

LoRa Gateway 4G data format

1 Data communication

Set LORA Gateway RTC time :

After a connection is established between the device and the server, the device sends a data message to the server. The server sends the following information to the device to change the RTC time. It is recommended that the server set the RTC time each time when the device connects to the server.

Set the RTC time Format: @UTC,yyyy-MM-dd HH:mm:ss#

For example: @UTC,2021-11-24 02:56:43#

*please note the time setting should be UTC +0 time

C# code:

```
byte[] utcBytes = System.Text.Encoding.Default.GetBytes(string.Format("@UTC,{0}#",  
System.DateTime.UtcNow.ToString("yyyy-MM-dd HH:mm:ss")));
```

```
_NetStream.Write(utcBytes, 0, utcBytes.Length);
```

2 Data parsing

LoRa Gateway 4G data is hex.

The format of hex code:

Format: Start symbol(2byte) + Packet length(2byte) + Protocol type(2byte) + Hardware type(2byte) + Firmware version(4byte) + IMEI(8byte) + RTC time(6byte) + LBS data length(2byte) + LAC(2byte) + CELLID(4byte) MCC(2byte) + MNC(2byte) + Extension(A) + State data length(2byte) + Alarm type(1byte) + Terminal information(1byte) + CSQ(1byte) +GSM state(1byte) +Battery voltage(2byte) +Power voltage(2byte) + Extension(B) + Sensor information data length (2byte) + Sensor type(1byte) + Number of the Sensor (1byte) + length of per Sensor (1byte) + Sensor information(X byte) + Extension(C) + Extension(D) + packet index(2byte) + Check code(2byte) + Stop symbol (2byte)

Here below is a table which informs more detailed information about the protocol.

Data block	Number of bytes	Data Content	Meaning
Start symbol	2	'TZ'	Header of every packet
Packet length	2	Variable	The packet length range from the protocol type to the Check code (include the protocol type and the Check code)
Protocol number	2	'\$\$'	
Hardware type	2	04H 06H	
Firmware version	4	Variable	i.e. 02H 10H 00H 00H means Firmware version is 2.16
IMEI	8	Variable	BCD format, i.e. 08H 66H 10H 40H 26H 60H 11H 09H means IMEI is 8666104026601109
RCT time	6	Variable	The RTC time when packet The sequence is Year Month Day Hour Minute Second i.e.14H 07H 1DH 01H 08H 24H means 2020/07/29/ 01:08:36
LBS data length	2	Variable	LBS's data length, if the value is 00H 00H, means no LBS data.
LAC	2	Variable	i.e. 25H 32H means LAC is 2532
CELL ID	4	Variable	i.e. 16H 11H F4H 0DH means CELL ID is 1611F40D
MCC	2	Variable	i.e. 04H 60H means MCC is 0460
MNC	2	Variable	i.e. 00H 01H means MNC is 0001
Extension	A=0		For future extending the protocol use, currently, has nothing, do not possess any byte
Status data length	2	Variable	The status data length, if this part is 00H 00H means no status data.
Alarm type	1	Variable	AAH Interval 4G data 10H Low battery Alarm 60H Begin Charge 61H End charge
Terminal information	1	Variable	Bit7: 1-connect to power 0-not connect to power Bit6: 1-This packet is the last packet of this packet index 0- This packet is not the last packet of this packet index Bit 5-0 :reserved
CSQ	1	Variable	GSM signal strength

GSM status	1	Variable	Bit 7-6 :reserved Bit 5: 1-TCP\UDP connected 0-TCP\UDP not connected Bit4: 1-4G network connected 0-4G network not connected Bit3: 1-roaming 0-not roaming Bit2: 1-GSM network connected 0-GSM network not connected Bit1: 1-Detected SIM card 0-no SIM card Bit0: 1-GSM module is on 0-GSM module is off
Battery voltage	2	Variable	Unit:10mv, MSB first i.e. 01H A5H=421, 421*10=4.21V
Power voltage	2	Variable	Unit:10mv, MSB first i.e. 04H D9H=1241, 1241*10=12.41V
Extension	B=0		For future use, currently, this part has nothing, does not have any byte
Sensor information data length	2	Variable	The length of sensor data area, 00H 00H means no sensor data
Sensor type	1	01H	01H-TAG07/07B/08/08L/08B(humidity unit is 1%) 04H-TAG08B(humidity unit is 0.1%,and the TAG08B default humidity unit is 0.1%). 05H-TAG09(double temperature)
Number of the Sensor	1	Variable	The number of sensor in this packet
length of per Sensor	1	0BH	The length of per sensor
Sensor information	X	Variable	per sensor data format: ID + status + battery voltage + temperature + humidity + RSSI+ Receive the sensor time ID(4byte): 72191346 Status(1byte): bit7: Battery voltage status, 1-low Voltage, 0- Voltage normal; bit6: Temperature alert status, 1-Temperature alert, 0- Temperature normal; bit5: Sensor button status, 1-Press sensor button

			<p>0-Don't press button button</p> <p>bit4: Sensor ACK switch</p> <p>1-Sensor ACK enable;</p> <p>0-Sensor ACK disable;</p> <p>bit3: RTC time;</p> <p>1-Sensor RTC enable;</p> <p>2-Sensor RTC disable;</p> <p>bit2-0:reserved;</p> <p>battery voltage(2byte):unit: 1mv, MSB first, i.e. 0DH EAH means voltage is 3.61V;</p> <p>Temperature 1(2byte):unit:0.1°C, MSB first, bit15:sensor is normal or abnormal</p> <p>1- abnormal</p> <p>0- normal</p> <p>bit14:temperature is positive(+) or negative(-), 0-positive, 1-negative,</p> <p>Bit13-0: temperature value i.e. 01H 14H means temperature is 27.6°C, 41H 14H means temperature is -27.6°C, 80H 00H means sensor is abnormal;</p> <p>Humidity: 1byte,unit:% or 2byte,unit:0.1% or 0 byte(TAG09)</p> <p>Note:</p> <p>1 byte,TAG07B or TAG08B (humidity unit is %)</p> <p>2 byte,TAG08B(humidity unit is 0.1%,and the TAG08B default humidity unit is 0.1%)</p> <p>0 byte,TAG09(no humidity value display) if it is FFH means no humidity, i.e. 2DH means humidity is 45%. 02H CFH means humidity is 71.9%</p> <p>Note:Only TAG09 for dual temperature sensor, contains temperature 2, other sensor only temperature 1.</p> <p>Temperature 2(2byte):unit:0.1°C, MSB first, bit15:sensor is normal or abnormal</p> <p>1- abnormal</p> <p>0- normal</p> <p>bit14:temperature is positive(+) or negative(-), 0-positive, 1-negative,</p>
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			Bit13-0: temperature value i.e. 01H 14H means temperature is 27.6°C, 41H 14H means temperature is -27.6°C, 80H 00H means sensor is abnormal; RSSI(1byte):unit: -dBm i.e 6FH means RSSI is -111dBm Receive the sensor time(6byte): 14H 07H 1DH 01H 08H 0BH Means 2020\07\29 01:08:11
Extension	C=0		For future use, currently, this part has nothing, do not have any byte
Extension	D=0		For future use, currently, this part has nothing, do not have any byte
Packet index	2	Variable	The value range of this part is between 1 and 9999
Check code	2	Variable	The range is from Protocol type to Packet index(include Protocol type and Packet index),MSB first, can see the Check code calculate function CRC16 at document RS485 modbus protocol v1.1
Stop bits	2	0DH 0AH	Indicate this packet is finished

For example:

54 5A 00 40 24 24 04 06 01 08 00 00 08 66 10 40 26 19 25 60 11 09 12 06 27 1A 00 04 27 B6 11
09 00 08 AA C0 11 37 01 9E 04 BF 00 14 01 01 11 72 17 00 20 00 0E 1A 01 14 2D 36 11 09 12 06
26 1B 0E E7 89 B9 0D 0A

Start symbol: 54 5A—‘TZ’;

Packet length: 00 4A—64bytes;

Protocol type: 24 24—‘\$\$’;

Hardware type: 04 06;

Firmware version: 02 10 00 00—2.16;

IMEI: 08 64 99 90 46 36 49 88—864999046364988;

RTC time: 14 07 1D 01 08 24—2020\07\29 01:08:36

LBS data length: 00 0A—10 bytes;

LAC: 25 32—2532;

CELLID:16 11 F4 0D—1611F40D;

MCC: 04 60—0460;

MNC: 00 01—0001;

State data length: 00 08—8 bytes;

Alarm type: AA;

Terminal information: C0—connect to power, last packet

CSQ: 11—17;

GSM state: 37—TCP\UDP connected;

Battery voltage: 01 A5—4.21V;

Power voltage: 04 D9—12.41V;

Sensor information data length: 00 14—20 bytes;

Sensor type: 01;

Number of the Sensor: 01;

length of per Sensor: 11—17;

Sensor information: 72 19 13 46 00 0E 2E 01 2C 42 6F 14 07 1D 01 08 0B:

ID:72191346

Status:00

battery voltage: 0E 2E—3.63V;

temperature: 01 2C—30.0°C;

humidity : 42—66%;

RSSI: 6F— -111dBm;

Receive the sensor time:14 07 1D 01 08 0B—2020\07\29 01:08:11

packet index: 03 03—0303;

Check code : 73 01;

Stop symbol: 0D 0A