LoRa Gateway GPRS 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 GPRS 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(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. 01H 08H 00H 00H means Firmware version is 1.08
IMEI	8	Variable	BCD format, i.e.08H 66H 10H 40H 26H 60H 11H 09H means IMEI is 866104026601109
RCT time	6	Variable	The RTC time when packet The sequence is Year Month Day Hour Minute Second i.e. 11H 09H 12H 06H 27H 12H means 2017/09/18/ 06：39：18
LBS data length	2	Variable	LBS's data length, if the value is 00H 00H, means no LBS data.
LAC	2	Variable	i.e. 27H B6H means LAC is 27B6
CELL ID	2	Variable	i.e. 11H 09H means CELL ID is 1109
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 GPRS 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-GPRS network connected 0-GPRS 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 9EH=4014, 414*10=4.14V
Power voltage	2	Variable	Unit:10mv, MSB first i.e. 04H BFH=1215, 1215*10=12.15V
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(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): 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: Sensor ACK switch 1-Sensor ACK enable; 0-Sensor ACK disable; bit3: RTC time; 1-Sensor RTC enable; 2-Sensor RTC disable; bit2-0:reserved; battery voltage(2byte):unit: 1mv, MSB first, i.e. 0DH EAH means voltage is 3.61V； Temperature 1(2byte):unit:0.1℃, MSB first, bit15:sensor is normal or abnormal 1- abnormal 0- normal bit14:temperature is positive(+) or negative(-), 0-positive, 1-negative, Bit13-0: temperature value i.e. 01H 14H means temperature is 27.6℃, 41H 14H means temperature is -27.6℃, 80H 00H means sensor is abnormal; Humidity：1byte,unit:% or 2byte,unit:0.1% or 0 byte(TAG09) Note: 1 byte,TAG07B or TAG08B (humidity unit is %) 2 byte,TAG08B(humidity unit is 0.1%,and the TAG08B default humidity unit is 0.1%) 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% Note:Only TAG09 for dual temperature sensor, contains temperature 2, other sensor only temperature 1; Temperature 2(2byte):unit:0.1℃, MSB first, bit15:sensor is normal or abnormal 1- abnormal 0- normal bit14:temperature is positive(+) or negative(-), 0-positive, 1-negative, Bit13-0: temperature value

			i.e. 01H 14H means temperature is 27.6℃, **41H 14H means temperature is -27.6℃,** **80H 00H means sensor is abnormal;** **RSSI(1byte):unit: -dBm** **i.e 36H means RSSI is 5dBm** **Receive the sensor time(6byte):** **11H 09H 12H 06H 26H 1BH** **Means 2017\09\18 06:38:27**
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: 01 08 00 00—1.08;
IMEI: 08 66 10 40 26 60 11 09—8666104026601109;
RTC time: 11 09 12 06 27 12—2017\09\18 06:39:18
LBS data length: 00 04—4 bytes;
LAC: 27 B6—27B6;
CELLID: 11 09—1109;
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 9E—4.14V;
Power voltage: 04 BF—12.15V;
Sensor information data length: 00 14—20 bytes;

Sensor type: 01;
Number of the Sensor: 01;
length of per Sensor: 11;
Sensor information: 72 17 00 20 00 0E 1A 01 14 2D 36 11 09 12 06 26 1B means:

ID:72170020
Status:00
battery voltage: 0D EA—3.61V;
temperature: 01 14—27.6℃;
humidity : 2D—45%;
RSSI: 36—-54dBm;
Receive the sensor time:11 09 12 06 26 1B—2017\09\18 06:38:27

packet index: 01 E7 —3815;
Check code : 89 B9;
Stop symbol: 0D 0A