# R16H Ankle Bracelet Protocol Document

**Communication method and principle:**

1) The device and the server communicate using TCP/IP protocol.

2) After the device uploads data, the software platform will not respond. The device can assume that the data has been received by the server if it is successfully sent.

3) If the device cannot connect to the server, it will cache the data after 3 repeated attempts (caching GPSD/LBSD data, and no caching is required if the correct time cannot be obtained for LBSD data), and re-upload it if the server is successfully reconnected.

**Basic data structure:**

@<Data_Type_ID>,<IMEI>[,Command_Data]$

| Item | Description | Remark |
|---|---|---|
| @ | Data header | Fixed content |
| <Data_Type_ID> | Data Type:<br>GPSD=GPS location data<br>LBSD=Indoor location data<br>ROLL=Update location immediately<br>STNA=Set device user name<br>STPH=Set SOS phone numbers<br>STIN=Set location updating interval time<br>STTZ=Set device time zone<br>STAL=Enable/Disable alarm SMS alert<br>CKPA=Check device parameters and status<br>RPLY=Reply setting result | |
| <IMEI> | Device identity ID | Fixed 15 digits |
| [,Command_Data] | Command content | optional |
| $ | Data tail | Fixed content |

**1. GPS Location Data**

Format:

@<GPSD>,<IMEI>,<R/S>,<YYYYMMDD>,<HHMMSS>,<Latitude>,<N/S>,<Longitude>,<E/W>,<Speed>,<Direction>,<Altitude>,<Battery_Percentage>,<Strap_locking_status>,<Alarm_flag>$

| Item | Description | Remark |
|---|---|---|
| <R/S> | Data Type: | |

| | | |
|---|---|---|
| | R=Real time data<br>S=History data in memory | |
| <YYYYMMDD> | Date | |
| <HHMMSS> | Time, using 24-hour format | The time is the local time obtained by adding Greenwich Mean Time to the currently set time zone |
| <Latitude> | Latitude, in degrees format: DD.DDDDD<br><br>Fixed number of digits, add 0 if the number is less than the decimal point, fixed 5 digits after the decimal point | |
| <N/S> | North/South Latitude:<br>N=Northern Hemisphere, S=Southern Hemisphere | |
| <Longitude> | Longitude, in degrees format: DDD.DDDDD<br><br>Fixed number of digits, add 0 if the number is less than the decimal point, fixed 4 digits after the decimal point | |
| <E/W> | East/West longitude: | |
| <Speed> | E=Eastern Hemisphere, W=Western Hemisphere | integer |
| <Direction> | Direction, value range 0~359 | integer |
| <Altitude> | Altitude (unit m) | integer |
| <Battery_Percentage> | Percentage of remaining battery power in the device, value range 0~100 | integer |
| <Strap_locking_status> | Device strap status: L/R | |
| <Alarm_flag> | Alarm flag:<br>SOS=Emergency alarm<br>LBT=Low battery alarm<br>ULK=Strap cutting/Locker released alarm | |

**2. Indoor Location Data**

Format:

@<LBSD>,<IMEI>,<R/S>,<YYYYMMDD>,<HHMMSS>,<LBS_data>,<WiFi_data>,<BLE_data>,<Battery_Percentage>,<Strap_locking_status>,<Alarm_flag>$

| Item | Description | Remark |
|---|---|---|
| <R/S> | Data Type:<br>R=Real time data<br>S=History data in memory | |
| <YYYYMMDD> | Date | |
| <HHMMSS> | Time, using 24-hour format | The time is the local time obtained by adding Greenwich Mean Time to the currently set time zone |
| <LBS_data> | LBS location data, format:<br>MCC-MNC-LAC-CellID-GSM_Signal_Strength+<br>MCC-MNC-LAC-CellID-GSM_Signal_Strength+… | |
| <WiFi_data> | WiFi hot spot data, format:<br>WiFi_Name-WiFi_MAC_Address-Signal_Strength+<br>WiFi_Name-WiFi_MAC_Address-Signal_Strength+… | |
| <BLE_data> | Blue tooth hot spot data, format:<br>BLE_Name-BLE_MAC_Address-Signal_Strength+<br>BLE_Name-BLE_MAC_Address-Signal_Strength+… | |
| <Battery_Percentage> | The remaining battery power percentage of the device, ranging from 0 to 100 integers | The remaining battery power percentage of the device, ranging from 0 to 100 integers |
| <Strap_locking_status> | Device strap locker status:<br>L/R<br>L=Locked<br>R=Released | |
| <Alarm_flag> | Alarm flag:<br>SOS=Emergency alarm<br>LBT=Low battery alarm<br>ULK=Strap cutting/Locker released alarm | |

3. **Update location immediately**

Format: @ROLL,<IMEI>$

Example: @ROLL,356823031235028$

Device Reply: the device will reply with RPLY command, and also upload a GPSD/LBSD data to the platform.

4. **Set device user name**

Format: @STNA,<IMEI>,<Name>$

<Name> is the user name. It must be within 50 English characters. It can contain spaces and decimal points, but cannot contain any other special characters.

Example: @STNA,356823031235028,Y.P.Phakh ST$

Device Reply: The device will reply the execution result using the RPLY instruction.

5. **Set SOS phone numbers**

Format: @STPH,<IMEI>,<Phone_Number1|Phone_Number2|Phone_Number3>$

Up to 3 SOS numbers can be set for receiving SOS calls and making calls to the device. The SOS number will also be used to receive alarm reminder text messages. The phone number can only contain numbers and plus signs.

Example: @STPH,356823031235028,13512345001|+8618666520189|$

Device Reply: The device will reply the execution result using the RPLY instruction.

6. **Set location updating interval time**

Format: @STIN,<IMEI>,<Interval>$

<Interval> is location updating interval time, unit is minute, the range should be integer between 1 and 60.

Example: @STIN,356823031235028,2$

Device Reply: The device will reply the execution result using the RPLY instruction.

7. **Set device time zone**

Format: @STTZ,<IMEI>,<time_zone>$

<time_zone> is time zone offset, the value format is +/-HH:MM， +/- Respectively means adding/subtracting a specific time difference from Greenwich Mean Time. The hours and minutes of the time difference are fixed as 2 digits.

Example: @STTZ,356823031235028,+05:30$

Device Reply: The device will reply the execution result using the RPLY instruction.

8. **Enable/Disable alarm SMS alert**

Format: @STAL,<IMEI>,<ABC>$

A:(0/1/2) SOS Alarm, 0=Platform Alert, 1=Platform & SMS Alert, 2=Platform & Phone Call alert

B:(0/1) Low Battery Alarm, 0=Platform Alert, 1=Platform & SMS Alert

C:(0/1) Strap Cutting/Locker Released Alarm, 0=Platform Alert, 1=Platform & SMS Alert
Example: @STAL,356823031235028,211$
Device Reply: The device will reply the execution result using the RPLY instruction.

Alarm alert SMS Format:
Name: Offender_Name (the name that you set by STNA command)
IMEI: XXXXXXXXXXXXXXX
Alarm Type: SOS/Low Battery/Removal alarm
Time: yyyy-MM-dd HH:mm:ss
Location: https://www.google.com/maps?q=Latitude,Longitude
(The latitude and longitude are in degree format. The latitude in the southern hemisphere is negative, and the longitude in the western hemisphere is negative, such as https://www.google.com/maps?q=1.34587,103.71993)

**9. Check device parameters and status**

Format: @CKPA,<IMEI>$
Example: @CKPA,356823031235028$
Device Reply: The device will reply the execution result using the RPLY instruction.
Reply Content Format:
IMEI= XXXXXXXXXXXXXXX
Name: Offender_Name (the name that you set by STNA command)
GSM=GSM signal level
GPS=GPS signal level
Alarm Alert=0/1 (the setting that you set by STAL command)
Time Zone=+/-HH:MM ( the time zone that you set by STTZ command)
SOS Phone Number=xxxxxx| xxxxxx| xxxxxx

**10. Reply setting result**

Format: @RPLY,<IMEI>,<Source_Command>,<Result>$
<Source_Command> is the source command type that the device reply to, including bellow command type:
ROLL=Update location immediately
STNA=Set device user name
STPH=Set SOS phone numbers
STIN=Set location updating interval time
STTZ=Set device time zone
STAL=Enable/Disable alarm SMS alert
CKPA=Check device parameters and status

<Result> is execution result, 0 means failed, 1 means success.
Example: @STAL,356823031235028,FWMS,1$

11. **Heartbeat data for keep connection alive**

    Format: @LINK,<IMEI>$

    Example: @LINK,356823031235028$