

MG9310 LoRaWAN Gateway

User Manual

Version: V1.0.0

Date: 2018-4-10

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1. General Description

MG9310 is a ruggedized LoRaWAN gateway , specifically designed for outdoor public or private network deployments. This highly performance IP65 gateway is capable of resisting the harshest environmental factors including moisture, dust ,wind, rain, snow and extreme heat, supporting LoRaWANTM applications in virtually any environment. Integrated with SX1301 LoRa concentrator, with 8 multi-SF LoRa Channels and 1 FSK channel, support thousands of LoRaWAN end devices . provides durable, low-power, wide area connectivity in support of M2M and IoT applications for both LoRa service providers and individual enterprises wanting to expand their LoRa network coverage.

Design for easy deployment , the gateway includes a IP65 enclosure ,GPS antenna to location coordinate information, LoRa antenna to improve outdoor range and provide various communication interface include 3G/4G-LTE and Ethernet to up-link data . can be deployed as part of an existing telecommunications tower, individual stand or wall mount .



2. Features

- ✓ LoRaWAN™ network compliant
- ✓ Channels: Up to 16 concurrent channels
- ✓ Communication Range : Over 15KM radius
- ✓ GNSS for location coordinate information
- ✓ Connectivity : Support Ethernet/3G/4G Lte Wireless communication
- ✓ Number of end nodes: Thousands to millions devices depending on data model
- ✓ Compact size 210*190*60 mm
- ✓ Simple to mount and install
- ✓ Ruggedized housing,IP65 Waterproof for outdoor

Hardware Models

The following table shows the model numbers (or part numbers) and descriptions for the Maxiot LoRa gateway.

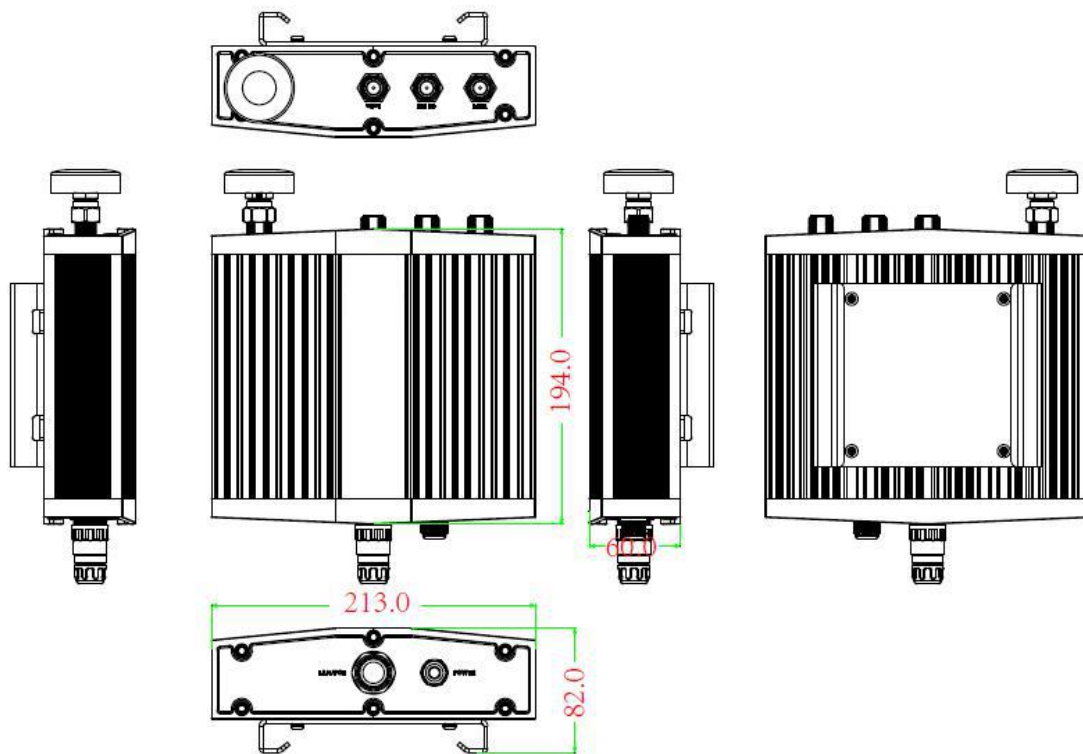
No.	Part No.	Description
1	MG9310-E	863~870MHz,Suitable for Europe, India etc...
2	MG9310-U	902~928MHz, Suitable for America, Australia, Asia, Korea, Japan etc...
3	MG9310-W	433MH, Suitable for Europe
4	MG9310-C	470~510MHz, Suitable for China

3. Interfaces

3.1 Mechanical Diagram

✓ Dimensions: 210 x 193 x 64 mm

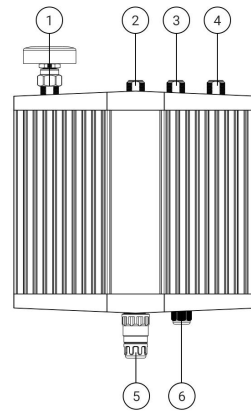
✓ Weight: 2050g



3.2 Gateway connectors

The following figure shows the LoRa gateway connectors on the bottom and top panels.

- 1 Active GPS antenna N-type connector
- 2 LoRa antenna N-Type connector
- 3 4G LTE antenna N-Type connector
- 4 WIFI antenna N-Type connector
- 5 LAN PoE In Port
- 6 DC Power In



3.3 internal Interface



No.	Interface	Description	Remark
1	SIM card slot	3G/4G SIM card slot	
2	Reset button	Reset system	

4. Hardware Description

HARDWARE:

- CPU: 560MHz, AR9344
- RAM: DDR2, 128Mb
- FLASH: SPI Flash 16M
- CPU Temperature sensor
- Hardware watchdog

POWER:

CONNECTIVITY

- Ethernet 100 Base *2
- UART for debug terminal
- LED indication
- Secured VPN, no need of external IP-address
- LoRaWAN™ compliant (433~510MHz or 863~928MHz , Opt)
- **LoRa™ Sensitivity -142.5dBm, 8 LoRa™ demodulators**

- PoE IEEE 802.3af Class A, 24V
- DC Power In 12~24V
- Average. power consumption: 5W

ENVIROMENT:

- Ingress protection IP65
- UV and Impact resistance

MOUNTING OPTIONS:

- Strand mount/box/wall mount

- More than 15km in LoS and 3km in dense urban environment
- External GPS ,WIFI and 4G LTE antennas
- Antenna lightning protection

GENERAL INFORMATION:

- Dimensions: 210 x 193 x 64 mm
- Operating temperature: -40 °C/ +80 °C
- Storage temperature: -40 °C/ +125 °C
- Weight: : 2.05KG

5. Gateway config

5.1 Connection

5.1.1 Wifi Connection

To do this you must connect the gateway to the PoE adapter.

WIFI SSID : Maxiiot

Password : kirinlora

5.1.2 Ethernet connection

Insert a PoE cable into PoE port, insert LAN cable into WIFI router.



5.2 View gateway information using Google Chrome:

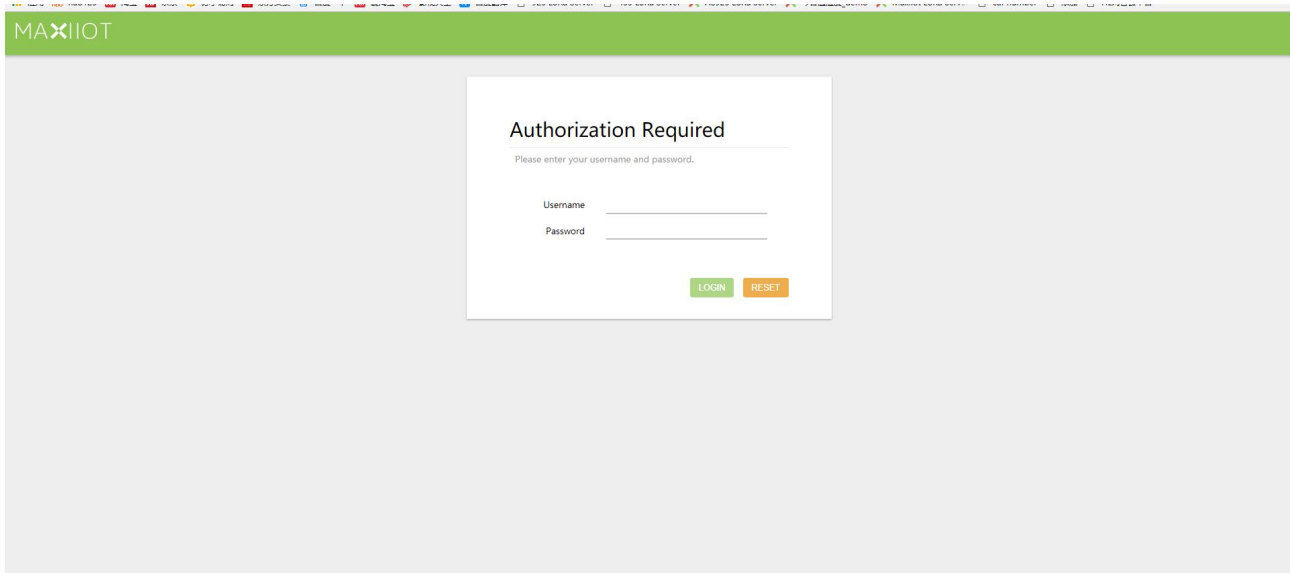
A. Google Chrome - Advanced - continue to 113.108.88.121

B. Local LAN : Go to <http://192.168.15.1>

Log in with your username and password

Username : admin

Password : Admin17



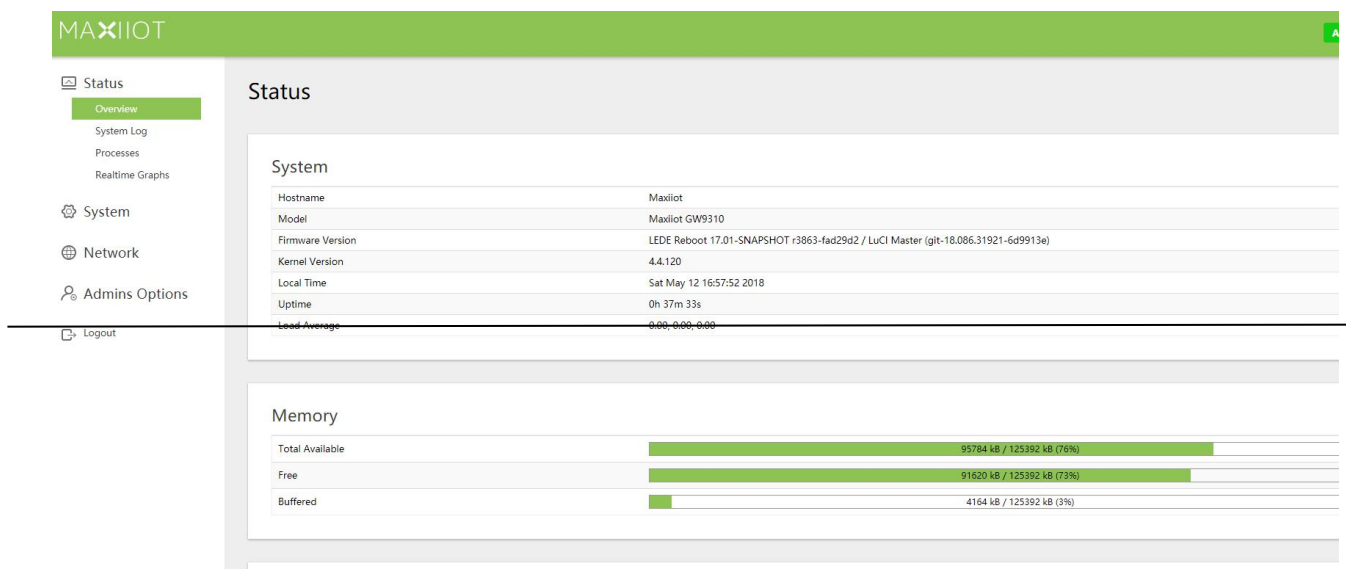
The image shows the MAXIIOT web interface's login page. It features a green header with the MAXIIOT logo. In the center, there is a white box titled "Authorization Required" with the instruction "Please enter your username and password." Below this, there are input fields for "Username" and "Password", followed by "LOGIN" and "RESET" buttons.

C. Remote control: <http://113.108.88.121:8888/10120> (10120 is the remote port number corresponding to the gateway)

Account number: amdin Password: Admin17

5.3 Status Tab

- Status → overview , view basic information of gateway



The image displays the MAXIIOT web interface's "Status" tab, specifically the "Overview" section. The left sidebar contains navigation links: Status, Overview (selected), System Log, Processes, Realtime Graphs, System, Network, Admins Options, and Logout. The main content area is titled "Status" and is divided into two sections: "System" and "Memory".

System Information:

Hostname	Maxilot
Model	Maxilot GW9310
Firmware Version	LEDE Reboot 17.01-SNAPSHOT r3863-fad29d2 / LuCI Master (git-18.086.31921-6d9913e)
Kernel Version	4.4.120
Local Time	Sat May 12 16:57:52 2018
Uptime	0h 37m 33s
Load Average	0.00, 0.00, 0.00

Memory Usage:

Total Available	95784 kB / 125392 kB (76%)
Free	91620 kB / 125392 kB (73%)
Buffered	4164 kB / 125392 kB (3%)

- Status——>System log, view system log

MAXIIOT

Status

Overview

System Log

Processes

Realtime Graphs

System

Network

Admins Options

Logout

System Log

```

Sat May 12 16:40:03 2018 local2 info chat[2424]: abort on (ERROR)
Sat May 12 16:40:03 2018 local2 info chat[2424]: abort on (NO DIALTONE)
Sat May 12 16:40:03 2018 local2 info chat[2424]: abort on (NO CARRIER)
Sat May 12 16:40:03 2018 local2 info chat[2424]: send (ATM)
Sat May 12 16:40:03 2018 local2 info chat[2424]: expect (OK)
Sat May 12 16:40:18 2018 local2 info chat[2424]: alarm
Sat May 12 16:40:18 2018 local2 info chat[2424]: Failed
Sat May 12 16:40:18 2018 daemon.err pppd[2422]: Connect script failed
Sat May 12 16:40:19 2018 daemon.info pppd[2422]: Exit.
Sat May 12 16:40:19 2018 daemon.notice netifd: Interface 'wan6' is now down
Sat May 12 16:40:19 2018 daemon.notice netifd: Interface 'wan6' is setting up now
Sat May 12 16:40:19 2018 daemon.notice pppd[2788]: pppd 2.4.7 started by root, uid 0
Sat May 12 16:40:20 2018 local2 info chat[2818]: timeout set to 15 seconds
Sat May 12 16:40:20 2018 local2 info chat[2818]: abort on (DELAYED)
Sat May 12 16:40:20 2018 local2 info chat[2818]: abort on (BUSY)
Sat May 12 16:40:20 2018 local2 info chat[2818]: abort on (ERROR)
Sat May 12 16:40:20 2018 local2 info chat[2818]: abort on (NO DIALTONE)
Sat May 12 16:40:20 2018 local2 info chat[2818]: abort on (NO CARRIER)
Sat May 12 16:40:20 2018 local2 info chat[2818]: send (ATM)
Sat May 12 16:40:21 2018 local2 info chat[2818]: expect (OK)
Sat May 12 16:40:36 2018 local2 info chat[2818]: alarm
Sat May 12 16:40:36 2018 local2 info chat[2818]: Failed
Sat May 12 16:40:36 2018 daemon.err pppd[2788]: Connect script failed
Sat May 12 16:40:37 2018 daemon.info pppd[2788]: Exit.
Sat May 12 16:40:37 2018 daemon.notice netifd: Interface 'wan6' is now down
Sat May 12 16:40:37 2018 daemon.notice netifd: Interface 'wan6' is setting up now
Sat May 12 16:40:37 2018 daemon.notice pppd[2839]: pppd 2.4.7 started by root, uid 0
Sat May 12 16:40:38 2018 local2 info chat[2841]: timeout set to 15 seconds
Sat May 12 16:40:38 2018 local2 info chat[2841]: abort on (DELAYED)
Sat May 12 16:40:38 2018 local2 info chat[2841]: abort on (BUSY)
Sat May 12 16:40:38 2018 local2 info chat[2841]: abort on (ERROR)
Sat May 12 16:40:38 2018 local2 info chat[2841]: abort on (NO DIALTONE)
Sat May 12 16:40:38 2018 local2 info chat[2841]: abort on (NO CARRIER)
Sat May 12 16:40:38 2018 local2 info chat[2841]: send (ATM)
Sat May 12 16:40:38 2018 local2 info chat[2841]: expect (OK)
Sat May 12 16:40:47 2018 daemon.info hostapd: wlan0: STA a0:c5:89:58:79:ab WPA: group key handshake completed (WPA)
Sat May 12 16:40:53 2018 local2 info chat[2841]: alarm
Sat May 12 16:40:53 2018 local2 info chat[2841]: Failed
Sat May 12 16:40:53 2018 daemon.err pppd[2839]: Connect script failed
Sat May 12 16:40:54 2018 daemon.info pppd[2839]: Exit.
Sat May 12 16:40:54 2018 daemon.notice netifd: Interface 'wan6' is now down
Sat May 12 16:40:54 2018 daemon.notice netifd: Interface 'wan6' is setting up now

```

- Status——>Processes , View system processes(Pls don' t modify)

MAXIIOT

Status

Overview

System Log

Processes

Realtime Graphs

System

Network

Admins Options

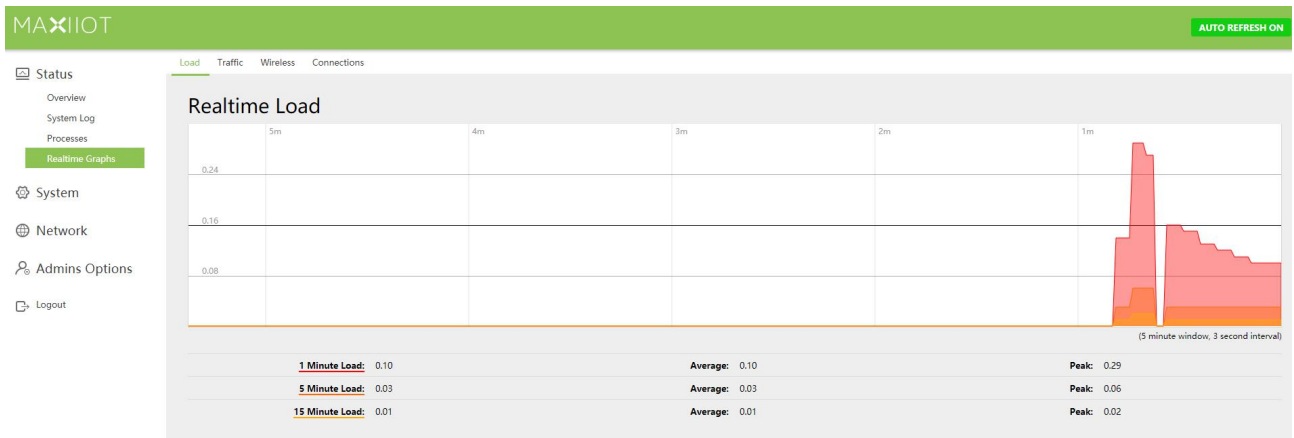
Logout

Processes

This list gives an overview over currently running system processes and their status.

PID	Owner	Command	CPU usage (%)	Memory usage (%)	Hang Up	Terminate	Kill
1	root	/sbin/procd	0%	2%	HANG UP	TERMINATE	KILL
2	root	[kthreadd]	0%	0%	HANG UP	TERMINATE	KILL
3	root	[ksortirq/0]	0%	0%	HANG UP	TERMINATE	KILL
5	root	[kworker/0:0H]	0%	0%	HANG UP	TERMINATE	KILL
34	root	[kworker/u2:2]	0%	0%	HANG UP	TERMINATE	KILL
67	root	[writeback]	0%	0%	HANG UP	TERMINATE	KILL
68	root	[crypto]	0%	0%	HANG UP	TERMINATE	KILL
70	root	[blosel]	0%	0%	HANG UP	TERMINATE	KILL
71	root	[kblockd]	0%	0%	HANG UP	TERMINATE	KILL
98	root	[kworker/0:1]	0%	0%	HANG UP	TERMINATE	KILL
105	root	[kswapd0]	0%	0%	HANG UP	TERMINATE	KILL
155	root	[fsnotify_mark]	0%	0%	HANG UP	TERMINATE	KILL
164	root	[sp0]	0%	0%	HANG UP	TERMINATE	KILL
181	root	[dmccue1]	0%	0%	HANG UP	TERMINATE	KILL

- Status——>Real-time Graphs



5.4 System

System Properties

General Settings | Logging | Language and Style

Local Time	Sat May 12 17:06:12 2018	SYNC WITH BROWSER
Hostname	Maxiiot	
Timezone	Asia/Shanghai	

Time Synchronization

Enable NTP client ☒

Provide NTP server ☐

NTP server candidates

s1a.time.edu.cn	X
s1b.time.edu.cn	X
s1c.time.edu.cn	X
s1d.time.edu.cn	+

5.5 Network Settings

- Network——>Interfaces, View the current connection mode/port of gateway (Automatic identification)

MAXIOT AUTO REFRESH ON

WAN WANG LAN

Interfaces

Interface Overview

Network	Status	Actions
LAN Master "Maxiot"	Uptime: 0h 47m 43s MAC-Address: C6:17:21:00:05:45 RX: 11.34 MB (107932 Pkts.) TX: 192.57 MB (154437 Pkts.) IPv4: 192.168.15.1/24 IPv6: fdfd:b3a:1a9e::1/60	CONNECT STOP EDIT DELETE
WAN eth0.1	Uptime: 0h 47m 45s MAC-Address: C6:17:21:00:05:47 RX: 176.44 MB (176389 Pkts.) TX: 10.96 MB (104903 Pkts.) IPv4: 192.168.181.103/24	CONNECT STOP EDIT DELETE
WAN6 3g-wan6	RX: 0 B (0 Pkts.) TX: 0 B (0 Pkts.)	CONNECT STOP EDIT DELETE

[ADD NEW INTERFACE](#)

Global network options

IPv6 ULA Prefix: fdfd:b3a:1a9e::/48

- Network —> Interfaces —> WAN, Configure LTE connection manually

✓ Switch Protocol to : DHCP client

MAXIOT AUTO REFRESH ON

WAN WANG LAN

Interfaces - WAN

On this page you can configure the network interfaces. You can bridge several interfaces by ticking the "bridge interfaces" field and enter the names of several network interfaces separated by spaces. You can also use [VLAN](#) notation `INTERFACE.VLANID` (e.g.: `eth0.1`).

Common Configuration

General Setup Advanced Settings Physical Settings Firewall Settings

Status Uptime: 1h 9m 43s
MAC-Address: C6:17:21:00:05:47
RX: 195.94 MB (206089 Pkts.)
TX: 15.33 MB (121813 Pkts.)
IPv4: 192.168.181.103/24

Protocol **DHCP client**

Hostname to send when requesting DHCP: Maxiot

[BACK TO OVERVIEW](#) [SAVE & APPLY](#) [SAVE](#) [RESET](#)

✓ Select : eth0.1 (WAN)

MAXIOT AUTO REFRESH ON

WAN WANG LAN

Interfaces - WAN

On this page you can configure the network interfaces. You can bridge several interfaces by ticking the "bridge interfaces" field and enter the names of several network interfaces separated by spaces. You can also use [VLAN](#) notation `INTERFACE.VLANID` (e.g.: `eth0.1`).

Common Configuration

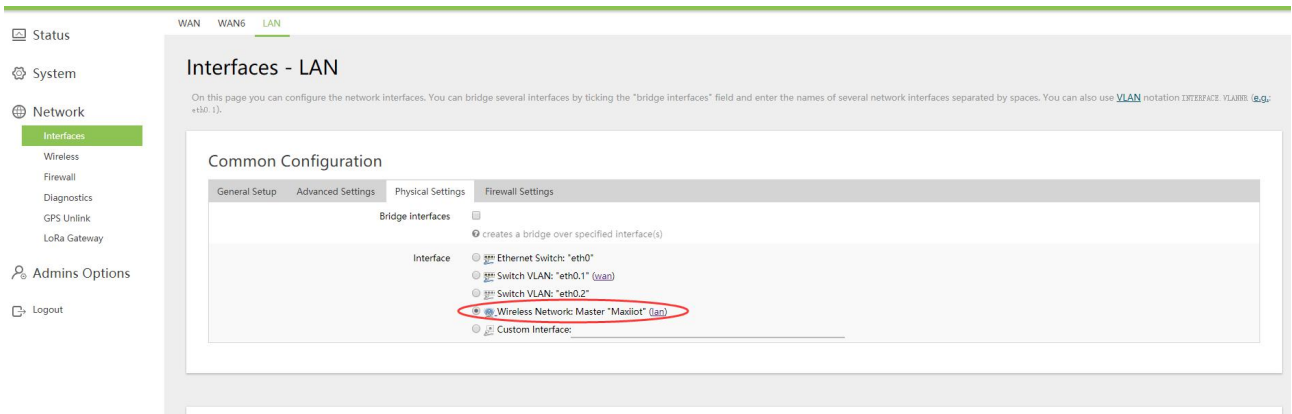
General Setup Advanced Settings Physical Settings Firewall Settings

Bridge interfaces ☐

Interface

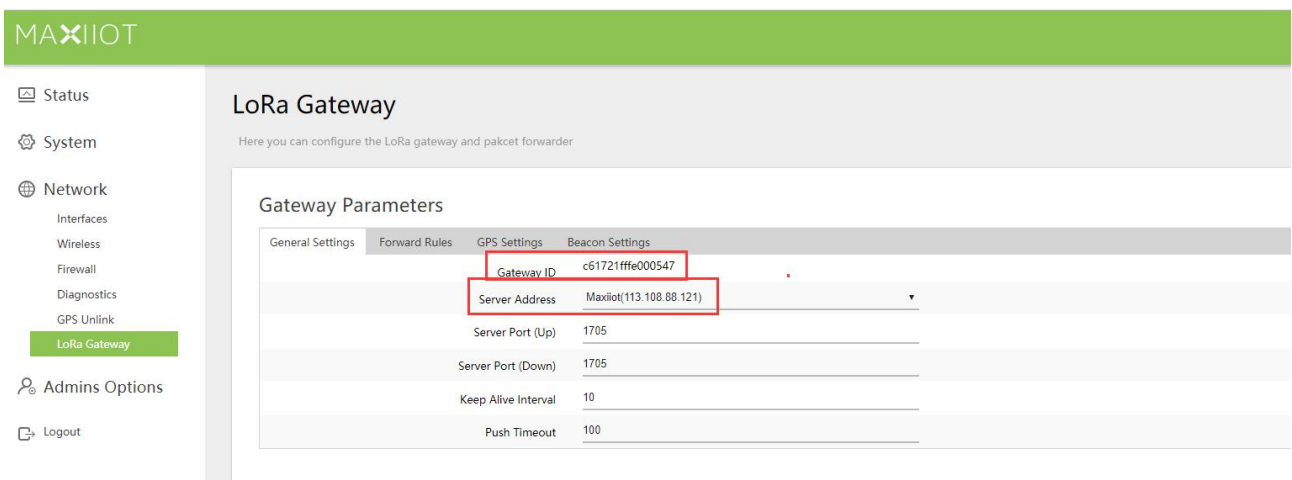
- ☐ Ethernet Switch: "eth0"
- ☒ Switch VLAN: "eth0.1" (wan)
- ☐ Switch VLAN: "eth0.2"
- ☐ Wireless Network Master "Maxiot" (lan)
- ☐ Custom Interface:

- Network —> Interfaces —> LAN



- Network——>LoRa Gateway, Parameter Settings.

✓ View Gateway ID and Server Address (Address can be modified)



✓ SX1301 Parameters , Select the corresponding frequency

SX1301 Parameters

LoRaWAN is public	True
Clock Source	From radio_1
Antenne Gain	0
Enable Reset Pin ?	<input type="checkbox"/>
Configuration Mode	Simple
Frequency Plan	United States 915MHz

- Radio Parameters config

MAXIIOT

Status

System

Network

Interfaces

Wireless

Firewall

Diagnostics

GPS Unlink

LoRa Gateway

Admins Options

Logout

Radio Parameters

RADIO_0

Enable	True
Type	SX1257
Frequency	902500000
	Hz
RSSI Offset	-166.0
	dB
Tx Enable	True
Tx Notch Frequency	129000
	[135, 250] KHz
Minimum Tx Frequency	923000000
	Hz
Maximum Tx Frequency	928000000
	Hz

RADIO_1

Enable	True
Type	SX1257
Frequency	903300000
	Hz
RSSI Offset	-166.0
	dB
Tx Enable	False

6. Gateway installation

6.1 Mounting options

There are four mounting options available:

- ✓ Pole mount-rooftop or tower
- ✓ Strand mount
- ✓ Box/wall mount
- ✓ Removable wall mount

6.2 Optional hardware

Depending on what you ordered, the following optional LoRa gateway hardware may be part of your shipment:

- ✓ Wall/pole mount kit (AIR-ACC1530-PMK1=)
- ✓ DC-IN power adapter jack plug (PLG-PWRJCK=)
- ✓ mPCIe 4G module,4G antenna

6.3 Installation Guide

Because the Wireless Gateway for LoRaWAN is a radio device, it is susceptible to common causes of interference that can reduce throughput and range.

6.3.1 Powering the gateway up

The gateway will automatically turn on after inserting a PoE cable into the RJ45 connector.

6.3.2 Insert SIM Card(if use 3G/4G backhaul)

You could follow the next steps to install SIM card in your Gateway .

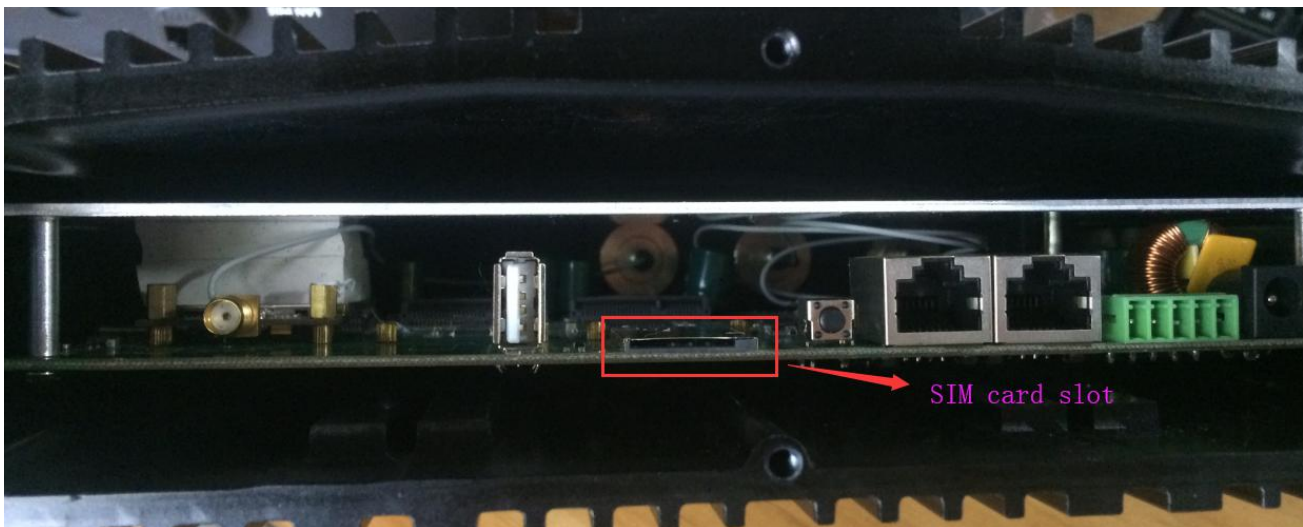
Step 1. Turn off the gateway

Step 2. Remove the screws on back cover of GW and remove the cover

Step 3. Insert SIM card (SIM card size is big)

Step 4. Close the cover

Step 5. Turn on the gateway



6.3.3 Mounting

Warning!

- ✓ If you prepare Ethernet cable first, do not forget the rubber protective cover
- ✓ Prepare Ethernet connection and mounting place before installation
- ✓ Select mounting point wisely

Check installation point:

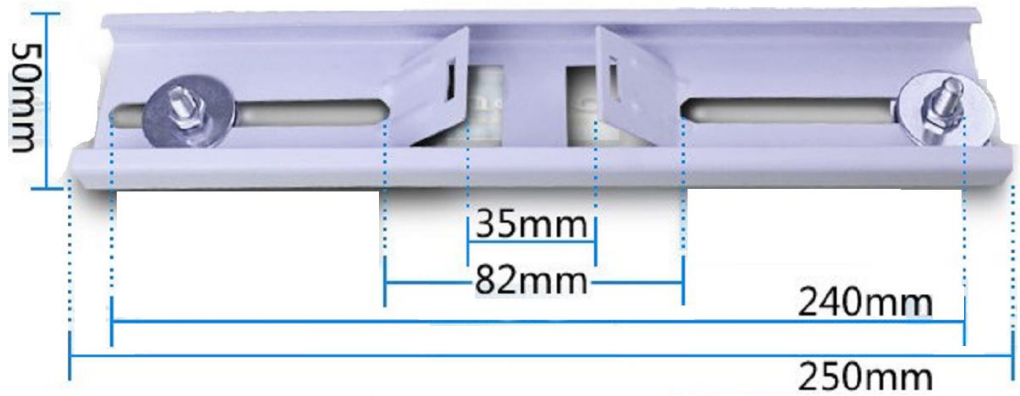
- ✓ Antenna should be installed on top of the building/tower. There should not be any buildings or other obstacles which restricts the antenna's field of view. Good examples are tall, standalone buildings.
- ✓ Antennas should be mounted on top of a pole, otherwise, antenna will be shadowed by the pole.
- ✓ If mounting pole is used to hold other equipment, this equipment should be mounted under the antenna.
- ✓ These objects should be as far away as possible from the mounted antenna:
 - big, heavy construction made from metal

- vertical constructions with a large surface area made from concrete or metal (ex. wall or roof)

Mounting pole should be made of metal and should be grounded.

6.4 Pole mount

Pole mount bracket :



Step1: Pass the hoop through bracket socket.

Step2: Use 4 mounting screws PM5 * 6 and pad M5 * 20 * 1.5mm to fix the pole mounting bracket on the gateway and tighten it.

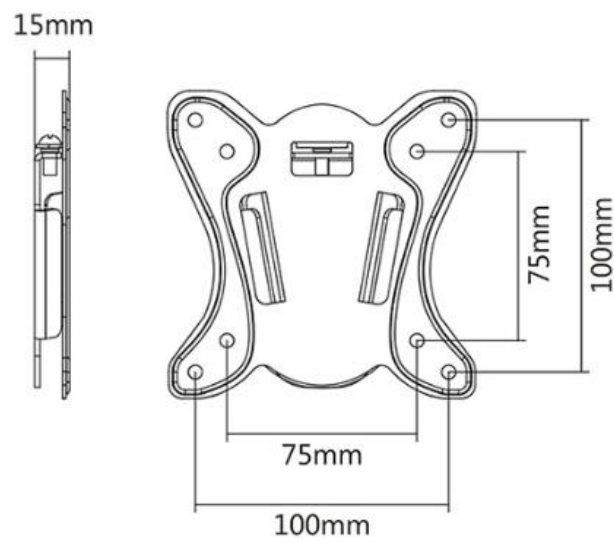


Step3: Fix the gateway to a pole with the pole mount brackets.



6.5.Wall Mount

VESA Wall mount bracket :



Step1: Use a impact drill to drill holes on the wall, insert expansion screws, fix the main bracket on the wall.



Step2: Take out the VESA accessory bracket. Use M5 fine-grained screws to fix the bracket on the gateway



Step3: Snap the the gateway into the main bracket.

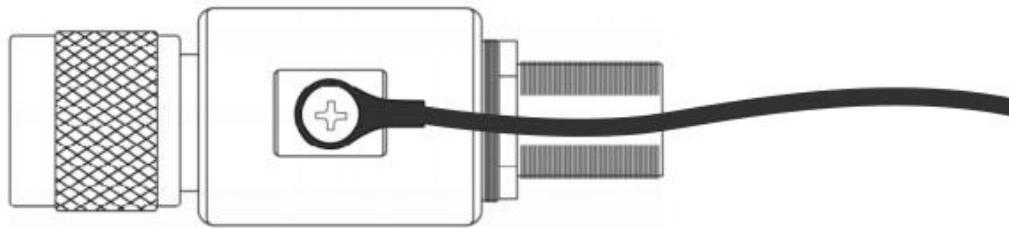


6.6 Lightning arrester installation

Before installing the LoRa antenna, install the lightning arrester at the LoRa antenna connector.



Cut off a piece of ground wire and twist it tightly at the lightning protection connector. The other end of the ground wire is connected to the lightning protection network.



6.7 Gateway

Antenna options

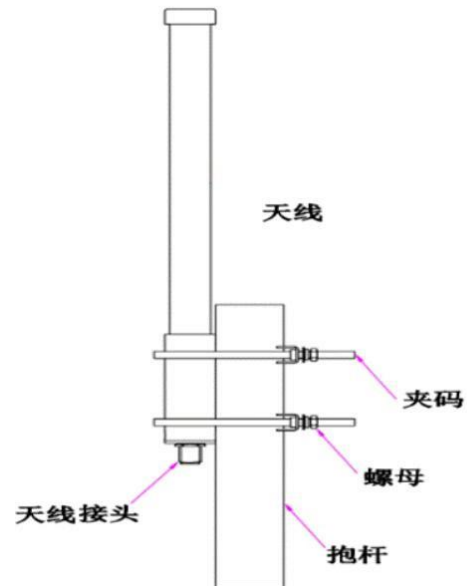
Standard accessories: 2.4G WIFI antenna , LoRa Antenna,POE cod.

Antenna Type	Frequency	Connector	Gain	VSWR	Remark
WIFI	2.4GHz	N-Type	5dBi omnidirectional antenna	<1.5	FCC/CE certificated
Active GPS	1575.42Mhz	N-Type	Antenna 3.5dB amplifier>28dB	<2.0	Voltage:3V/5V FCC/CE certificated
4G	900/1800/ 2100/2700Mhz	N-Type	4dBi	<1.8	FCC/CE certificated
LORA	480MhZ	N-Type	8dBi		FCC/CE certificated

(1) Install standard WIFI , LoRa and 4G antenna.



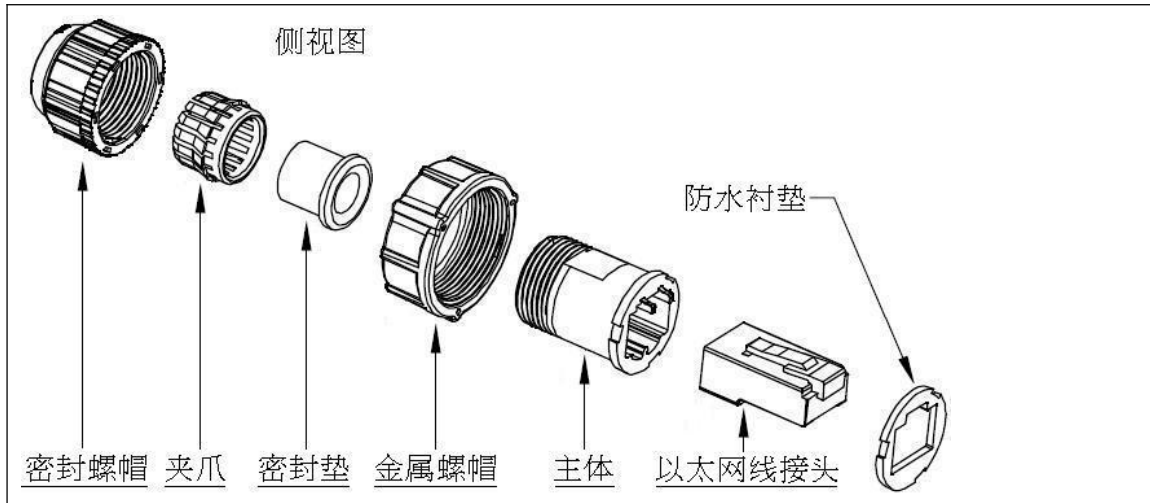
(2) In some cases, in order to obtain a better gain, customers will use a customize high-performance LoRa antenna. Clients need to connect the LoRa antenna to gateway through the N-Type antenna extension cable, fix the antenna to a pole via an antenna bracket.



6.8 Power supply and waterproof treatment

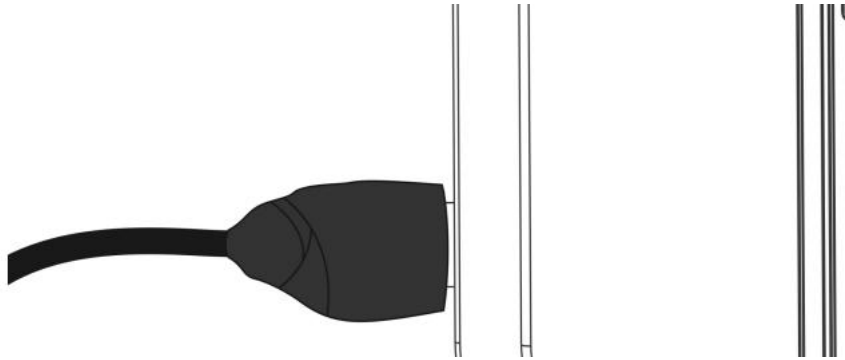
1. Power supply through POE port.

<p>①Put the metal nut into the waterproof joint</p> <p>螺帽</p>	<p>②Slide the gasket into the jaws</p> <p>夹爪 密封垫</p>	<p>③Pass the Ethernet cable through the waterproof connector</p> <p>RJ-45 网线 密封螺帽</p>
<p>④Press Ethernet cable crystal head</p> <p>压制以太网线接头</p>	<p>⑤connect the Ethernet cable to LAN port and lock the sealing nut.</p> <p>以太网线接头 lock the sealing nut.</p>	<p>⑥Pass the waterproof gasket through the Ethernet connector and fix it</p> <p>防水衬垫</p>
<p>各部位零件说明</p> <p>以太网线接头</p> <p>密封螺帽 夹爪 密封垫 金属螺帽 主体 防水衬垫</p>		



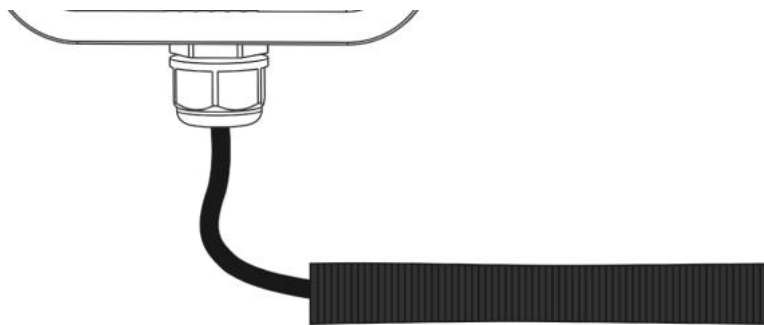
2. Waterproof

All exposed metal parts connecting the device and the antenna are wrapped with waterproof tape, and the wrapped part is wrapped again with electrical tape.



※ In this process, please avoid loosening the power feeder;

Put the POE network cable into a waterproof sleeve to protect the power supply cable from water.



Warning

※ Power feeder bend must be greater than 90°

※ It is forbidden to supply power to the base station when the gateway antenna is not connected or is not properly connected.


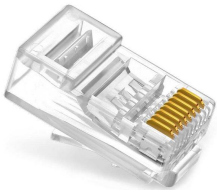




※ When bundling the wires, do not tie them too tightly, which will affect the cable life and transmission

performance

- ✘ Make sure the external power supply matches the power supply of the gateway.
- ✘ Make sure that the gateway is completely fixed and will not move or fall
- ✘ Make sure that the power cord is in good connection and meets the safety requirements

7. Packing list

No.	Picture	Item	QTY	Remark
1		MG9310 Gateway	1	
2		POE adapter	1	CN/EU/US versions
3		Ethernet cable	1	For debug
4		LoRa antenna	1	
5		4G antenna	1	optional
6		WIFI antenna	1	
7		Pole mount bracket	2	optional
8		loops bracket	2	Optional

9		Wall mount bracket	1 (set)	Optional
10		Ethernet cable crystal head	2	
11		Mounting screw:PM5*6 , Screw pad M5*20*1.5mm	8 (sets)	
12		antenna bracket	1 (set)	Optional
13		N-type Lightning arrester	1	
14		N_Type Antenna extension cable , 50cm	1	
15		User manual	1	
16		Warranty card	1	