LoRa Gateway (4G)

--User Manual V2.2

1 Product overview

The 4G LoRa Gateway is an ultra-long-range wireless data acquisition gateway dedicated to receiving the signals from our company's LoRa-based temperature and humidity sensors. The 4G LoRa Gateway supports TCP, UDP, HTTP, RS485 and MODBUS-RTU interfaces and other communication interfaces.. The LoRa Gateway uses a high-performance 32-bit industrial processor and an industrial-grade wireless module, which are featured by high reliability, stability and data security. It supports local sound and light alarms, SMS alarms, GPRS alarms and other alarm methods.
Unlike conventional ASK,FSK and GFSK, this gateway uses LoRa, a proprietary spread spectrum modulation technology to greatly improved the receiving sensitivity. A link budget up to 157 db has greatly increased the wireless communication distance. Combined with our LoRa sensors, the distance in open air can reach up to 5 km.

2 Product features

- Support 4G
- RS-485
- Support MODBUS-RTU
- Compatible with TCP/UDP/HTTP
- One outlet for connecting alarming device
- Multiple alarming methods
- An external USB interface specially for configuring the operating mode by user
- The LoRA Sensor parameters can be configured GPRS downward
- Anti-collision: Mutual interferences can be prevented by advanced anti-collision technology
- Security: Encryption algorithm and certification ensure data security and prevent link eavesdropping and cracking
- Metal shell resistance to high pressure and easy to install and use

3 Technical Parameters

RF frequency	917MHz
RF receiver sensitivity	-148dBm
RF modulation mode	LoRa
LoRa Sensor identification angle	Omni-directional
Interface	TCP/UDP/HTTP/RS485/MODBUS-RTU
LED	Three LED (RF, NET, power)
Firmware update	Support
Communication protocol	Private protocol
Flash memory	32Mb
Supply power	DC12V
Net weight	0.27kg
Operating temperature	-20°C to +60°C
Operating humidity	5% to 95% (non-condensing)
Dimension	112mm*105mm*27mm
Frequency band	LTE-TDD： B34/B38/B39/B40/B41 LTE-FDD： B1/B2/B3/B4/B5/B7/B8/B12/B13/ B18/B19/B20/B25/B26/ B28/B66 UMTS/HSPA+： B1/B2/B4/B5/B6/B8/B19

	GSM/GPRS/EDGE： 850/900/1800/1900MHz

4 Definition of interfaces

4.1 Appearance

4.2 All interfaces

Interface	Functions
A. LED lights	RF, NET and Power successively
B. Extension interfaces	Extension functions (see the description in below 4.3 part)
C. USB	Configure the device and save the log
D. Switch of power	Turn on/off
E. Charging interface	Connect the power adapter
F. SIM card slot	Insert the SIM card
G. RF antenna interface	Connect the RF antenna
H. 4G antenna interface	Connect the 4G antenna

4.3 Extension interfaces

Interface	Functions
1- RS-485B	RS-485B

2- RS-485A	RS-485A
3- GND	Ground
4- OUT	Output
5-GND	Ground
6-12V	12V output

5 Status of the LED indicator lights

Blue light - RF	
Status of the RF light	**Explanations**
On without flashing	OTA/Bulk read and write configuration
Flash for 0.1 second	Receive the LoRa Sensors' data

Green light - NET	
Staus of the NET light	Explanations
On without flashing	OTA /Read or write configuration/connected
On for 0.1 second then off for 0.1 second	Unable to read IMEI/wait for the phone to be connected
On for 0.1 second then off for 0.2 second	Receive SMS
On for 0.1 second then off for 0.9 second	Connected to the GPRS network
On 0.1 for second then off for 2.9 seconds	Connected to the 4G network

On for 1 second then off for 2 seconds	Unable to connect to the 4G network
On for 0.5 second then off for 0.5 second	Unable to read the SIM card

Red light - Power	
Status of the Power light	**Explanations**
On without flashing	OTA/bulk read and write configuration/power adapter connected
Flash every 2 seconds	Power adapter not connected

6 4G Protocol

Please read the document of LoRa Gateway 4G protocol.

7 HTTP Protocol

Please read the document of LoRa Gateway HTTP protocol.

8 RS485 Data Protocol

8.1 Report automatically

Please read the document of LoRa Gateway RS485 Protocol Supporting Automatic Report.

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8.2 Modbus Protocol

LoRa Gateway supports the standard RS485 Modbus protocol. Please read the document of RS485 Modbus Protocol.

9 Command List

The following are ASCII commands, which can be configured via SMS or by serial port or 4G.

Note: $$$$$$ is the password and the default password is 000000.

Attention: (1) The default configuration is to send a piece of GPRS data to the Tzone platform every 5 min;

If the SIM card needs a specified APN to use, please set the 011 command.

(2) Configure the RTC time of the LoRa gateway:

The machine cannot calibrate the time by itself, so when the server receives the machine

data, the following information can be sent to the machine to modify the machine's RTC time (The Tzone server already has this function):

Format: @UTC,yyyy-MM-dd HH:mm:ss#
Example: @UTC,2021-11-24 02:56:43#

Set the APN (Access Point Name)

Format: *$$$$$$,011,APN,Username,Password,PDP_type,auth_type#

Notes: The username and password can be empty.

For example: *000000,011,cmnet,,,0,1#

Explanation: China Mobile's APN is "cmnet", and the username and password are empty,PDP_type is IP,auth_type is PAP;

After you send the command via SMS, the mobile phone will receive the

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following message.

Receive:'011'OK

***000000,011,cmnet,,,0,1#**

If you send the command via serial port, the serial port will receive the following reply:

CMD bytes: 18

***000000,011,cmnet,,,0,1#**

ComdType:011(SETAPN)

APNnumber:cmnet

Username:

Password:

APN Type:00

Auth Type:01

NO.	SMS command	Format	Explanations
001	Modify user password	*$$$$$$,001,@@@@@@#	$$$$$$: old password @@@@@@ : new Password (default:000000)
003	Set a preset SMS number	*$$$$$$,003,SMS Number#	SMS Number: Must be less than 25 characters
008	Extension setting	*$$$$$$,008,ABCDEFG#	A=0, disable Sensor ACK

			downward function; A=1, enable Sensor ACK downward function (default); Note: When the Sensor ACK is disabled, the machine will no longer return the ACK information to the Sensor. B=0, C=0, D=0, default, D=1, close all SMS functions; E=0, F=0, G=0, disable Server ACK function, default; G=1, enable Server ACK function Note: If Server ACK function is enabled, every time the machine sends data to the server, the server must return @ACK,Packet index (Hex converted into decimal)# to the machine. Then the machine will send the next data to the server. Otherwise, the previous data will be sent repeatedly.
009	Change band	*$$$$$$,009,S#	S=0, work in 900/1800

			S=1, work in 850/1900 S=2, Automatic selection S=3, not set (default) Note: The default parameter is S=3, without the setting of the frequency band. If the GSM module supports three frequencies (900/1800/1900), then you could set the parameter to S=0; if the GSM module supports four frequencies (850/900/1800/1900), then you could set the parameter to S=1.
011	Set APN, Username, Password	*$$$$$$,011,APN,Username, Password,PDP_type,auth_type#	APN: < 28 characters; Username: <28character ; Password: <28 character; * If there is no username or password, then leave it blank. PDP_type:0-IP,default, PDP_type:1-IPV6, PDP_type:2-IPV4V6, PDP_type:3-PPP; auth_type:0-NONE, auth_type:1-PAP,default, auth_type:2-CHAP, auth_type:3-PAP or CHAP

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			Note: PDP_type and auth_type can be left empty. The default is PDP_type:0, auth_type:1, To leave them empty is suitable for most situations. For example: *000000,011,CMNET,,#
014	Set DNS	*$$$$$$,014, X,DNS1,DNS2# Disable the DNS	X=0 Disable the DNS(default) X=1 Enable the DNS DNS is the domain name server , xxx.xxx.xxx.xxx
015	Set IP Address and port number	*$$$$$$,015,X,IP,PORT#	X=0 Use IP to connect the server X=1 Use DN to connect the server IP : xxx.xxx.xxx.xxx DN: (Domain name) www.xxx.com If the HTTP protocol is selected, please write URL in here PORT : [1,65535] If the HTTP protocol is

			selected, no need to set IP or Port.
016	Enable/Disable GPRS functions	*$$$$$$,016,X#	X=0 Disable GPRS unctions X=1 Enable GPRS Functions (default)
018	Set the time intervals of GPRS data	*$$$$$$,018,X#	X=0 stop send time interval GPRS =[10,6000] Time interval (Unit: Sec) (Default: 300)
019	Set the GPRS mode	*$$$$$$,019,X#	X=0, use UDP mode X=1, use TCP mode (default)
020	Set the local alarm function	*$$$$$$,020,X#	X=0, disable X=1, enable (default)
021	Set GPRS data include LBS information or not	*$$$$$$,021,X#	X=0, disable X=1, enable (default)
030	Set the SMS alarm function	*$$$$$$,030, ABCDEFG#	A=1, enable SMS alarm for temperature and humidity; the alarm condition is in 142 (default); B=1; C=1; D=0; E=0;

			F=0; G=0;
040	Set RS485 port	*$$$$$$,040, A,B,C,D #	A: Baud rate selection [1200,115200], 9600 (default); B: Data bit, 0-8 bit (default), 1-9 bit; C: Stop bit, 0-0.5 bit, 1-1 bit (default) 2-1.5 bit, 3-2bit D: Parity Check bit 0-Null (default), 1-Even parity, 2-Odd parity
041	RS485 working mode	*$$$$$$,041, X#	X:0-Report automatically; X:1-Modbus protocol (default), Should add the LoRa Sensor to each channel;
042	RS485 address	*$$$$$$,042, AB#	AB:[0-F], cannot be 00, default:01
043	RS485 anti-Reread	*$$$$$$,043, X#	X:[0-3600],unit:s,default:0

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			It is only used in the RS485 automatic report mode.
044	Max online time of the sensor	*$$$$$$,044, X#	X:[0-86400],unit:s,default:3600 Beyond this time period, the LoRa Gateway will consider sensor is offline. It is only used for the Modbus protocol.
136	Enable RF function	*$$$$$$,136,X#	X:0, disable RF function X:1, enable RF function (default）
142	Set the temperature and humidity alarm functions for LoRa Sensor	*$$$$$$,142,X,Temp_H,Temp_L, RH_H,RH_L#	X=0: disable this function (default) X=1, enable this function. The alarm threshold is the configured value of this command. If the LoRa Sensor's temperature is above Temp_H or below Temp_L and the humidity is above RH_H or below RH_L, the alarm will be given. The alarm will be withdrawn after recovery; X=2, enable this

			function. The alarm threshold is the configured value of each sensor. Its alarm situation is same with the sensor's. X=3, enable this function. If the Lora Sensor's temperature exceeds Temp_H, the alarm is given. If the temperature drops below Temp_L, the alarm is withdrawn; If the Lora Sensor's humidity exceeds RH_H, the alarm is given; if the humidity drops below RH_L, the alarm is withdrawn; X=4, enable this function. If Lora Sensor's temperature drops below Temp_L, the alarm is given; if it is restored above Temp_H, the alarm is

			withdrawn. If the Sensor's humidity drops below RH_L, the alarm is given; if the humidity is recovered above RH_H, the alarm is withdrawn. Temp_H: High-temperature threshold, [-55~125] Unit: ℃, Default: 100; Temp_L: Low-temperature threshold, [-55~125] Unit: ℃, Default: 0 RH_H: High-humidity threshold, [0~100] Unit: %, Default:100 RH_L: Low-humidity

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			threshold, [0~100] Unit: %, Default: 0
144	Add a LoRa sensor	*$$$$$$,144,X,Y,ID#	X: LoRa sensor type X=0, TAG07/TAG07B/TAG08/TAG08B/TAG08L/TAG09 (Humidity unit % TAG) X=2,TAG07B/TAG08B (Humidity unit 0.1%) X=3,TAG09 (double temperature) X=4,TAG11 Y: Channel, [1,100]; ID: LoRa sensor ID, 8 characters; Note:The number of all sensor should not be more than 100. By default, all sensor in all ranges can be received. This function needs to be configured only when binding sensor and using RS485 Modbus mode, and the TAG07B default is %, TAG08B default humidity unit

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			is 0.1%.
144	Add a LoRa sensor	*$$$$$$,144,X,Y,ID,N#	X: LoRa sensor type X=0, TAG07/TAG07B/TAG08/TAG08B/TAG08L/TAG09 (Humidity unit % TAG) X=2,TAG07B/TAG08B (Humidity unit 0.1%) X=3,TAG09 (double temperature) X=4,TAG11 Y: Channel, [1,100]; ID: LoRa sensor ID, 8 characters; N:The number of sensor ID added, followed by 1 Note:The number of all sensor should not be more than 100. By default, all sensor in all ranges can be received. This function needs to be configured only when binding sensor and using RS485 Modbus mode, and the TAG07B default is %, TAG08B default humidity unit is 0.1%.

145	Delete a LoRa Sensor	*$$$$$$,145,X,Y#	X: Sensor type X=0, TAG07/TAG07B/TAG08/TAG 08B (tag with humidity unit %) X=2,TAG07B/TAG08B (tag with humidity unit 0.1%. By default, the TAG08B humidity unit is 0.1%). X=3,TAG09 (double temperature) X=4,TAG11 Y: Channel, [1,100];
146	Delete all LoRa Sensors	*$$$$$$,146,1#	
147	Query all added LoRa Sensors	*$$$$$$,147,1#	Note: The Sensor ID can only be queried through the serial port.
148	Select the reboot time when RF does not receive the data	*$$$$$$,148,X#	X: [1,1440] Default: 20 Unit : min
200	Set GPRS transmission format	*$$$$$$,200,X#	X:0-TCP/IP (default); X:1-Http
201	Set Http proxy server	*$$$$$$,201,X,IP,PORT#	X=0 Disable X=1 Enable IP:Proxy Server IP PORT:[1,65535]

			Proxy Server Port
500	Clear flash data	*$$$$$$,500#	Clear the stored data in the flash memory of the machine
600	Auto Reboot	*$$$$$$,600,X,Y#	X=0, disable his function X=1, enable this function. (Default) Y: Reboot time interval, [10,9999], unit: min, (Default: 1440)
800	Query command	*$$$$$$,800,X #	X: The command to be queried
801	Read the IMEI number	*$$$$$$,801#	Use this command to get the IMEI, firmware version and GSM module version of the LoRa Gateway
900	Issue the LoRa Sensor commands	*$$$$$$,900,ID,cmd#	ID: Sensor ID; cmd: Sensor command. Please see the LoRa Sensor's issuing command list. Note: To use the function , please enable the ACK function of LoRa Sensor
901	Delete the sensor's issued command list that has been recorded	*$$$$$$,901#	
990	Initialize the machine	*$$$$$$,990,099#	This command will set all parameters to factory default

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			values (except for the password/frequency band).
991	Reboot now	*$$$$$$,991#	Reboot the LoRa Gateway

10 Data query

TZONE cloud platform.

Please register an account and add a device. After adding a device, you can query the data by device ID.

For more details, please log in and view the help documentation.

Tzone cloud platform website: http://cloud.tzonedigital.com/

Tzone Server Domain: t-gateway.tzonedigital.cn(default)

Tzone Server Port: 54929 (default)

URL：http://g.cloud.tzonedigital.cn:18811/Receive（HTTP）


Cloud Platform
Login

FCC Warning

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 inte rference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance 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 interferenceto 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.
- Reorient or relocate the receiving antenna.
- Reorient or relocate the receiving antenna.
- Consult the dealer or an experienced radio/TV technician for help important announcemen

Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.

ISED Statement

- English: This device complies with Industry Canada license‐exempt RSS standard(s). Operation is subject to the following two conditions: (1) This device may not cause interference, and (2) This device must accept any interference, including interference that may cause undesired operation of the device.

The digital apparatus complies with Canadian CAN ICES‐3 (B)/NMB‐3(B).

- French: Le présentappareilestconforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitationestautorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareildoit accepter tout brouillageradioélectriquesubi, mêmesi le brouillageest susceptible d'encompromettre le fonctionnement.

l'appareil numérique du ciem conforme canadien peut - 3 (b) / nmb - 3 (b).

For Receiver:

This device meets the exemption from the routine evaluation limits in section 2.5 of RSS 102 and compliance with RSS 102 RF exposure, users can obtain Canadian information on RF exposure and compliance.

cet appareil est conforme à l'exemption des limites d'évaluation courante dans la section 2.5 du cnr - 102 et conformité avec rss 102 de l'exposition aux rf, les utilisateurs peuvent obtenir des données canadiennes sur l'exposition aux champs rf et la conformité.

This equipment complies with Canada radiation exposure limits set forth for an uncontrolled environment. The device is installed and operated without restriction.

Cet équipement est conforme Canada limites d'exposition aux radiations dans un environnement non contrôlé. Die Installation und der Betrieb der Ausrüstung sind uneingeschränkt.

For Transmitter:

This device meets the exemption from the routine evaluation limits in section 2.5 of RSS 102 and compliance with RSS 102 RF exposure, users can obtain Canadian information on RF exposure and compliance.

cet appareil est conforme à l'exemption des limites d'évaluation courante dans la section 2.5 du cnr - 102 et conformité avec rss 102 de l'exposition aux rf, les utilisateurs peuvent obtenir des données canadiennes sur l'exposition aux champs rf et la conformité.

This equipment complies with Canada radiation exposure limits set forth for an uncontrolled environment. The device is installed and operated without restriction.

Cet équipement est conforme Canada limites d'exposition aux radiations dans un environnement non contrôlé. Die Installation und der Betrieb der Ausrüstung sind uneingeschränkt.