GDO51x

Multi-channel Outdoor gateway of LoRaWAN

User Guide

ManThink Technology Co., Ltd.

Introduction

- This guide aims to provide users with detailed operational guidelines for the LoRaWAN outdoor gateway-GD051x series, helping you correctly install, configure, and use the gateway device.

- When using this manual, you can read according to your actual needs. If you only need to quickly configure the gateway, please refer to the ManThink official website: https://www.manthink.cn

- Thank you for choosing ManThink products, and we hope this user manual can provide you with the necessary help and support. If you have any comments, suggestions, or feedback, please feel free to contact us.

- The images in this document are for reference only, and the actual product appearance shall prevail.

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1. Product Introduction

1.1. Product Overview

The GD051x is a high-performance outdoor multi-channel gateway designed by ManThink for LoRaWAN systems. It is suitable for low-power network construction in cities, factories, parks, and other environments, as well as data collection and transmission in harsh environments such as deserts, grasslands, and Gobi. With strong processing capabilities and a flexible secondary development environment, it can also play an important role in emerging technologies such as edge computing, AI, and big data.

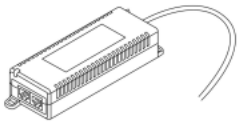
1.2. Product Features

- IP67 protection level
- Supports POE and Type-C power supply
- Supports 4G, WiFi, and Ethernet
- 8 frequency bands
- 16 channels
- Supports US902, AU915, AS923, EU868, EU433, and CN470 LoRaWAN standards
- External SIM card and debugging interface for easy maintenance and repair
- Seamless connection to TTN, ChirpStack, and Basicstation LoRaWAN NetServers
- Supports remote maintenance and upgrade
- Web-based visualization and user-friendly configuration

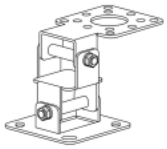
2. Gateway Components

2.1. Accessories List

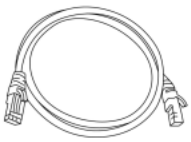
Gateway ×1



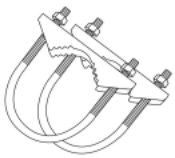
POE Power Supply ×1



Backplate×1



Network Cable ×1



Pole Clamp ×2

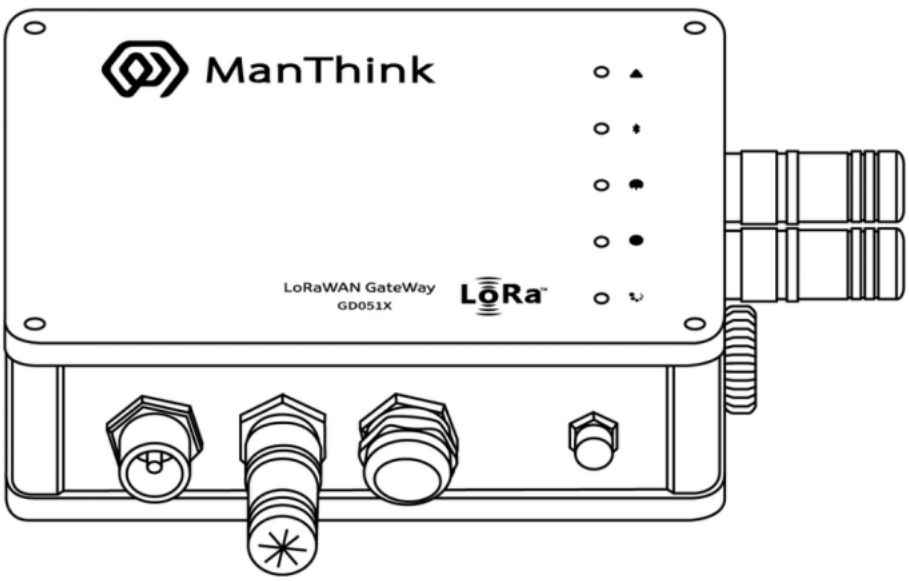
Fiberglass Antenna ×1

Screws×4

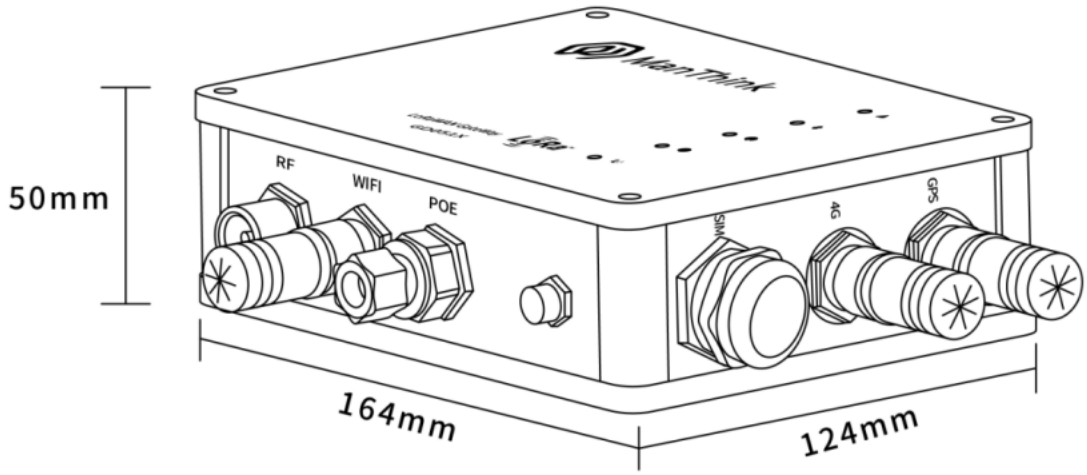
Certificate & Warranty Card ×1

User Guide ×1

2.2. Main part of gateway



2.2.1. Product Dimensions



2.2.2.Interface Description

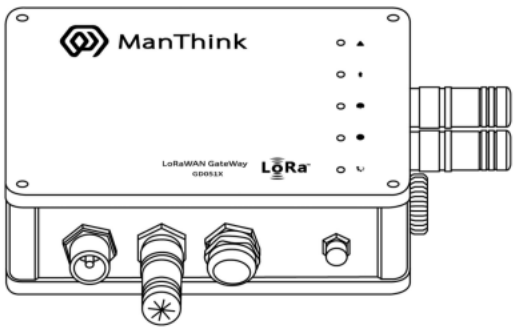
Interface Name	Description
RF	LoRa Antenna Interface
WIFI	WIFI Antenna Interface
POE	POE Power Interface
SIM	SIM Card Slot
4G	4G Antenna Interface
GPS	GPS Antenna Interface

2.2.3.Indicator Light Description

Indicator	Function	Status		Description
	Running Indicator	Steady On		System starting up
		Off		System running normally, entering process startup phase
		Flashing at 1Hz		System running normally
	Network Indicator	Red (Wired Network Status)	Flashing at 1Hz	Network connection normal
			Flashing at 500ms	Network connection abnormal
			Fast Flashing	Gateway does not have 4G module installed
		Blue (4G Network)	Off	Gateway does not have 4G module installed
			Steady On	Gateway has 4G module installed but no SIM card inserted
			Irregular Flashing	Gateway is performing data interaction
	LoRa Data Transceiver Indicator	Red	Flashing	Gateway is sending a data packet
		Blue	Flashing	Gateway is receiving a data packet
	LAN Status Light	Red		System control
		Blue		WiFi connection status
	Fault Indicator	Fast Flashing		Second phase of startup process
		Off		No fault
		Flashing		Fault

3. Gateway Installation and Fixing

3.1. Installation Direction



Note： The front view of the product is as shown above. The GPS and 4G antenna interfaces are on the right, and the WiFi antenna interface is on the bottom. During installation, please ensure the product direction is consistent with the above diagram for correct installation.

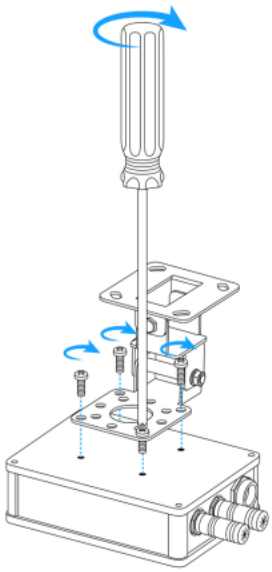
3.2. Gateway Installation

Note： Do not disassemble the gateway housing during installation.

3.2.1. Backplate Installation

·Flip the gateway to the direction shown in the diagram, ensuring the backplate is tightly connected to the gateway.

·Align the screws with the screw holes and use a screwdriver to tighten them clockwise until they cannot be turned further.

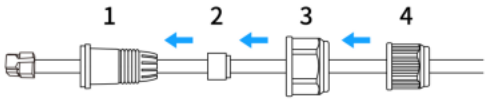


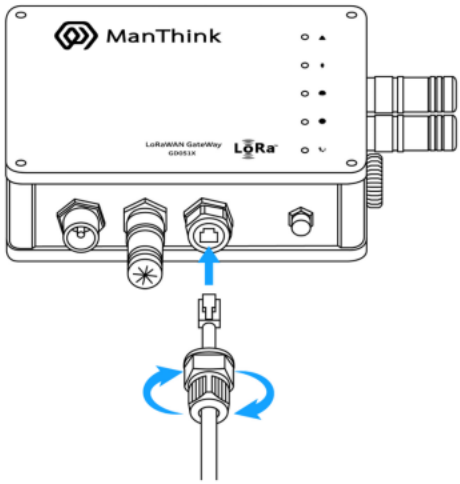
3.2.2.Network Cable Installation

·Pass the waterproof plug through the network cable in the order from right to left, and tightly assemble parts 1, 2, 3, and 4.

·Insert the RJ45 connector of the network cable into the POE interface of the gateway.

·Move the assembled waterproof plug towards the RJ45 connector and screw it onto the POE interface, ensuring a tight connection.



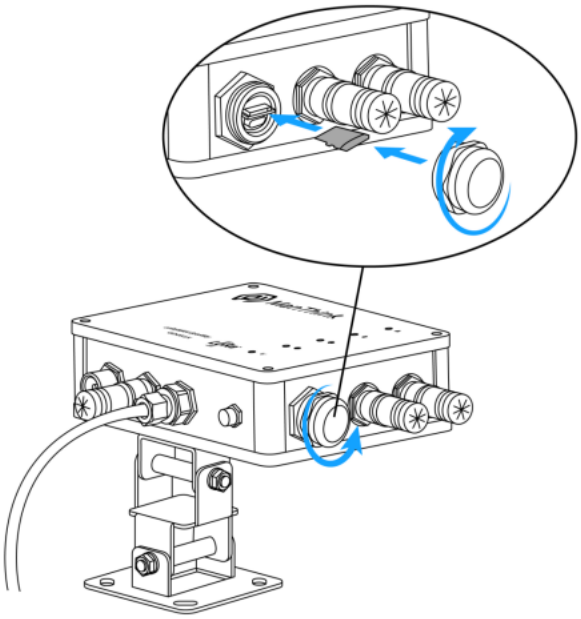


3.2.3. SIM Card Installation

·Unscrew the waterproof cover of the SIM interface.

·Keep the metal contact side of the SIM card facing the TYPE-C interface.

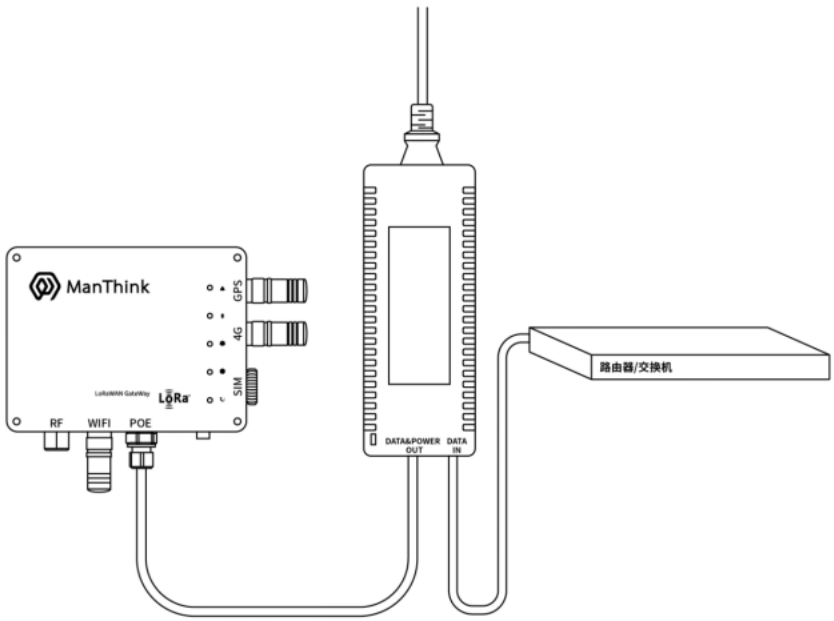
·Insert the SIM card into the slot and tighten the waterproof cover.



3.2.4. Power Connection

·OUT □ Connect to the gateway POE interface (power supply).

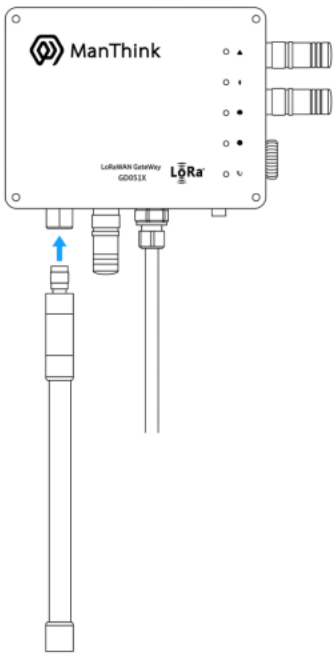
·IN □ Connect to a switch or router (network supply). If using 4G, there is no need to connect the IN interface.



3.2.5.Fiberglass Antenna Installation

·Connect the LoRa antenna to the RF interface of the gateway.

Note: This step is required when selecting a LoRa antenna.



3.2.6.Gateway Fixing

3.2.6.1.Wall Mounting

·Install the gateway with the front side facing up (as shown in Figure 1).

·Drill four holes in the wall corresponding to the backplate bracket holes, then insert expansion bolts (you can mark the positions of the four holes on the wall first).

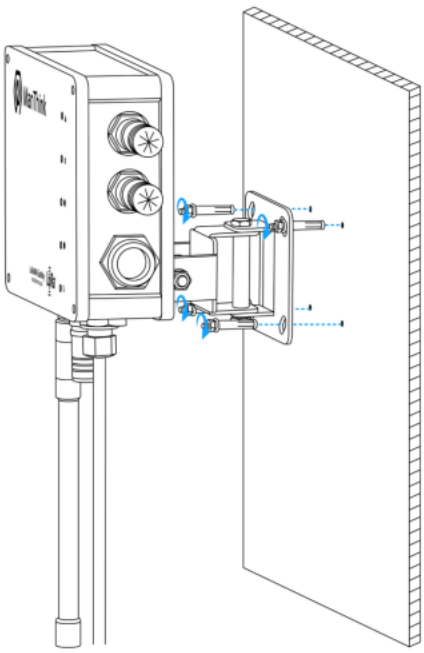
·Pass the expansion screws through the backplate bracket and tighten them with tools.

3.2.6.2.Pole Mounting

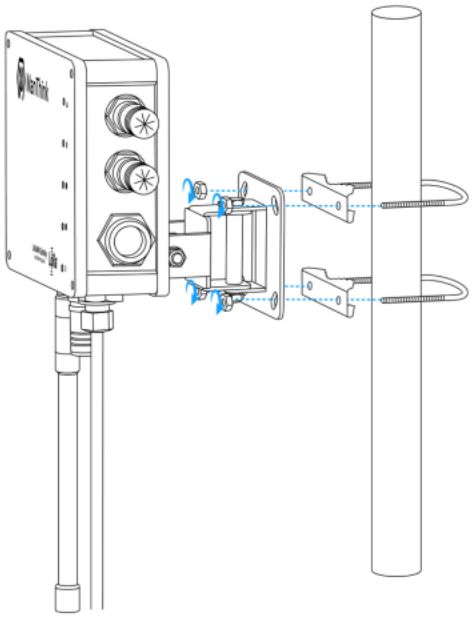
·Install the gateway with the front side facing up (as shown in Figure 2).

·Ensure the pole diameter is between 30mm-52mm.

·Assemble the pole clamps as shown in the diagram and tighten the screws.



(Figure 1: Wall Mounting)



(Figure 2: Pole Mounting)

4.Precautions

4.1.Waterproof Protection

- Use insulating tape or waterproof materials to wrap and seal the connections to ensure they are protected from moisture and water ingress.
- Pay special attention to areas prone to water ingress, such as outdoor installations or places exposed to rain or high humidity.
- Wrap the insulating tape tightly around the connections, fully covering them to form a waterproof barrier.
- Regularly check the waterproofing and reapply or replace the insulating tape as needed to maintain effective protection.
- Ensure all connections and cables are properly sealed and protected to prevent water damage and maintain installation integrity.

4.2. Gateway Waterproofing

- Ensure all cable entry points and connectors on the gateway are properly sealed according to the installation steps.
- Pay special attention to areas where water may enter, such as cable connections, antenna interfaces, and power input ports.
- Apply a layer of waterproof material around cable entry points and connectors, fully covering them to prevent water ingress.
- Regularly check the waterproofing and reapply or replace the waterproof material as needed to maintain effective protection.

4.3. POE Adapter Waterproof Installation

- Choose a suitable location to install the POE adapter, ensuring it is away from direct water sources or areas prone to splashing.
- Install the POE adapter vertically with the connection ports facing downward to prevent water ingress.
- Use waterproof materials such as insulating tape or waterproof enclosures to cover and seal the POE adapter connections.
- Pay attention to cable entry points and ensure they are properly sealed to prevent water ingress.
- Regularly check the waterproof measures and reapply or replace any damaged or aged materials.

Please note that waterproof requirements may vary depending on specific environments and installation conditions. To ensure effective waterproofing, follow best practices and consult professionals when necessary.

5. Gateway Configuration

5.1. Device Connection

5.1.1.Connecting Gateway WiFi with PC

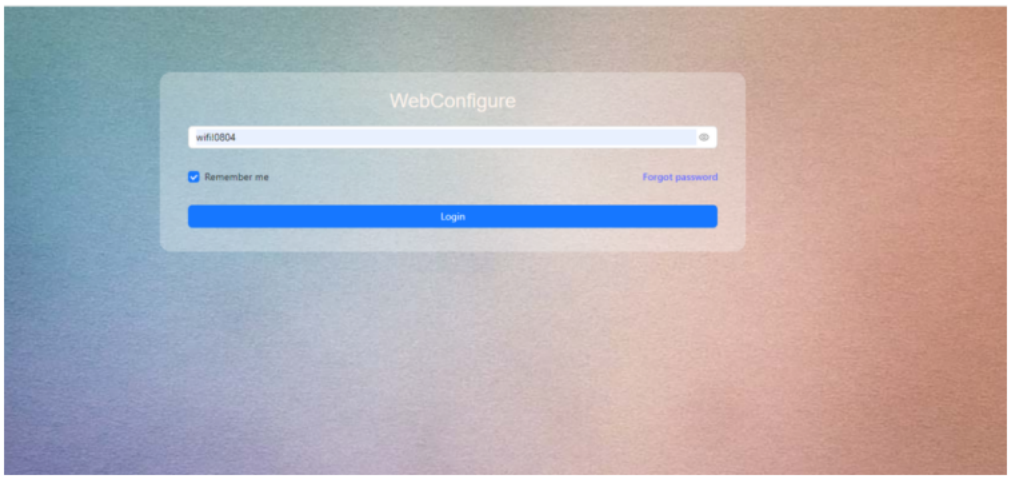
1)Connect the gateway to the power supply. Once the gateway is operational, the WiFi will automatically turn on.

2)The gateway WiFi name is the gateway's DEVEUI (found on the side or back label of the gateway), e.g., "GD0518-b10000000000129". The default WiFi password is "wifi10804". (As shown below)

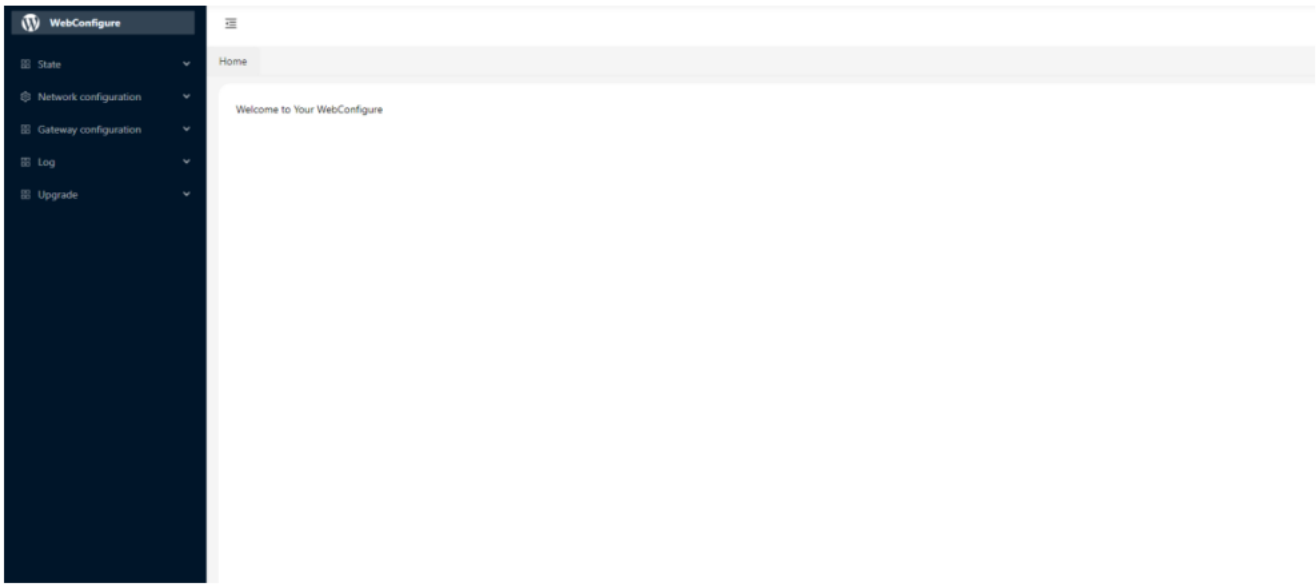
5.1.2. Logging into WebConfigure

1)Access via browser: 192.158.1.1

2)Default login password: "wifi10804"



3)The page displaying "Welcome to Your WebConfigure" indicates a successful login.

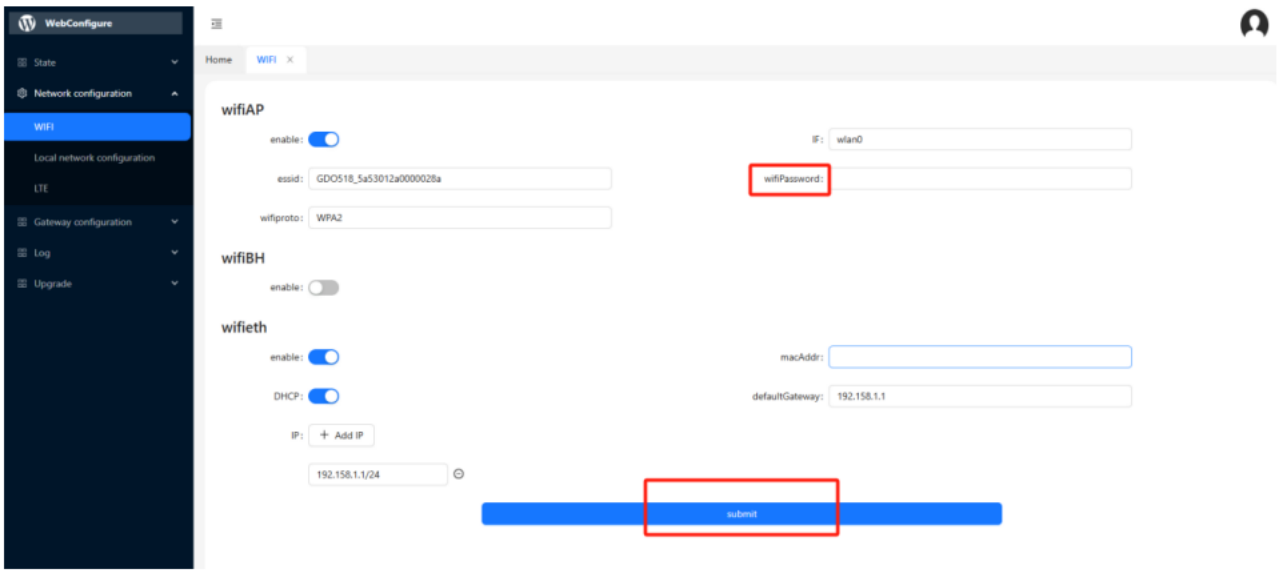


5.1.3. WebConfigure Login Password Modification

1) After logging in, it is recommended to change the default password.

2) Go to Network configuration → WiFi → wifiPassword → Click submit.

3) Use the new password for future logins.



5.2. Configuration Function Overview

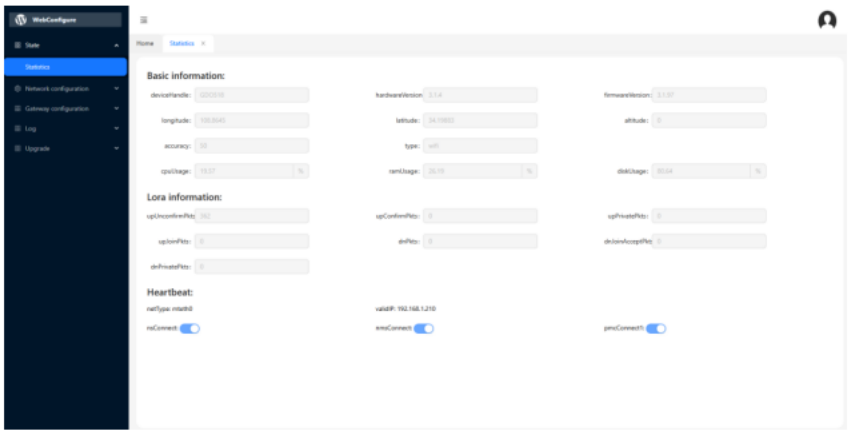
Primary Menu	Secondary Menu	Function Description	Notes	
State	Real-time Operation Status, Data Status	Statistics	Displays basic information during gateway operation: basic information, LoRa-related information, heartbeat information, and connection status with the Server.	
Network Configuration	Network Connection Parameters Configuration	WiFi	Enable/disable WiFi, configure WiFi AP ESSID, WiFi password, etc.	
		Local Network Configuration	Configure parameters when the device is connected to a wired network: DHCP, IP address, default gateway, port number, etc.	Commonly used
		LTE	Usually does not require manual configuration.	
Gateway Configuration	Gateway Device Parameters Configuration	LoRaWAN Server	Configure LoRaWAN Server connection information: protocol, IP address (or domain name), uplink port number, downlink port number.	Commonly used

		Basic Information	Gateway basic information, no configuration required.	
		Frequency Configuration	frequency points of the LoRa section of the gateway must match the frequency points of the Node device for normal communication between the two parties.	Critical
		Professional Configuration	Usually does not require manual configuration.	
		Backup & Restore	Backup and restore configuration files.	
Log	View Logs	Run Log	Used to browse and query partial logs during gateway operation.	
Upgrade		Upgrade Package	Upgrade gateway firmware through this function.	

5.3. Detailed Configuration Functions

5.3.1. State: Real-time Display of Gateway Operation Status and Data Status

5.3.1.1. Statistics



Basic Information: Gateway model, hardware version, firmware version, GPS address, hardware usage rate, etc.

LoRa Information: Statistics of various types of data.

Heartbeat: Gateway network connection method, IP address, server connection status, etc.

5.3.2. Network configuration：Configuring Gateway Network Connection Parameters

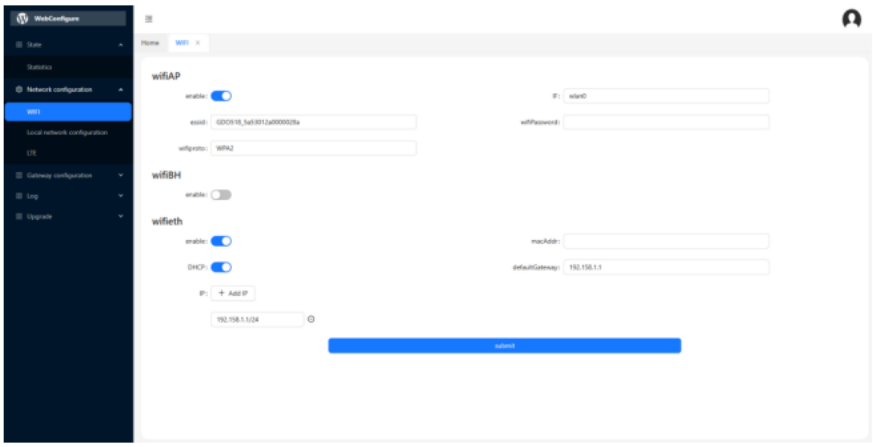
5.3.2.1. WIFI

Enable/disable WiFi, configure WiFi AP ESSID, WiFi password, etc. Usually, these parameters do not need to be configured and can be left as default.

wifiAP: When the gateway is in AP mode, select this function. This function allows configuration via WiFi connection.

wifiBH: When using WiFi as the uplink channel for the gateway, select this function. Once enabled, WiFi will not support config functions.

wifieth: Use WiFi as a network router to share the network with other devices.



5.3.2.2. Local network configuration

- **mteth:** Configure wired network parameters.

  enable: Enable/disable.

  macAddr: Network card hardware address.

  DHCP: Enable to request an IP address from the network via DHCP.

  IP: Set a fixed IP address.

  DNS: Domain Name System.

- **netCheck:** Configure network monitoring function. When enabled, the gateway will monitor the network status in real-time. If the current network is disconnected, the gateway will automatically try other connection methods.

  enable: Enable/disable network monitoring function.

  mode: Enter "ping".

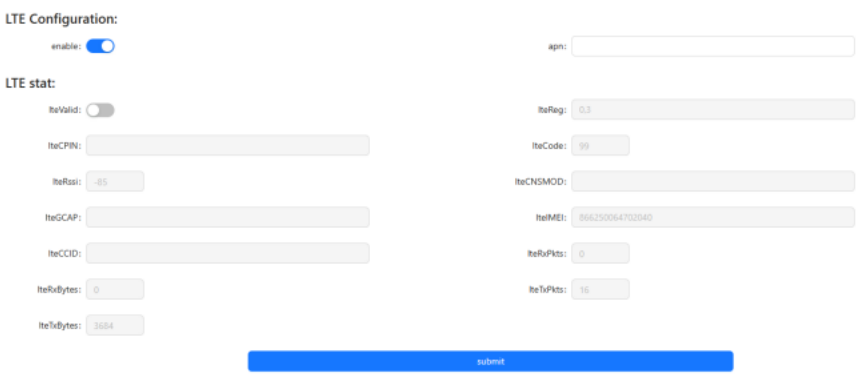
  server: Enter the NServer address or domain name. When the network monitoring function is enabled, the monitoring program will use "ping" to check the connectivity of this address in real-time. If it cannot connect, it will determine that the network is disconnected and try to switch the gateway's connection method. If the gateway is working in a local network and cannot connect to the internet, this field must be filled with the local server address. Otherwise, the monitoring program may determine that the gateway is always disconnected, continuously switch connection methods, and periodically restart the gateway, causing it to malfunction.

  switchTime: 60, the waiting time before the network monitoring program switches the connection method after determining the network is disconnected. No need to modify, keep the default value.

  rebootTime: 600, the waiting time before the network monitoring program restarts the gateway device after determining that switching the connection method still cannot connect. No need to modify, keep the default value.

5.3.2.3. LTE

4G SIM card related parameters, usually do not require manual configuration.



5.3.3. Gateway configuration：Configuring Gateway Device Parameters

5.3.3.1. LoRaWAN Server

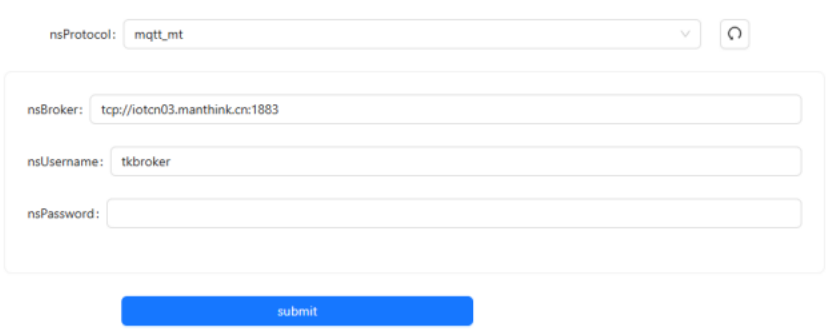
nsProtocol：Communication protocol between the gateway and the LoRaWAN server.

1) **"mqtt_mt":** ManThink's gateway protocol based on MQTT, can only connect to ManThink's server.

nsBroker: tcp://iotcn03.manthink.cn:1883

nsUsername: tkbroker

nsPassword: The password is not displayed here. When modifying the password, enter the correct password. If left blank, clicking "submit" will not modify this parameter.

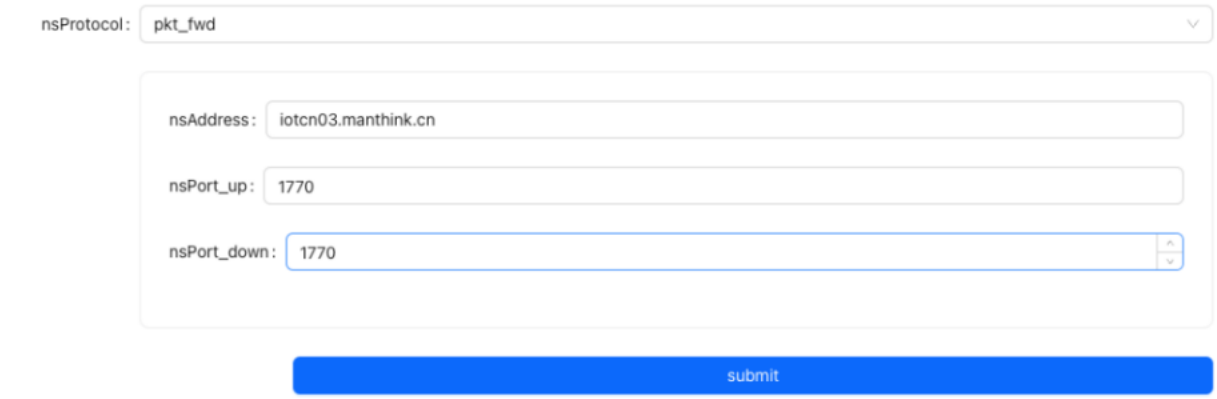


2）pkt_fwd”：Generic Semtech UDP protocol.

nsAddress: Enter the NServer IP address (or domain name). ManThink's default domain name is: iotcn03.manthink.cn.

nsPort_up: Enter the ChirpStack uplink port number (ChirpStack or TTN usually defaults to 1700, ManThink defaults to 1770).

nsPort_down: Enter the ChirpStack downlink port number (ChirpStack or TTN usually defaults to 1700, ManThink defaults to 1770).



3) “mqtt_chirpstack”：Connect to the MQTT interface of the ChirpStack server.

Sever: tcp://192.168.1.141:11883

Username: gateway

Password: The password is not displayed here.

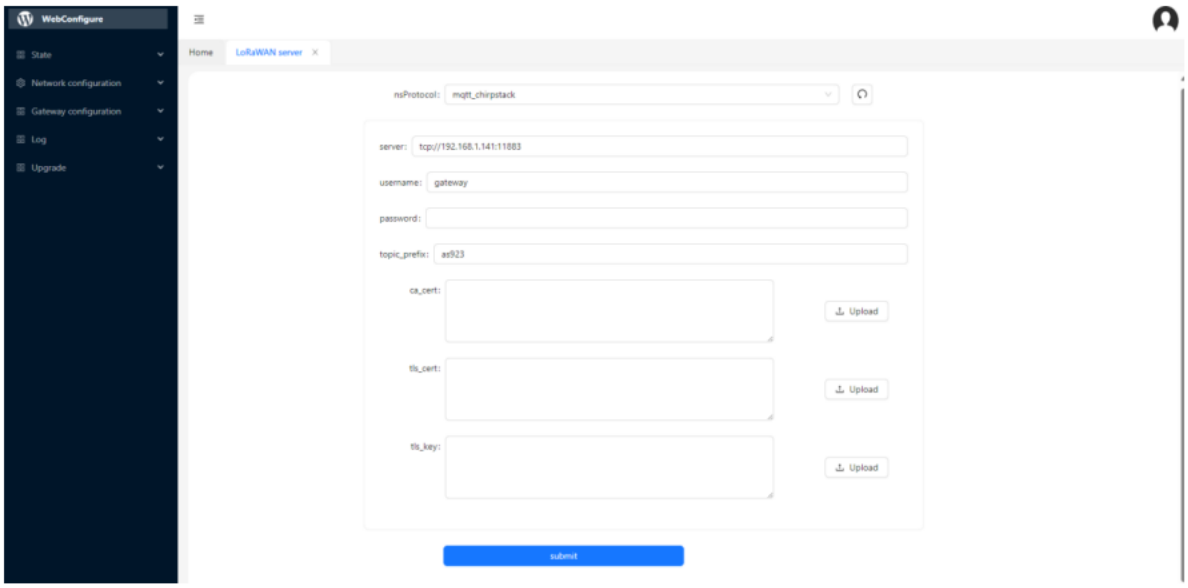
When modifying the password, enter the correct password.

If left blank, clicking "submit" will not modify this parameter.

topic_prefix: Can be used to define the region of the gateway.

ca_cert: ChirpStack's CA certificate .

tls_cert: Public key file tls_key: Private key file



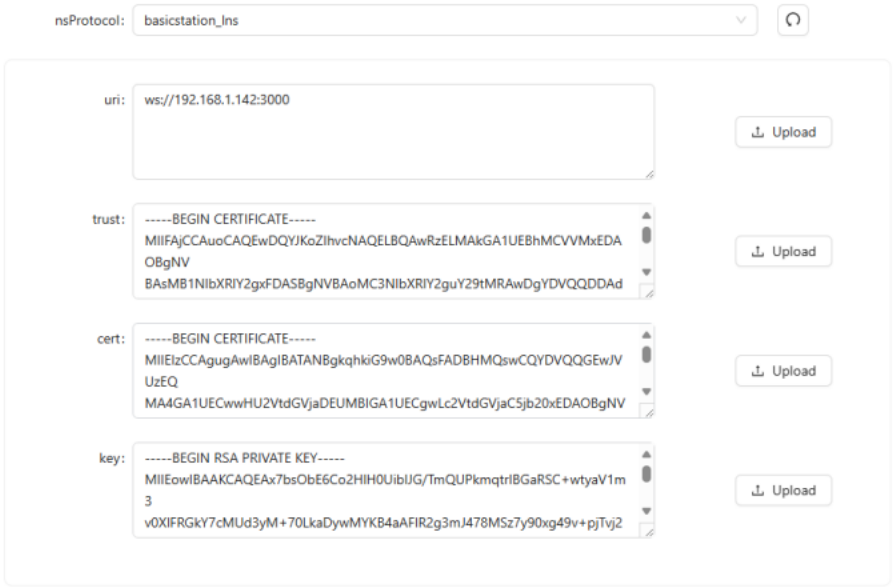
4) “basicstation_lns”：Connect to the LNS protocol server of the BasicStation standard.

url: LNS server address

trust: CA certificate of the LNS server

cert: LNS public key file

key: LNS private key file



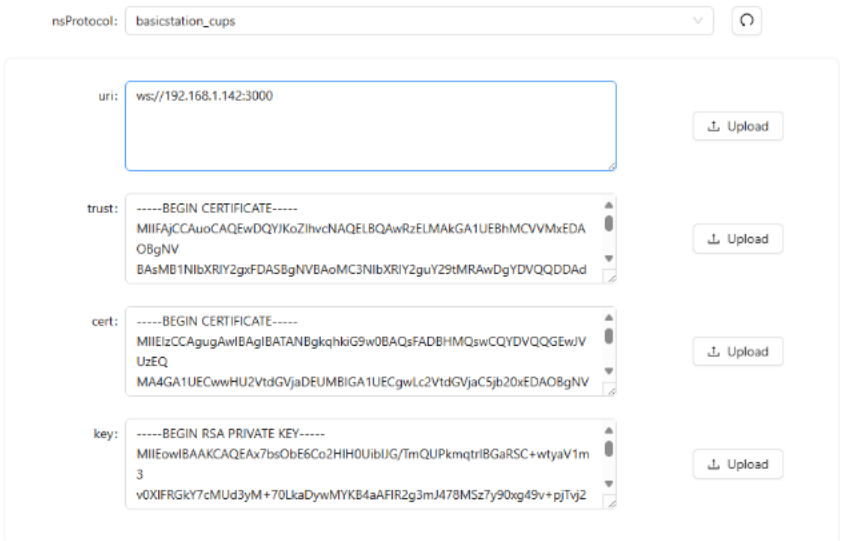
5) basicstation_cups”：Connect to the CUPS protocol server of the BasicStation standard.

url: CUPS server address

trust: CA certificate of the CUPS server

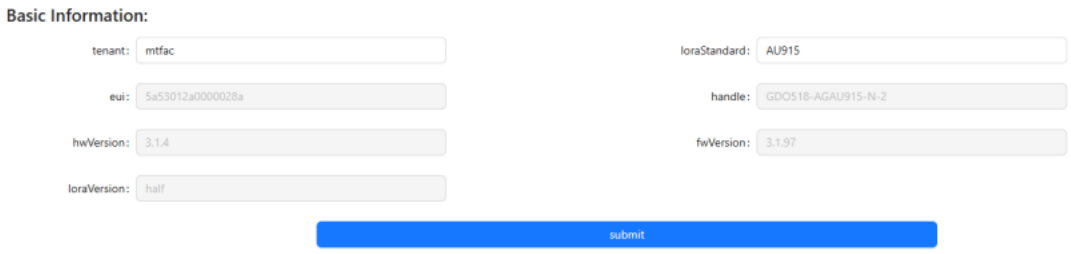
cert: CUPS public key file

key: CUPS private key file



5.3.3.2. Basic Information

Basic information of the gateway, usually does not require modification



5.3.3.3. Frequency Configuration

Configure the frequency points of the gateway.

- **Uplink Session Validation Duration:**

keepalive_interval: Set the interval time for the gateway to send keep-alive messages to the network server. Default is 5 seconds.

Stat_interval: Set the interval time for the gateway to send status (stat) messages to the network server. Default is 60 seconds.

- **Beacon Configuration:**

beaconBW: Bandwidth of the beacon signal. Default is 500000 for 500 kHz bandwidth.

beaconFreq: Frequency of the beacon signal. Default is 923300000 for 923.3 MHz frequency.

beaconSF: Spreading factor of the beacon signal. Default is 10.

beaconStep: Frequency step of the beacon signal.

beaconDatarate: Data rate of the beacon.

beaconPower: Transmission power of the beacon.

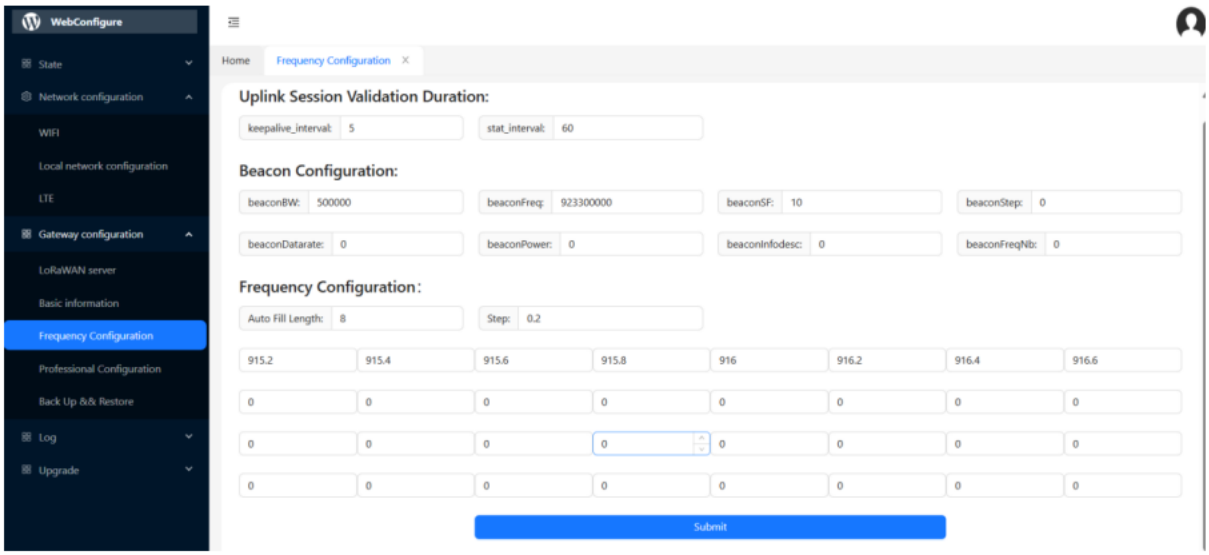
beaconInfodesc: Description of the beacon information.

beaconFreeNb: Number of beacon frequencies.

- **Frequency Configuration:**

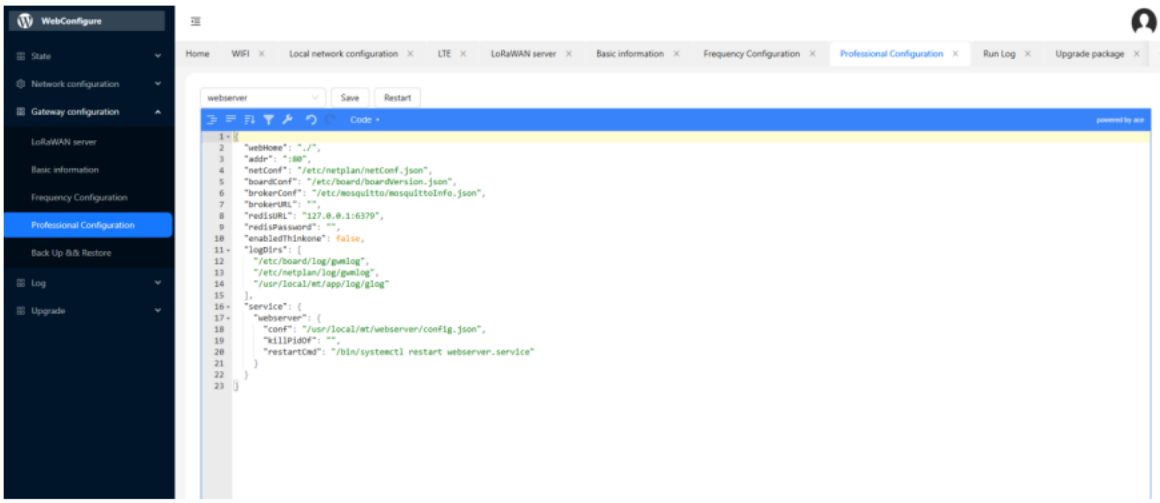
Auto Fill Length: Number of frequency points supported by the gateway. Default is 8 under standard configuration.

Step: Interval width between adjacent frequency points. Generally 0.2 MHz.



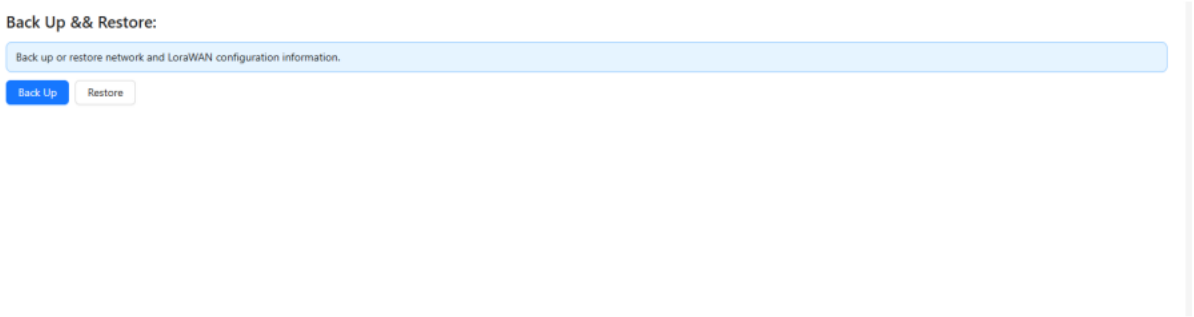
5.3.3.4. Professional Configuration

This function is somewhat risky. Improper operation may cause the gateway to malfunction. It is recommended to contact ManThink technical support when this function is needed.



5.3.3.5. Back Up && Restore

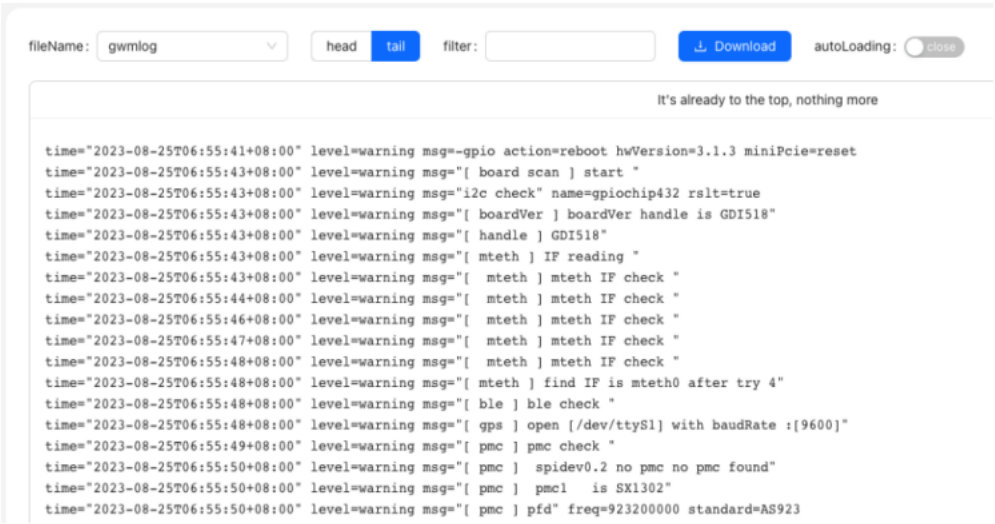
Backup and restore configuration files.



5.3.4. Log：Viewing Logs

Used to browse and query partial logs during gateway operation.

5.3.4.1. Run Log



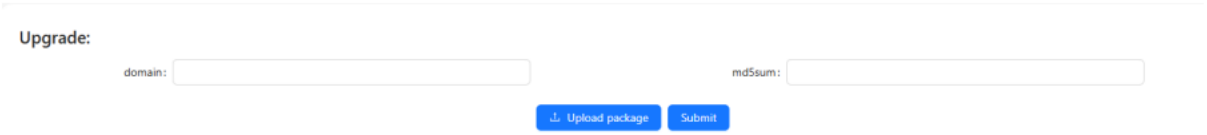
5.3.5. Upgrade：Gateway Upgrade Function

5.3.5.1 .Upgrade package

When the gateway needs to be upgraded, first obtain the upgrade package from ManThink and import it through this interface.

Before upgrading, ensure that the product model, hardware version, LoRa version, firmware version, LoRa standard, and tenant information match the required information.

If you have any questions, please contact ManThink technical support.



6. Troubleshooting

6.1. Unable to Find Gateway WiFi Connection

1. Check the gateway power supply. Note that the green indicator light on the POE power supply is dim and needs to be viewed closely to see if it is on.

2. Check if the OUT and IN interfaces on the POE power module are correctly connected. The "OUT" interface should be connected to the gateway, and the IN interface should be connected to a router or switch (no need to connect the IN interface when using 4G).

6.2. How to Adjust Gateway Frequency Points

For example: The gateway frequency points are: 923.2MHz ~ 924.6MHz, now adjusted to: 923.0MHz ~ 924.4MHz.

1. Set Auto Fill Length to 8 and Step to 0.2MHz.

2. Click on frequency point 1, change it from 923.2MHz to 923.0MHz, and click on the blank area of the page. The subsequent 7 frequency points will be automatically modified.

3. After confirming, click the Submit button to save the changes.

Before modification

After modification

7. Contact Us

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