

LoRa Gateway WIFI data format

1 Data communication

1. 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. Set ACK reply:

After a connection is established between the device and the server, each time the machine sends a piece of data to the server, the server must reply with an ACK message to the machine, otherwise the machine will continue to send duplicate data.

Reply ACK Format: `@ACK,Packet index (Hex converted into decimal)#`

For example: `@ACK,0035#`

C# code:

```
byte[] ackBytes = System.Text.Encoding.Default.GetBytes(string.Format("@ACK,{0}#",  
serial));
```

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

2 Data parsing

LoRa Gateway WIFI 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) + Reserved (2byte) + Extension(A) + State data length(2byte) + Alarm type(1byte) + Terminal information(1byte) + Reserved (2byte) + 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 01H 00H 00H means Firmware version is 2.01
IMEI	8	Variable	BCD format, i.e.06H 51H 88H 49H 07H 90H 00H 03H means IMEI is 651884907900003
RCT time	6	Variable	The RTC time when packet The sequence is Year Month Day Hour Minute Second i.e. 12H 0CH 0AH 05H 37H 13H means 2018/12/10/ 05: 55: 19
Reserved	2	00 00	Always shows 00 00
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 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
Reserved	2	00 00	Always shows 00 00
Battery voltage	2	Variable	Unit:10mv, MSB first i.e. 01H A8H=424, 424*10=4.24V
Power voltage	2	Variable	Unit:10mv, MSB first i.e. 04H DFH=1247, 1247*10=12.47V
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/08/08B/08L/09(humidity unit is 1%) 04H-TAG08B(humidity unit is 0.1%,and the TAG08B default humidity unit is 0.1%).
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):72180476 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 0-Don't press button button bit4: need Lora gateway reply ACK(set by sensor 09 command), 1-Enable ACK 0-Disable ACK bit3: RTC time mark 1-Sensor enable RTC time mark 0-Sensor disable RTC time mark Bit2-0:reserved;

			<p>battery voltage(2byte):unit: 1mv, MSB first, i.e. 0EH 38H means voltage is 3.67V;</p> <p>Temperature 1(2byte):unit:0.1°C, MSB first, bit15:sensor is normal or abnormal 1- abnormal 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 Note: 1 byte,TAG07/07B/08/08L/09 (humidity unit is 1%) 2 byte,TAG08B(humidity unit is 0.1%,and the TAG08B default humidity unit is 0.1%) if it is FFH means no humidity, i.e. 2DH means humidity is 45%. 02H CFH means humidity is 71.9%</p> <p>RSSI(1byte):unit: -dBm i.e 07H means RSSI is 7dBm</p> <p>Receive the sensor time(6byte): 12H 0CH 0AH 05H 37H 12H Means 2018\12\10 05:55:18</p>
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 3C 24 24 04 06 02 01 00 00 06 51 88 49 07 90 00 03 12 0C 0A 05 37 13 00 00 00 08 AA
C0 00 00 01 A8 04 DF 00 14 01 01 11 72 18 04 76 20 0E 38 00 D6 30 07 12 0C 0A 05 37 12 03
F5 E8 1C 0D 0A

Start symbol: 54 5A—‘TZ’;

Packet length: 00 3C—60bytes;

Protocol type: 24 24—‘\$\$’;

Hardware type: 04 06;

Firmware version: 02 01 00 00—2.01;

IMEI: 06 51 88 49 07 90 00 03—0651884907900003;

RTC time: 12 0C 0A 05 37 13—2018\12\10 05:55:19;

Reserved: 00 00—2 bytes;

State data length: 00 08—8 bytes;

Alarm type: AA;

Terminal information: C0—connect to power, last packet

Reserved: 00 00-2byte;

Battery voltage: 01 A8—4.24V;

Power voltage: 04 DF—12.47V;

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 18 04 76 20 0E 38 00 D6 30 07 12 0C 0A 05 37 12

ID:72180476

Status:20

battery voltage: 0E 38—3.64V;

temperature: 00 D6—21.4°C;

humidity : 30—48%;

RSSI: 07— -7dBm;

Receive the sensor time:12 0C 0A 05 37 12—2018\12\10 05:55:18

packet index: 03 F5 —1013;

Check code : E8 1C;

Stop symbol: 0D 0A