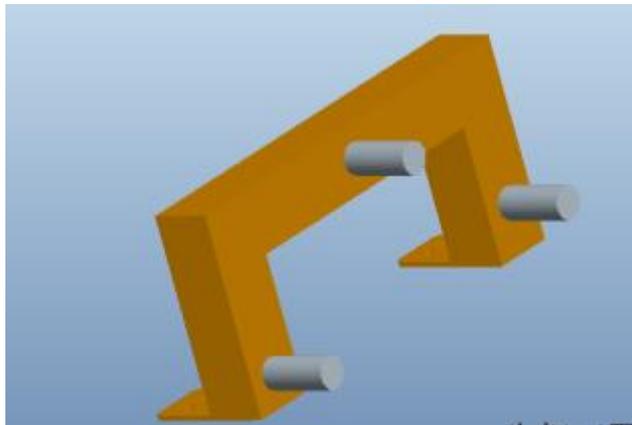
Figure 2-3-4 Swelling Screws Installation Diagram

➤ Step 3: Fix the bracket on the wall and tighten the screw, Figure 2-3-5.
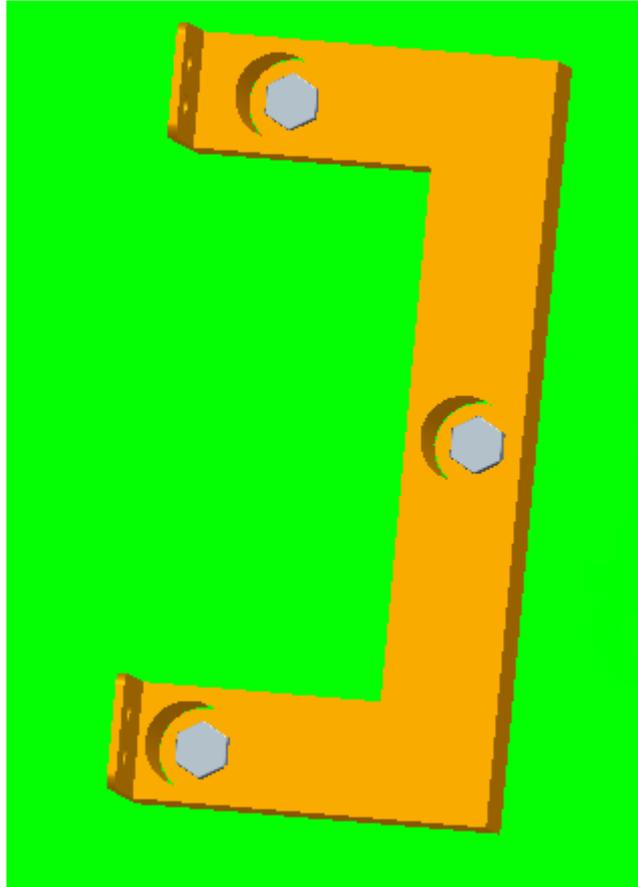
Figure 2-3-5 Bracket Installation Diagram

➢ Step 4: Tighten the four screws and fix the gateway on the bracket, then install the antenna, Figure 2-3-6.
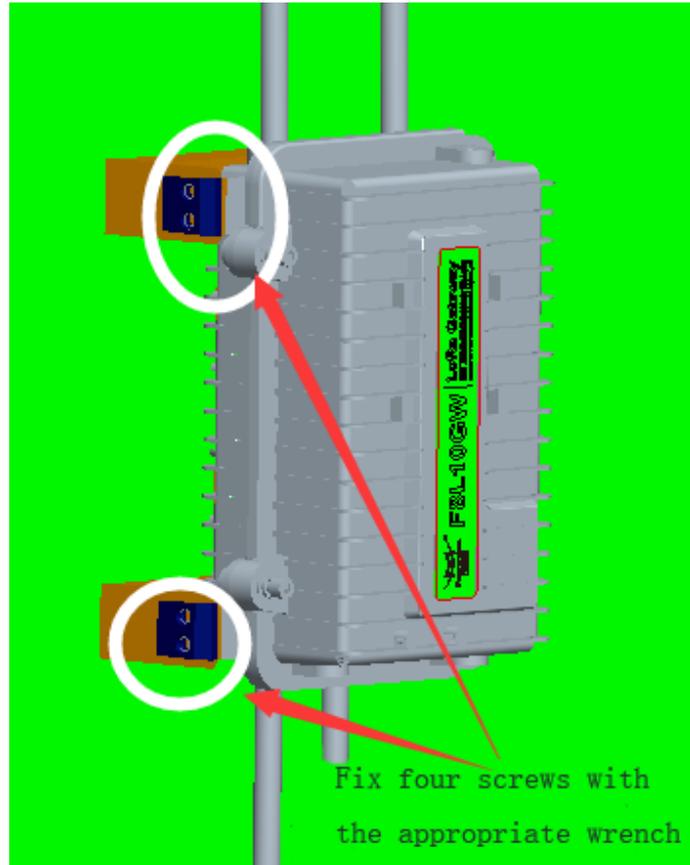
Figure 2-3-6 Fix Four Screws Diagram

2.3.3 Pole-mounted Installation

➢ Step 1: Prepare a pole with 70~90mm diameter, make sure no shield within 5 meters around LoRa antenna.

➢ Step 2: Put the clamp into the pole, fix the clamp in the pole with screws.

Derrick hoop   Hoop screw   Hoop nut

Assembled base station

Use the hoop and screw nut
to fix the box on the pole.
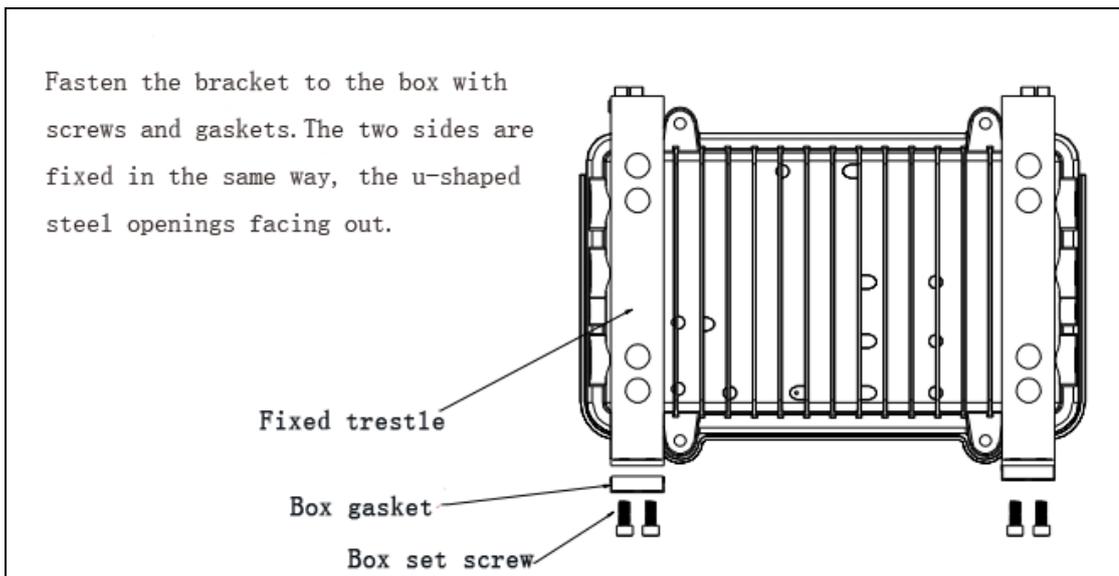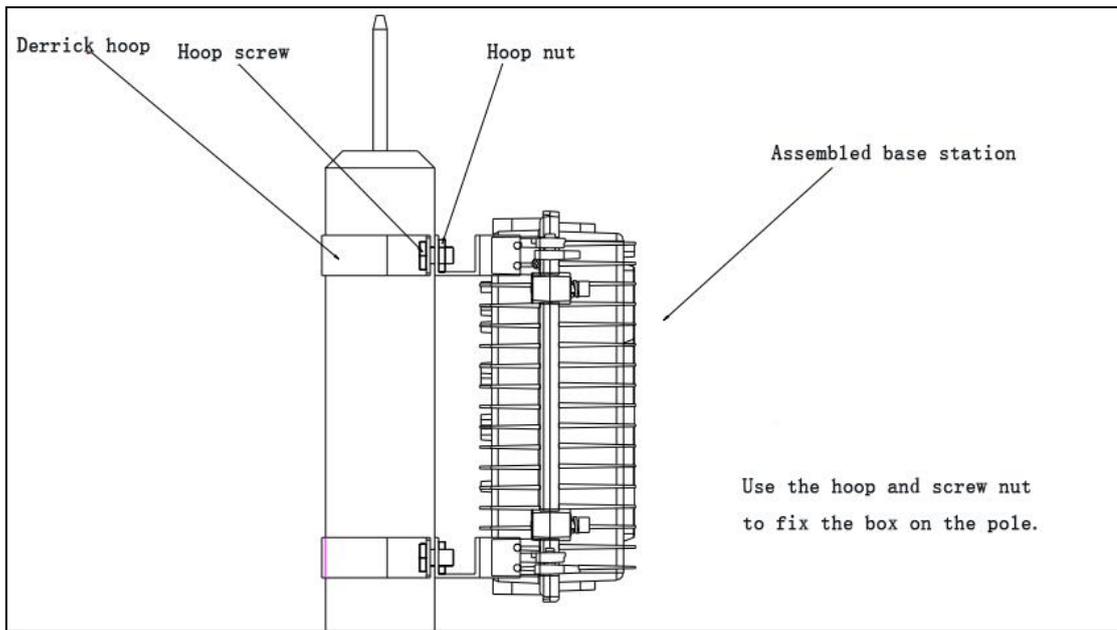
Note: Pole is not included in the product.

2.3.4 Antenna Installation

After gateway is installed on the wall or pole, connect the Matching antennas to the antenna interface.Make sure the antennas are tightened to get best signal. Fig. 2.3.7

Note: Each antenna must install to the right interface and Using a tool to tighten, otherwise the gateway won't work properly and waterproof.
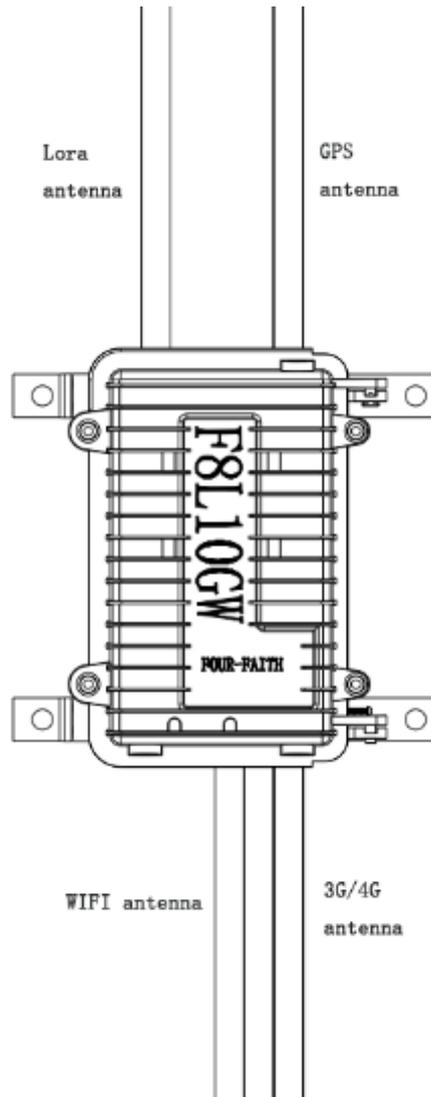
Fig. 2.3.7

2.4 Indicator light description

The F8L10GW offers the following indicators: Power, System, Online, SIM, LoRa, WAN, WIFI, Signal Strength. Status description of each indicator are as below:

Indicator light	Status	Description
PWR	Red light on	Power on
PWR	Red light off	Power off
SYS	Yellow light flash	System work properly
SYS	Yellow light off	System work improperly
WIFI	Blue light on	WIFI on
WIFI	Blue light off	WIFI off
LoRa	Green light on	LoRa normal

	Green light off	LoRa abnormal
	Green light flash	Data Transmitting
3G/4G Signal	Turn on an light	Weak signal strength (less than -90db)
	Turn on two lights	Medium signal strength (-70db~-90db)
	Turn on three lights	Better signal strength (greater than -70db)
Online	Green light off	Online
	Green light on	Offline

Chapter 3 Configuration

3.1 Configuration Connection

Before configuring the F8L10GW, connect the F8L10GW and the PC network cable or WIFI. When connect with network cable, one end is connected to any Ethernet interface of F8L10GW "Local Network" (LAN port), and the other end is connected to the Ethernet interface of PC. When connect with WIFI, the default SSID of F8L10GW is "FOUR-FAITH" without password verification.
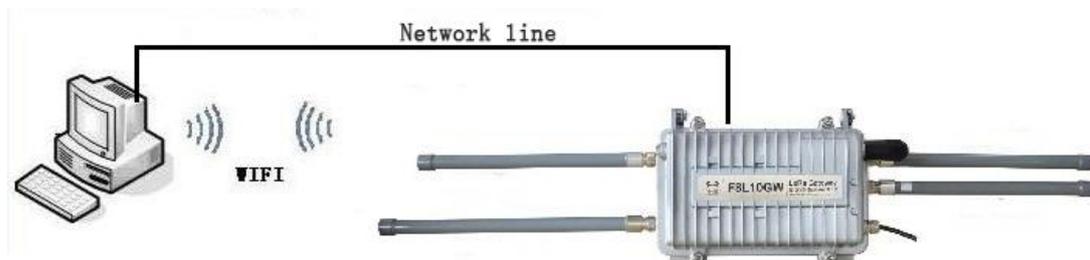
3.2 Access to Configuration Web Page

3.2.1 IP Address Setting

Specify IP address

Set the IP address of PC as 192.168.1.9(or other IP address of 192.168.1 network segment), the subnet mask as 255.255.255.0, and the default gateway as 192.168.1.1.DNS as a locally available DNS server.
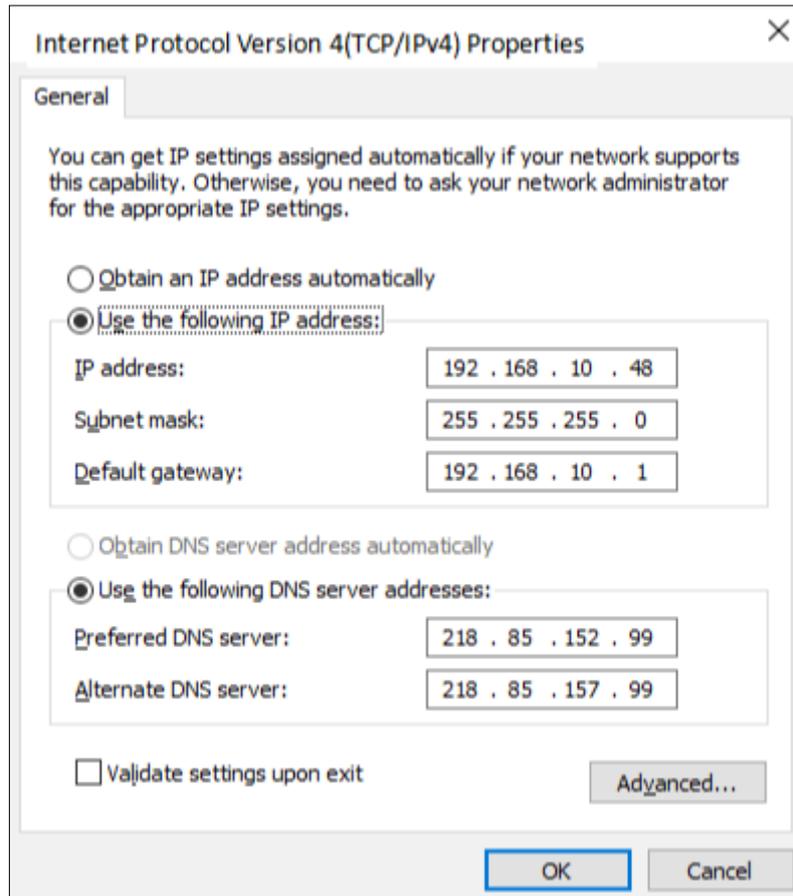
3.2.2 Login configuration web page

This chapter describes the main functions of the relevant pages. Visit the web pages via web browser by the computer connected to F8L10GW. There are 11 main pages: Settings, Wireless, Service, VPN, Security, Access Restrictions, NAT, QoS Settings, Applications, Management and Status. Users enable to browse slave pages by click one main page. This manual introduces the parameters related to F8L10GW, other parameters can be default.

To access F8L10GW web-based Web management tool, enter the default IP address 192.168.1.1 of the F8L10GW in the address bar of browser, press enter. When login the web page in the first time, there will display a page shows as blow to tip users to modify the default user name and password. User can click "Change Password" to modify user name and password if needed.

Your Router is currently not protected and uses an unsafe default username and password combination, please change it using the following dialog!

Router Password

Router Username	admin
Router Password	•••••
Re-enter to confirm	•••••

Change Password

Then access to main page.

Setup	Wireless	Services	VPN	Security	Access Restrictions	NAT	QoS	App	Admin	**Status**

Router Information

Help more...

System

Router Name	Four-Faith
Router Model	Four-Faith Router
Firmware Version	F8L10GW CN470 v1.0 (Jul 10 2018 17:18:52) std - build 3201
MAC Address	54:D0:B4:85:8F:3C
Host Name	
WAN Domain Name	
LAN Domain Name	
Current Time	Not available
Uptime	3 min

Router Name:
This is the specific name for the router, which you set on the *Setup* tab.

MAC Address:
This is the router's MAC Address, as seen by your ISP.

Firmware Version:
This is the router's current firmware.

Current Time:
This is time received from the ntp server set on the *Setup / Basic Setup* tab.

Serial Applications

Status	Disabled

Uptime:
This is a measure of the time the router has been "up" and running.

Memory

Total Available	125224 kB / 131072 kB	96%
Free	100544 kB / 125224 kB	80%
Used	24680 kB / 125224 kB	20%
Buffers	2452 kB / 24680 kB	10%
Cached	8500 kB / 24680 kB	34%

Load Average:
This is given as three numbers that represent the system load during the last one, five, and fifteen minute periods.

Users need to enter user name and password if it is the first time to login.

Authentication required

http://192.168.1.1
Your connection to this site is not private

Username	
Password	

Log in Cancel

Enter username and password to access the web page, default username and password are both "admin". (You can change the username and password on

administration page.) then click "OK".

3.3 Management & Configuration

3.3.1 Connection Setting

Click "Settings" and open first basic setting web page. On this page, change basic settings according to the notices, click "Save" button to change the setting but don't take effect, click "Apply" button to make settings to take effect, or click "Cancel" button to cancel the settings.

Basic Settings:

"WAN Connection Type" setting section describes how to configure F8L10GW to

connect to the Internet. Details on this can be obtained from your ISP.

WAN Connection Type

Select the Internet connection type provided by your ISP from the drop-down menu,

WAN connection type includes 7 modes: Disable, Static IP, Automatic Configuration -

DHCP, PPPOE, 3G/UMTS/4G/LTE and DHCP-4G. The F8L10GW (LAN port only)

provides wired Ethernet connections and DHCP-4G (default) connections.
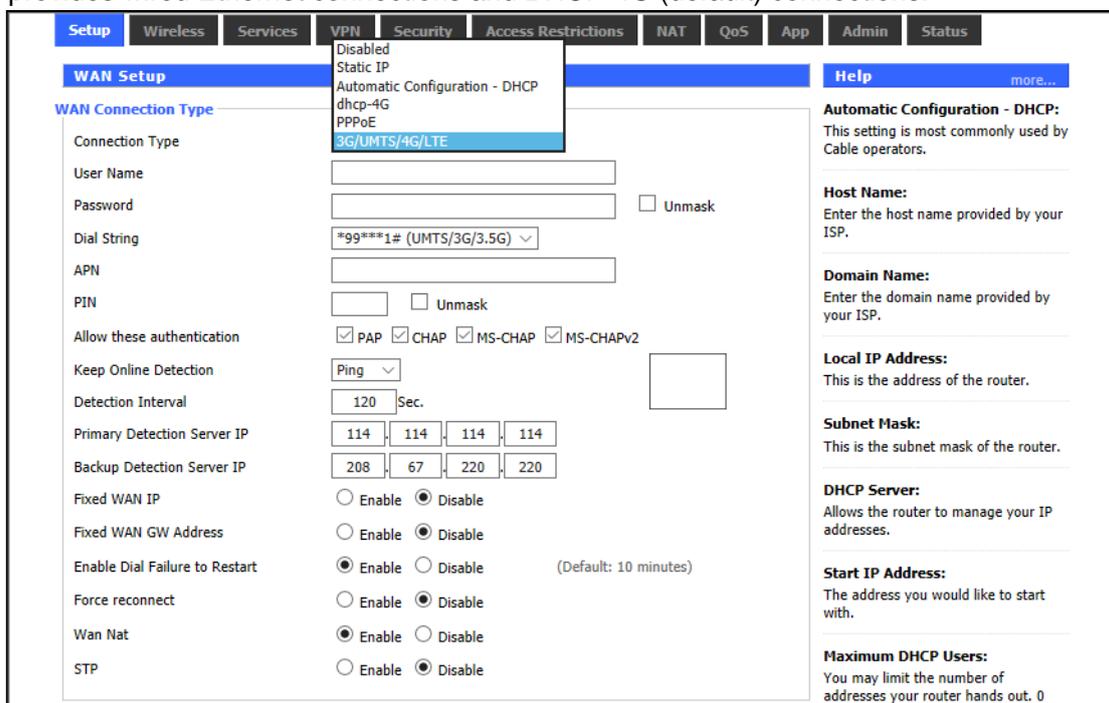
Mode 1: Wired Ethernet connection

In the menu "WAN Settings" - > "WAN Connection Type" - > "Connection Type" select "Disabled", in the menu of "Network Settings" - > "Router IP Configuration" Set IP address of gateway with the same LAN IP.Then Wired Ethernet Connection is finished.

Mode 2: **DHCP-4G**

The IP address of the WAN port is obtained by dhcp-4G

Keep Online
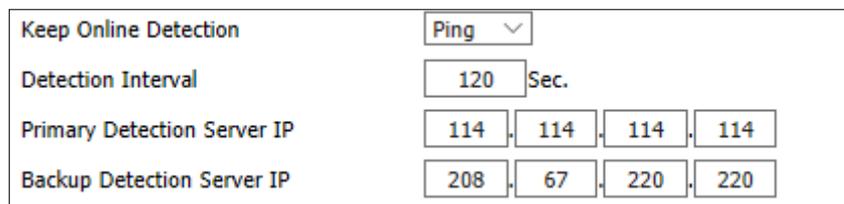
This function is to detect whether the Internet connection is active. If users set it, the F8L10GW will automatically detect the Internet connection. Once gateway detects the link disconnected or invalid, the system will automatically reconnect and re-establish the effective connection. If network is busy or in private network, Router mode is recommended.

Keep Online:

None: disable Keep Online function.

Ping: Send ping packet to detect connection. In this mode, "Detection Interval",

"Primary Detection Server IP" and "Backup Detection Server IP" must be configured correctly.

Route: Detect connection with route method. In this mode, "Detection Interval", "Primary Detection Server IP" and "Backup Detection Server IP" must be configured correctly.

PPP: The PPP mode is to detect connection. In this mode, "Detection Interval" must be configured correctly.

Detection Interval: time interval between two detection, unit is second

Primary Detection Server IP: Primary server IP used to response gateway's detection packet.This item is only valid for "Ping" and "Route".

Backup Detection Server IP: Backup server IP used to response gateway's detection packet. This item is only valid for "Ping" and "Route".

STP

STP	○ Enable ⦿ Disable

STP（Spanning Tree Protocol）can be applied to the loop network, Through certain algorithm achieves path redundancy, and loop network cuts to tree-based network without loop in the meantime, thus to avoid the hyperplasia and infinite circulation of a message in the loop network .

3.3.2 WiFi

WiFi function of F8L10GW gateway/gateway is to provide parameter configuration and online upgrade.

3.3.2.1 Basic Configuration

Enable: Turn on WIFI.

Disable: Turn off WIFI.

Wireless mode: AP, client, ad-hoc, relay and relay bridge are available.

Wireless network mode:

Hybrid: Support wireless devices with 802.11b/g/n standards at the same time

Bg-mix: Support both 802.11b and 802.11g standards wireless devices.

B Only: Only 802.11b standard wireless devices are supported.

G Only: Only 802.11g standard wireless devices are supported.

NG-mix: It supports 802.11g and 802.11n wireless devices.

Only N: Only 802.11n standard wireless devices are supported.

8021.11n transmission mode: When the wireless network mode is "only N", select its transmission modes:

Greenbelt: When sure that no other 802.11a/b/g device in the surrounding environment using the same channel, using this mode or increasing throughput. If there are other 802.11a/b/g devices in the environment that using the same channel, the messages you send can be errors, re-sends, and so on.

Mixture：This model is the opposite of the greenbelt model, but it reduces throughput.

Wireless network name (SSID): The network name Shared by all devices in a wireless network, and the SSID of all devices is the same.SSID consists of Numbers and letters, case - sensitive, no more than 32 characters.

Wireless channels: there are 1-13 channels available. In the environment of multiple wireless devices, please try to avoid using the same channels as other devices.

Channel width: 20MHZ and 40MHZ are available.

Broadband: when the channel is 40MHZ, you can choose upper or lower.

Wireless SSID Broadcast:

Enable: broadcast SSID.

Disable: hide SSID.

Network configuration:

Bridged: the bridge is connected to F8L10GW. In general, select bridged.

Unbridged: when no bridge is connected to F8L10GW, and the IP address needs to be manually configured.

Virtual interface：Click to add a virtual interface, after successfully addition, click to remove the virtual interface.

AP independence: completely isolate all wireless client devices so that they can only access a fixed network with AP connections.

Note: save settings: save your changes, after changing the mode of "wireless", "wireless network model", "wireless width" and "broadband" option, please click on this button, and then configure other options.

3.3.3 LoRa Application

Users can configure the parameters of forwarding function of LoRa gateway according to the requirements.

LoRa Gateway infrastructure configuration:

Enable the failed restart mechanism: when the gateway connection server fails, the restart mechanism will start working.

Server address: the IP address of LoRaWAN data service center

Server upstream port: LoRaWAN data service center program uplink port. The range is 0-65535 and the default value is 1700.

Server downstream port: LoRaWAN data service center program downlink port. The range is 0-65535 and the default value is 1700.

Advanced configuration of LoRa Gateway:

LoRa Gateway ID: the unique identity of the LoRa Gateway, through which the server can distinguish different LoRa Gateway.

CRC validation ok: Turn on/off CRC for validation. Default is on.

CRC validation error: Turn on or off the CRC validation error function. The default is close.

CRC validation disabled: Turn on or off CRC validation. The default is close.

3.3.4 ADMINISTER

3.3.4.1 ADMINISTER

This page allows network administrators to manage specific F8L10GW functions to ensure access and security.

The new password shall not exceed 32 characters in length and shall not contain any spaces. Make sure your password is the same as your new password, or it will fail.

Warning:

The default username: admin.

We strongly recommend that you modify the factory default password, all users trying to access and modify the F8L10GW should use the correct F8L10GW password, thus they can access and use it.

Web Access

This feature allows you to manage F8L10GW using either the HTTP protocol or the HTTPS protocol. If you choose to disable this feature, you will need to reboot manually. You can also activate or disable the F8L10GW information page.

That way you can use a password to protect the page (enter the correct username and password).

Protocols: protocols support web pages include HTTP and HTTPS.

Automatic refresh (second): adjust the time interval for automatic refresh of Web interface. 0 means turn off this feature.

Display system information page before login: whether to enable display system information page before login.

System information page password protection: whether to enable the system information page password protection function.

Web interface management: this feature allows you to manage F8L10GW from a remote location over the Internet. To disable this feature, keep the default Settings. To enable this feature, select enable and remotely manage F8L10GW using the specified port on your computer (default is 8080). If you have not yet set the password, you must set the default password for your own F8L10GW.

For remote management F8L10GW, go to http://xxx.xxx.xxx.xxx:8080 (x represents F8L10GW Internet IP address, 8080 on behalf of the specified port) in your web browser address bar. You will be requested to enter the F8L10GW password.

If you are using HTTPS, you need to specify the URL to https://xxx.xxx.xxx.xxx:8080 (not all firmware support the reconstruction of the SSL)

SSH management: you can enable SSH to secure remote access to F8L10GW.Note that to understand the setup of the SSH daemon, you can access more content on the service page.

Warning:
If the remote F8L10GW access function is enabled, anyone who knows the Internet IP address and password of F8L10GW can change the setting of F8L10GW.

Telnet management: Enable or disable remote Telnet functionality.

Cron：Cron's subsystem is the Linux command you plan to execute. You will need to use the command line or startup script in actual use.

Equipment management: The F8L10GW can be monitored and managed, parameter configuration, WIFI advertising update through the customized remote management server.
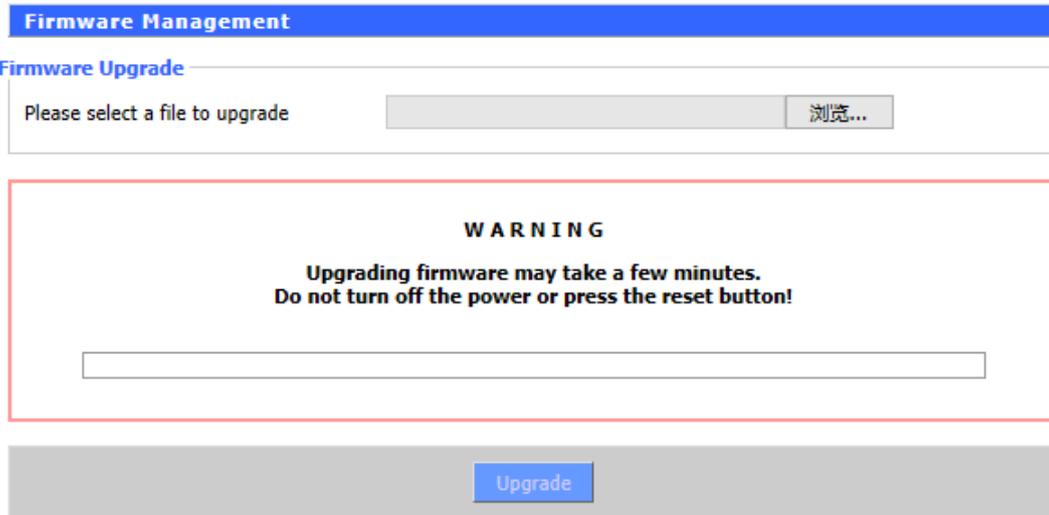
3.3.4.2 The factory default

To clear all configurations and restore to factory default values, click "Yes" button and save. All the Settings will lose when revert to the default Settings. The default configuration for this feature is "No". For more information, click "More".

3.3.4.3 Firmware Upgrade

Firmware upgrade: new firmware can be loaded onto F8L10GW.The new firmware version will be available at www.four-faith.com for free. It is no essential to download the updated firmware version that F8L10GW work, unless there is useful functionality in new version.

Note: Upgrading of F8L10GW firmware may lose the configuration Settings. It is essential to back up the setup information of F8L10GW before upgrading.

After the refresh, reset to: Click "Default Settings" to reset the default Settings of the firmware version of F8L10GW after the upgrade.

Click browse, select the upgrading firmware file, and then click the "Upgrade" button to start. It may take few minutes, please do not turn off the power or press the reset button during this period.

3.3.4.4 Backup

This page is used to back up or restore the F8L10GW configuration file.

To backup the F8L10GW configuration file, click the "Backup" button. After that, follow the instructions on the screen.

To restore the F8L10GW configuration file, click the "Browse" button. After finding the backup file, follow the instructions on the screen. Select the backup file and click the "Restore" button.

3.3.5 State

3.3.5.1 F8L10GW

Server status: connection status to the specified LoRaWAN server.

Mac: Mac address of F8L10GW, LoRaWAN server identification code of different F8L10GW.

GPS status: it is GPS signal status indicator.

Longitude, dimension and altitude are obtained from GPS.

Appendix

The following steps describe how to make F8L10GW Gateway enter configure state with the Windows XP Hyper Terminal.

1. Press "Start"→"Programs"→"Accessories"→"Communications"→"Hyper Terminal".
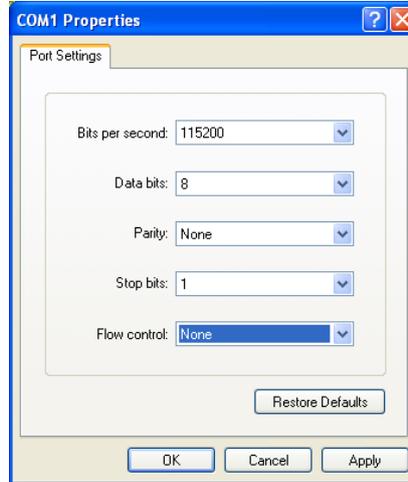
2. Enter the connection name and select "OK".

3. Select the actual physical serial port of PC that is used to connect to the F8L10GW Console port, and select "OK".
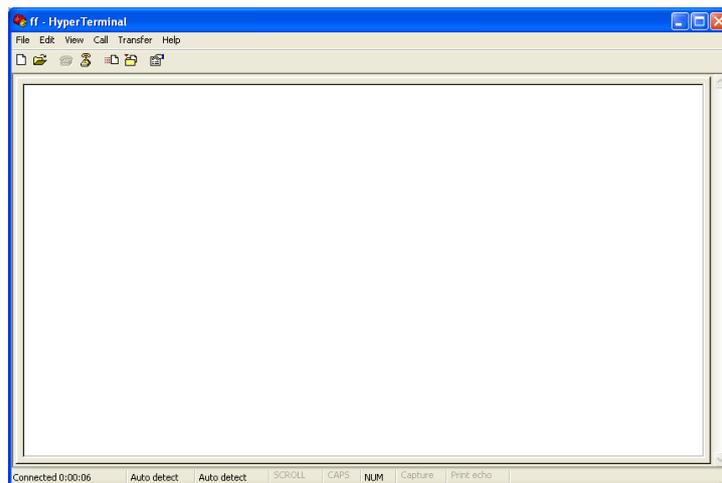

4. Configure the super terminal as shown below and select "OK".

Communication rate: 115200

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Data bit: 8

Parity check: none

Stop bit: 1

Data flow control: none

At this point, the super terminal is running normally.

If you are using win7, you can download a win7 super terminal online. Or other common serial interactive software, the use way is similar.