

# TT18-4G-M data protocol

## 1 Data communication

### 1. Set TT8 4G 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,the RTC time is set first, and then the ACK reply is set.**

#### 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

TT18-4G-M data is in hex format.

The format of hex code:

Start bits(2byte) + Packet length(2byte) + Protocol number(2byte) + Hardware type(2byte) + Firmware version(4byte) + IMEI(8byte) + RTC date time(6byte) + GPS data length ( 2byte ) +Status ( 1byte ) +UTC date time ( 6byte ) + longitude(4byte) + latitude(4byte) + angle(2byte) + speed(2byte) + LBS data length(2byte) + The number of LBS(1byte) + signal LBS information(1byte) + MCC(2byte) + MNC(2byte) + LAC(2byte) + CELLID(4byte) + RxLev(1byte)+ PCI(2byte)+earfcn(3byte)+RSRP(1byte)+RSRQ(1byte)+RSSI(1byte)+ Extension bits(A) + State data length(2byte) + Alarm type(1byte) + Terminal information(1byte) + Network signal strength(1byte) +Network state(1byte) +Battery voltage(2byte) + Temperature(2byte) + humidity(2byte) + Light Sensor(1byte) + Extension bits(B) + Extension bits(C) + packet index(2byte) + CRC(2byte) + Stop bits(2byte)

The data of the device send to the server:

```
54 5A 00 52 24 24 04 07 03 08 00 00 01 80 32 30 00 00 50 98 17 05 04 16 34 1E
00 13 01 17 05 04 16 34 32 01 57 BF 08 06 CC AE B8 00 00 00 00 00 14 01 52 04
60 00 00 1D 2F 0D 63 5F 52 00 16 00 0E 66 53 0C 46 00 0B AA 00 16 3F 01 76 4
0 CE 03 2B 01 00 2B 12 AE 0D 0A
```

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

Data block	Number of bytes	Data Content	Meaning
Start bits	2	'T' 'Z'	Tzone company identifier. This is the header of every packet
Packet length	2	Variable	The bytes length from the start at protocol number to the end at the CRC.
Protocol number	2	'\$\$'	Normal data
Hardware type	2	0x04 0x07	The hardware is TT18
Firmware version	4	Variable	Each byte represents a first-level version For example, 03H 08H 00H 00H indicates that the version is 3.8.0.0

<b>IMEI</b>	<b>8</b>	<b>Variable</b>	<b>The high four bits of the first byte are ignored, and every other 4 bits represent a character, such as 01H 80H 32H 30H 00H 00H 50H 98H Indicates that the IMEI is 180323000005098.</b>
<b>RCT time date</b>	<b>6</b>	<b>Variable</b>	<b>The time when the piece of data is packaged and ready to be sent is in the order of year, month, day, hour, minute, and second, and 2000 is added to the year. For example, 17H 05H 04H 16H 34H 1EH indicates that the time is: 2023/05/04 22:52:30</b>
<b>GPS data length</b>	<b>2</b>	<b>Variable</b>	<b>Indicates the length of GPS information (unit: byte), if it is 0000H, it means that there is no such data</b>
<b>Status</b>	<b>1</b>	<b>Variable</b>	<b>bit0: latitude mark, 1=N north latitude, 0=S south latitude; bit1: longitude mark, 1=W west longitude, 0=E east longitude, other bits are reserved</b>
<b>UTC date time</b>	<b>6</b>	<b>Variable</b>	<b>The format is the same as the RTC date time</b>
<b>longitude</b>	<b>4</b>	<b>Variable</b>	<b>Unit: degree, HEX format, this value/1000000 is the latitude, such as 0157BF08H means 22.527752</b>
<b>latitude</b>	<b>4</b>	<b>Variable</b>	<b>Unit: degree, HEX format, this value/1000000 is the longitude, such as 06CCAEB8H means 114.077368</b>
<b>angle</b>	<b>2</b>	<b>Variable</b>	<b>Unit: degree, reserved</b>
<b>speed</b>	<b>2</b>	<b>Variable</b>	<b>Unit: 0.1Knots, reserved</b>
<b>LBS data length</b>	<b>2</b>	<b>Variable</b>	<b>GSM LBS's data length excludes LBS data length part. If the value is 0, there is no LBS data.</b>
<b>The number of LBS</b>	<b>1</b>	<b>Variable</b>	<b>The number of LSB base stations included in this package data</b>
<b>Signal LBS information</b>	<b>1</b>	<b>Variable</b>	<b>Single LBS base station information length and base station information indication, bit7-6 means base station type, 00H-2G base station, 01H-NB base station, 10H-CATM1 base station, bit4-0, means Signal LBS information length</b>
<b>MCC</b>	<b>2</b>	<b>Variable</b>	<b>Mobile Country Code, ignore the first digital, only 3 digital, 04 60 means that MCC is 460.</b>
<b>MNC</b>	<b>2</b>	<b>Variable</b>	<b>Mobile Network Code, 2 or 3 digital, if the first digital is 8, MNC is 3 digital. If the first digital is 0, MNC is 2 digital. 87 56 means that MNC is 756. 00 56 means 56.</b>
<b>LAC</b>	<b>2</b>	<b>Variable</b>	<b>location area code, hex code 0x27 0x56 means LAC is 10070</b>

<b>CELL ID</b>	<b>4</b>	<b>Variable</b>	<p>Cell identification code, 4 byte, hex code, i.e. 01H23H45H67H means CELL ID is 19088743;</p> <p>In the data example: LBS length:00H 22H, means 34byte;</p> <p>The number of LBS: 03H, means 3;</p> <p>The first LBS information: Signal LBS information :0AH, 2G base station, Contains 10 bytes of data; MCC :04H 60H,460; MNC:00H 00H,00; ; LAC:27H 93H,10131; CELL ID:00H 00H 0FH A1H,4001;</p> <p>The second LBS information: Signal LBS information:0AH,2G base station,Contains 10 bytes of data; MCC:04H 60H,460; MNC:00H 00H,00; LAC:27H B6H,10166; CELL ID:00H 00H 15H BBH,5563;</p> <p>The Third LBS information: Signal LBS information:0AH, 2G base station, Contains 10 bytes of data; MCC:04H 60H,460; MNC:00H 00H,00; LAC:27H B6H,10166; CELL ID:00H 00H 12H A3H,4771;</p>
<b>RxLev</b>	<b>1</b>	<b>Variable</b>	Received Signal power, 1 byte, hex format, unit: -dbm, supported by 2G base stations, this data does not appear for unsupported base stations; for example, 52H means -82dbm
<b>PCI</b>	<b>2</b>	<b>Variable</b>	Physical Cell Identity, 2 bytes, hex format, supported by LTE base stations, this data does not appear for unsupported base stations
<b>earfcn</b>	<b>3</b>	<b>Variable</b>	Evolved Absolute Radio Frequency Channel, 3 bytes, hex format, supported by LTE base stations, this data will not appear for unsupported base stations

RSRP	1	Variable	Reference Signal Received Power (RSRP) in dBm.1 byte, hex format, unit: -dbm, supported by LTE base stations, this data does not appear for unsupported base stations, such as 52H means -82dbm
RSRQ	1	Variable	Reference Signal Received Quality (RSRQ) in dB.1 byte, hex format, unit: -db, supported by LTE base stations, this data does not appear for unsupported base stations, such as 12H means -18db
RSSI	1	Variable	Received signal strength indicator value, 1 byte, hex format, unit: -dbm, supported by LTE base stations, this data does not appear for unsupported base stations, such as 52H means -82dbm
Extension bits	A=0		For future extending the protocol use, currently, has nothing, does not possess any byte
Status data length	2	Variable	The status data length excluding “Status data length” itself. If this part is 0, there is no status data.
Alarm type	1	Variable	The value of this part has four possibilities, Temperature/humidity included in all the data. 0xAA Interval GPRS data 0x10 Low battery Alarm 0xA0 Temperature/Humidity over threshold alarm 0xA1 Temperature/Humidity sensor abnormal alarm 0xA1 Light sensor bright and dark changes
Terminal information	1	Variable	Bit 7-6 work mode 00= Normal work mode, 01= Flight mode, bit 5 are reserved for future use. Bit4: 1 press the button 0 Have not press the button Bit3: 1 The temperature/Humidity sensor is abnormal 0 The temperature/Humidity sensor is normal Bit2: 1 The temperature/Humidity is over threshold 0 The temperature/Humidity is normal Bit1: 1 The battery low voltage 0 The battery is normal Bit0: 1 The machine is charging 0 The machine is not charging
GSM signal strength	1	Variable	CSQ value , Hex code

<b>GSM status</b>	<b>1</b>	<b>Variable</b>	<p>Bit 7 to bit 6 are reserved for future use.</p> <p>Bit 5: 1 Internet connection is established 0 Internet connection is not established</p> <p>Bit4: 1 GPRS is registered successfully 0 GPRS is not registered</p> <p>Bit3: 1 The GSM is in roaming mode 0 The GSM is in home network mode</p> <p>Bit2: 1 GSM is registered successfully 0 GSM is not registered yet</p> <p>Bit1: 1 Detected SIM card 0 Not detected SIM card</p> <p>Bit0: 1 The GSM module is started 0 The GSM module is not started yet</p>
<b>Battery voltage</b>	<b>2</b>	<b>Variable</b>	<p>Unit:10mv, for example: 0175H=373(DEC), 375*10mV=3.73V.</p>
<b>Temperature</b>	<b>2</b>	<b>Variable</b>	<p>Unit:0.1℃, hex code,convert to binary first, Bit15: 0 the temperature/humidity sensor is normal 1 the temperature/humidity sensor is abnormal</p> <p>Bit14: 0 the temperature is positive. 1 the temperature is negative.</p> <p>Bit0-13:the temperature value, convert to HEX first , and multiply 0.1℃. for example:01 23=29.1℃ , 41 23= - 29.1℃ 80 00= not connect temperature/humidity sensor</p>
<b>humidity</b>	<b>2</b>	<b>Variable</b>	<p>Unit:0.1%, Hex code,convert to binary first, Bit15: 0 the temperature/humidity sensor is normal 1 the temperature/humidity sensor is abnormal</p> <p>Bit0-14:the humidity value, convert to HEX first , for example: 02 4D=58.9%, FF = not connect temperature /humidity sensor or no humidity</p>
<b>Light Sensor</b>	<b>1</b>	<b>Variable</b>	Bit0 means bright or dark, 0-bright,1-dark;
<b>Extension bits</b>	<b>B=0</b>		For future use, currently, this part has nothing, does not have any byte
<b>Extension bits</b>	<b>C=0</b>		For future use, currently, this part has nothing, does not have any byte
<b>Packet index</b>	<b>2</b>	<b>Variable</b>	The value range of this part is between 1 and 9999
<b>CRC</b>	<b>2</b>	<b>Variable</b>	The checked content is from the “protocol number” to the end at “CRC”, including “protocol number”, excluding “CRC”.
<b>Stop bits</b>	<b>2</b>	<b>0x0D 0x0A</b>	Indicate that this packet is finished