**W300PL device LORAWAN protocol**

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# 

# Overview

|  |  |  |  |
| --- | --- | --- | --- |
| V1.0 |  | 2025-05-08 | Organize the directory, update the agreement content, and add the use instructions of new equipment |

The module over there:

Wristband register network method for watches:

1: Activation by Personalization (OTAA-CLASSA activation method)

Default APPSKEY： 2B7E151628AED2A6ABF7158809CF4F3C

If you need special KEY, please contact with us

2: Another ABP network access mode

CAPPSKEY - EF6D6E2503F57AE2FA151CDA87455F18

CNWKSKEY - 2E8C8650B4041672BBB9A399F2DEB427

**2.Equipment instructions**

**2.1 Device functions and instructions for use**

General version: The default high frequency general is AS923(923.2-924.6), OTAA-CLASSA, if other requirements are required, please put forward requirements

1. starting up：

Please charge the device fully before the first use. The device will automatically start up when the charging power is reached. The charging status shows the charging icon, and the full charge is a green icon

Manual start: Long press the upper key for 10s and then release it. The interface will appear with the word "Welcome"

Note: The default wearing state is on, and the heart rate is not measured to report the fall alarm

1. shut down:

Low power shutdown: the screen is turned off after the interface displays Byebye

Manual shutdown: Shutdown: Long press the button for more than 15 seconds, and the screen will be turned off after the interface display Byebye

Note: Charge when the machine is on without shutting down

1. SOS function:

Trigger mode: the device does not go to sleep after triggering. Long press the button for 3s, and the interface displays SOS SEND OK/SOS sent successfully, followed by SOS icon

Cancellation mode: In SOS mode, long press the button for 3s. After the interface displays SEND CENCEL/SOS cancellation, the SOS icon disappears

1. signal condition:

No signal: the interface signal is a horizontal line, indicating that the device has failed to report or has not entered the network (not within the lora gateway range)

There is a signal: the interface signal has a stepped columnar pattern

1. Device hibernation:

Trigger condition: The device does not move for 40 minutes, enters the sleep mode, and does not report data

**2.2 Default reporting logic for the device**

General version: the report should be within the range of lora gateway, otherwise the report will fail. The default interval for reporting failure is 5 minutes to re-enter the network

1. Power signal report

F9: The power meter step report is reported once when the machine is turned on, and a report will also be followed when the location and health report is reported

1. Location-related reporting

gps/ Bluetooth beacon: the default reporting frequency is 10 minutes, and the default positioning priority is Bluetooth> gps. Bluetooth positioning is preferred, and gps is switched when positioning fails Note: GPS is difficult to locate indoors. Please test in an open and unobstructed outdoor environment

1. Report of alarm related events

SOS alarm (0xB5): triggered by the user. See the previous section for the triggering method

SOS cancellation (0x02): The user actively triggers the cancellation. See the previous section for the triggering method

Power-off alarm (0x02): The device actively shuts down or shuts down with low power. See the previous section for the triggering method

Wearing and falling off alarm (0x02): The device determines the wearing according to the healthy sampling report frequency, reports the wearing alarm when the heart rate is measured, and reports the falling off alarm when the heart rate is not measured

Sedentary alarm (0x02): It is triggered and reported every 3 minutes by default if you do not move

Drop alarm (0x02): The device falls freely at a certain height and meets the drop algorithm trigger

Low power alarm (0x02): triggered when the current power level of the device is less than or equal to 0

1. Health-related reporting

Step count, heart rate, body temperature & wrist temperature, blood pressure, blood oxygen (0x32): the default reporting frequency is 10 minutes

1. Equipment information and status report

Charging status (0xC3): start charging, end charging, and report when fully charged

Note: The device reports the situation of packet reporting, that is, a data packet contains multiple complete messages. Please do not omit the message. The message is a complete message and will not be interrupted in the next data packet

Eg:bdd6000119a9cf610445270387bf452708a1bc44279d18b74427e518b7f9bdf9010000006400002800000019a9cf61ca

this data packet contains (0xD6) Bluetooth location and (0xF9) power signal messages

(0xD6)Bluetooth positioning:bdd6000119a9cf610445270387bf452708a1bc44279d18b74427e518b7f9

(0xF9)Power signal:bdf9010000006400002800000019a9cf61ca

**2.3 Device downlink description**

Universal version: CLASSA accepts the downlink when the device reports

1. Equipment positioning report frequency is issued (0x17):

The default reporting frequency is 10 minutes, and the minimum is 1 minute. After receiving the downlink command, the device receives the command according to the time period and frequency of the issued command Report the data according to the default reporting frequency outside the time period, such as: 00:00-18:00 5-minute location report Report outside the time period at the default reporting frequency of 10 minutes

1. Text message sent (0x28):

Unicode Code, up to 20 Chinese characters 40 bytes, one Chinese character occupies 2 bytes, one English letter occupies 2 byte

1. Equipment positioning priority distribution (0xCE01):

The default positioning priority is Bluetooth> gps. If the positioning priority is Bluetooth beacon> gps, bluetooth positioning cannot be switched When the GPS is successfully located, it will not switch to the next positioning priority to produce positioning

1. Equipment health sampling frequency issued (0xCE02):

The default health sampling frequency is 10 minutes, and the minimum reporting time is 2 minutes

1. Time calibration (0xFF):

Each time the device starts up, it will report the FF00FF message, which needs to be sent down immediately. After receiving the message, the device will calibrate the time according to the down time

1. Falling alarm switch (0xCE07):

The default fall alarm is enabled. After the downlink shutdown command is issued, the device turns off the fall alarm trigger

1. Sedentary alarm switch (0xCE08):

The alarm for prolonged sitting is enabled by default. After the downlink shutdown command is issued, the device turns off the alarm for prolonged sitting

1. Shut down and restart (0x77):

After the down command, the device shuts down or restarts

1. Weather warning (0xCB):

Downward weather warning, the equipment receives and displays the weather warning picture

# 3.Protocol Data Packet Structure

A basic protocol data packet structure is shown in Figure 1.：



**Figure1**

## 3.1 Data Header

Each data packet begins with a 1-byte Header or token (in some response messages, a timestamp is used instead):

Currently, the token for Eurofins devices is fixed as BD

Header: 0xBD

Timestamp: 32 bits, generated by the server

## 3.2 Message ID

MessageId represents the content as described in Chapter 3.

## 3.3 Token Generation Mechanism

Currently fixed to BD

## 3.4 Payload

The payload below refers to the effective content of the protocol, excluding the head token and checksum. The length of the content is indicated afterwards.

The data formats used in the payload are shown in the following table:

[U-unsigned; I-signed; X-bitfield; number-bytes occupied]

In the protocol below, little-endian is used for all data types except for ch, u8, i8, and x8.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Short** | **peTypeType** | **Size(Bytes)** | **Min/max** | **Resolution** | **explain** |
| CH | ASCII/ISO 8859.1 | 1 | - | - | char |
| u8 | Unsigned Char | 1 | 0..255 | 1 | unsigned short |
| i8 | Signed Char | 1 | -128..127 | 1 | short |
| x8 | Bitfield | 1 | - | - | bit |
| u16 | Unsigned Short | 2 | 0..65，535 | 1 | unsigned int |
| i16 | Unsigned Short | 2 | -32,768..32,767 | 1 | int |
| x16 | Bitfield | 2 | - | - | （bit）2 |
| u32 | Unsigned Long | 4 | 0..4,294,967,295 | 1 | unsigned long |
| i32 | Signed Long | 4 | -2,147,483,648..2,147,483,647 | 1 | long |
| u64 | Uint64\_t | 8 | 0..18,446,744,073,709,551,616 | 1 | uint64\_t |
| float | float | 4 | -3.44\*10e38..3.4\*10e38 | - | float |

## 3.5 Checksum

The content to be added to the checksum includes the payload, as shown in Figure 1. The algorithm is as follows, where Buffer[N] represents the data to be accumulated.

Ck\_sum = 0

For(i=0; i<N; i++)

{

ck\_sum = ck\_sum + Buffer[i]

ck\_sum = ck\_sum % 0x100

}

ck\_sum = 0xFF – ck\_sum

Return ck\_sum

Where ck\_sum cannot exceed 0xFF, so after each loop, it must be modulo 0x100 and then taken the remainder.

# **4.**messages

## 4.1 Equipment information related

### 4.1.1 Power quantity and step counting report protocol (0xF9)

After the terminal connects to the server, it uploads a heartbeat packet to the server at fixed intervals.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Message | MSG\_HTB\_UPL | | | |
| Decription | heartbeat packet | | | |
| Firmware | -/- | | | |
| Payload Length | 15 bytes | | | |
| Message structure | Hearer | Message ID | Payload | Checksum |
| token | 0xF9 | 见下方定义 | CK\_sum |

payload contents

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Byte offset | Format | Name | Scale | Unit | Decription |
| 1 | U8 | Bat\_type |  |  | Battery Type  0: 4-level  1: 5-level  2: Percentage  3: Voltage |
| 2 | u16 | Bat\_volt |  | -/- | Battery Level  If Bat\_type is 0:  The battery level ranges from 0 to 3  (0 for 25%, 3 for 100%)  If Bat\_type is 1:  The battery level ranges from 0 to 4  (0 for 20%, 4 for 100%)  If Bat\_type is 2:  The battery level ranges from 0 to 100 |
| 1 | U8 | Signal\_type |  |  | Signal Type  0: Percentage  1: 5-level  2: CSQ value |
| 2 | I16 | Signal\_strength |  |  | Signal\_strength |
| 1 | U8 | Other\_type |  |  | Extension Type  0: Full Step Count  1: Incremental Step Count  2: Vibration |
| 4 | U32 | Num |  |  | Extended value |
| 4 | U32 | Timestamp | -/- | -/- | Utc Timestamp |

Example： BD F9 02 1E00 00 5000 00 94040000 8CAF5667 CD

F9 : MSGID

02： Percentage of power

1E00 : littele Endian，Power 30%

00： Signal strength percentage is indicated

5000： littele Endian，Signal strength 80%

00： Count all steps

0x00000494：Prodometer 1172 (step)；

8CAF5667： Timestamp: Beijing time2024-12-09 16:51:24

## 4.2 Positioning related reporting

### 4.2.1GPS/BDS Position Reporting: Location Data Reporting (0x03)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Message | MSG\_UPL\_GPS | | | |
| Decription | GPS/BDS | | | |
| Firmware | -/- | | | |
| Payload Length | 23 bytes | | | |
| Message structure | Hearer | Message ID | Payload | Checksum |
| token | 0x03 | See below | CK\_sum |

payload contents

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Byte offset | Format | Name | Scale | Unit | Decription |
| 8 | Double | lon |  | -/- | longitude |
| 8 | Double | lat |  |  | latitude |
| 1 | U8 | north\_south |  |  | /\*N or S\*/ |
| 1 | U8 | east\_west |  |  | /\*E or W\*/ |
| 1 | U8 | status |  |  | /\*A or V\*/ |
| 4 | U32 | Timestamp |  |  | Timestamp |

Example：bd 03 22fb20cb827a5c40 21ea3e00a9953640 4e 45 41 cf084e5f 13

03: MSGID

22fb20cb827a5c40 : 小端（littele Endian），0x405c7a82cb20fb22，数据为double类型，需要转为浮点数，longitude值为：113.9142330000000 （dd.dddd格式）；(Double type, need change the data to Floating point

21ea3e00a9953640 : 小端（littele Endian），0x403695a9003eea21，数据为double类型，需要转为浮点数，longitude值为：23.5846100000000（TYPE:dd.dddd）；(Double type, need change the data to Floating point)

4E : ASCII 编码表述，南、北纬度，范围为/\*N or S\*/，表示为：N（北纬）；

(ASCII code, south and north latitude, the range is /\*N or S\*/,: N (north latitude))

45 : ASCII 编码表述，东、西经度，范围为/\*E or W\*/，表示为：E（东经）；

(ASCII code, east and west longitude, range is /\*E or W\*/: E (east longitude))

41 : ASCII 编码表述，定位状态，范围为/\*A or V\*/，表示为：A（有效）；

(ASCII code representation, positioning status, range is /\*A or V\*/, expressed as: A (valid))

cf084e5f : 小端（littele Endian），0x5f4e08cf，Unix时间戳转换后，值为：2020/9/1 16:39:43 ；

Example of GPS parsing (JAVA)：

DBDBDBDB037d9f84ac81815c40e766926b1d8936404e4541749d695f0b

//DBDBDBDB03 7d9f84ac81815c40 e766926b1d893640 4e 45 41 749d695f 0b

public static void main(String[] args){

//eg:7d9f84ac81815c40 -->405c8181ac849f7d

Double.longBitsToDouble(Long.parseLong("405c8181ac849f7d",16))); //114.02353966666665

//message e766926b1d893640 actual value 4036891d6b9266e7

Double.longBitsToDouble(Long.parseLong("4036891d6b9266e7", 16))) ;//22.535605166666667

HexToStr(data.Substring(“4e”)); //N

HexToStr(data.Substring(“45”));//E

HexToStr(data.Substring(“41”));//AA represents data "OK", V represents a warning

//Message 749d695f actual value 5f699d74

Date date=new Date();

date.setTime(Long.parseLong(“5f699d74",16)\*1000);

SimpleDateFormatsdf = new SimpleDateFormat("yyyyMMddHHmmss");

System.out.println(sdf.format(date)); //2020-09-22 14:45:08

### 4.2.2 Bluetooth positioning information(LBE Location)（MsgId=0xD6）

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Message | MSG\_HTB\_UPL | | | |
| Decription | LBE Location | | | |
| Firmware | -/- | | | |
| Payload Length | 1 bytes +n | | | |
| Message structure | Hearer | Message ID | Payload | Checksum |
| token | 0xD6 | See below | checksum |

Payload:

|  |  |  |  |
| --- | --- | --- | --- |
| Format | Name | Scale | Description |
| U8 | Type | 1 | Currently fixed to0 (Fix value 0) |
| U8 | Total\_groups | 1 | Total number of assemblies, there may be multiple sets of information, and each set may contain multiple items.  ibeacon (The total number of groups, there may be multiple groups of information, and there may be multiple ibeacons in each group) |
| Int32 | Utc | 4 | Utctimestamp (the UTC timestamp of the first group) |
| U8 | Total\_PackCount | 1 | Total number of packages at the current time: (the ibeacon’s count of the first group) |
| U16 | Major0 | 2 | Major |
| U16 | Minor0 | 2 | Minor |
| S8 | Rssi0 | 1 | Rssi |
| U16 | MajorN | 2 | Major |
| U16 | MinorN | 2 | Minor |
| S8 | RssiN] | 1 | Rssi |
| Int32 | Utc | 4 | Utc timestamp (UTC timestamp of the second group) |
| U8 | Total\_PackCount | 1 | Total number of packages at the current time (the ibeacon’s count of current group) |
| U16 | Major0 | 2 | Major |
| U16 | Minor0 | 2 | Minor |
| S8 | Rssi0 | 1 | Rssi |
| U16 | MajorN | 2 | Major |
| U16 | MinorN | 2 | Minor |
| S8 | RssiN] | 1 | Rssi |

Example：

BDd60001be20315f0443271794ac43273094aa4327b956a54327fe94a56a

**BD - header**

**d6 - msgID**

**00 - type**

**01 -- Only one set of iBeacon data（total groups of beacons data :1）**

be20315f -- The first group’s timestamp: 0x5f3120be=1597055166

There are 4 beacon information in the first group.4327 --- major : 0x2743 = 10051

1794--- minor: 0x9417 = 37911

ac--- rssi: 0xac = -84

4327 --- major: 0x2743 = 10051

3094--- minor:0x9430 = 37936

aa--- rssi:-86

4327 --- major: 0x2743 = 10051

b956--- minor:0x56b9 = 22201

a5--- rssi:-91

4327 --- major: 0x2743 = 10051

fe94--- minor:0x94fe=38142

a5--- rssi:-91

6a --checksum

**4.3：Alarm related reporting**

### 4.3.1Alarm data upload (0x02)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Message | LNK-WRN | | | |
| Description | Terminal uploads its warnings to terminal server. | | | |
| Firmware |  | | | |
| Direction | Terminal => Terminal Server | | | |
| Payload length | 6 bytes | | | |
| Message structure | Header | Message ID | Payload | Checksum |
| Token | 0x02 | See below | CK\_sum |

Payload contents

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Byte Offset | Format | | Name | Scale | Unit | Drscription |
| 2 | x16 | | Upl\_warn | - | - | Bitfield see below(Little-endian) |
| 4 | | U32 | Timestamp |  |  | Timestamp (timestamp will be added afterwards for supplementary upload) |
|  |  | |  |  |  |  |

Bitfield WRN:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 15 |  |  |  |  |  |  |  |  |  |  | 4 |  |  | 1 | 0 |

Below is the corresponding definition table for when the bit is 1 and the current alarm. Multiple alarms may also be present simultaneously.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| bit | Name | Description | Code | 调整后的16进制 | 十进制 |
| 15 | Gas alarm（- special equipment support） | Gas alarm（- special equipment support） | 0 | 8000 |  |
| 14 | Drop the alarm | Drop the alarm | 1 | 4000 | 4\*4096=16384 |
| 13 | Fence alarm（- special equipment support） | Fence alarm (away from the beacon) （- special equipment support）） | 2 | 2000 | 2\*4096=8192 |
| 12 | Strap damage（- special equipment support） | Strap damage（- special equipment support） | 3 | 1000 | 1\*4096=4096 |
| 11 | Lock open（- special equipment support） | Lock open（- special equipment support） | 4 | 0800 | 8\*256=2048 |
| 10 | Approaching beacon point (125K) （- special equipment support） | Approaching beacon point (125K) （- special equipment support） | 5 | 0400 | 4\*256=1024 |
| 9 | Release key  （- special equipment support） |  | 6 | 0200 | 2\*256=512 |
| 8 | Wearing device | Wearing device | 7 | 0100 | 1\*256=256 |
| 7 | Cancel SOS | Cancel SOS | 8 | 0080 | 8\*16=128 |
| 6 | Vibration alarm（- special equipment support） | Vibration alarm（- special equipment support） | 9 | 0040 | 4\*16=64 |
| 5 | Sedentary alarm | Sedentary alarm | 10 | 0020 | 2\*16=32 |
| 4 | Remove device | Remove device | 11 | 0010 | 1\*16=16 |
| 3 | Open box alarm（- special equipment support） | Open box alarm（- special equipment support） | 12 | 0008 | 8 |
| 2 | Shutdown | Shutdown | 13 | 0004 | 4 |
| 1 | SOS |  | 14 | 0002 | 2 |
| 0 | Low Battery | Low Battery | 15 | 0001 | 1 |

BD02020007FD8860E7 true value 0002—0000 0000 0000 0010 SOS alarm

Timestamp = 07FD8860 is equal to 6088FD07 = 1619590407. This represents the time when 1619590407 seconds have elapsed since 1970-01-01 00:00:00. This corresponds to the device reporting the time as 2021/4/28 6:13:27.

Alarm 02 and each independent, the status of the corresponding bit is not associated in the context of non-related alarms, only the current bit alarm with a value of 1 is processed, and the corresponding processing is performed.

### 4.3.2 Alarm data upload(0x21) (supplement to 0x02)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Message | LNK-WRN | | | |
| Description | Terminal uploads its warnings to terminal server. | | | |
| Firmware |  | | | |
| Direction | Terminal => Terminal Server | | | |
| Payload length | 8 bytes | | | |
| Message structure | Header | Message ID | Payload | Checksum |
| Token | 0x21 | See below | CK\_sum |

Payload contents

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Byte Offset | Format | | Name | | Scale | Unit | Drscription | |
| 2 | U16 | | type | |  |  | Type of alarm | |
| 4 | U32 | | Upl\_warn | | - | - | Bitfield see below(Small end priority) | |
| 4 | U32 | Timestamp | |  | |  | | Timestamp (timestamp will be added afterwards for supplementary upload) |
|  |  | |  | |  |  |  | |

Alarm type =1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 2 | Device is charging and powered off (firmware functionality support required) |  | 29 | 0004 | 4 |
| 1 | Device low on power, powered off (firmware functionality support required) |  | 30 | 0002 | 2 |
| 0 | Device powered off manually (firmware functionality support required) |  | 31 | 0001 | 1 |

BD21010001000000ECFFBE65DA

### 4.3.3upload alarm information（0x16）

Special Note: This is a supplement to 0x02. The original 0x02 is limited by the number of digits and cannot represent these combinations of alarms.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Message | MSG\_NB\_SOS | | | |
| Decription | Upload SOS information, including temperature and heart rate alarms. | | | |
| Firmware | -/- | | | |
| Payload Length | 7+4 bytes | | | |
| Message structure | Hearer | Message ID | Payload | Checksum |
| token | 0x16 | See below | CK\_sum |

payload contents

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Byte offset | Format | Name | Scale | Unit | Decription |
| 1 | U8 | Type | -/- | -/- | Alarm types (  0: heart rate alarm  1:temperature alarm) |
| 2 | U16 | Heart | -/- | -/- | heart rate |
| 2 | U16 | temperature | -/- | -/- | temperature |
| 2 | U16 | Pa | -/- | -/- | pressure |
| 4 | 4\*U8 or U32 | expand | -/- | -/- | 4-byte extension for other sensors. |

Currently, the last four bytes of the isolated wristband are used as a timestamp.

### **4.3.4** SOS Message（MSGID=0XB5）

|  |  |  |  |
| --- | --- | --- | --- |
| Byte offset | Format | Name | Decription |
| 1 | U8 | Status | 1:SOS |
| 4 | Int32 | timestamp | timestamp littele Endian |

Example：**bdb50128F2CD5F55**

28F2CD5F: Timestamp: Beijing time2020-12-07 17:13:12

**4.4Equipment information and status reporting**

### 4.4.1 Device charging status upload (0xC3)--Special version to use

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Message | MSG\_HRD\_DATA | | | |
| Decription | Device charging status upload ，Terminal=>Terminal Server | | | |
| Firmware | -/- | | | |
| Payload Length | 5 bytes | | | |
| Message structure | Hearer | Message ID | Payload | Checksum |
| token | 0xC3 | See below | CK\_sum |

payload contents

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Byte offset | Format | Name | Scale | Unit | Decription |
| 0 | U8 | Status | / | / | 0start，  1end，  2 fully charged |
| 1 | U32 | Timestamp |  |  | Timestamp |

Eg:

BDC301DB4D2F668A The device is charged at the end

BDC300DB4D2F668A The device starts charging

BDC302DB4D2F668A The equipment is fully charged

**4.5 Downstream feedback report**

### 4.5.1Downlink feedback(MSGID=0xC0)---General firmware is not available

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Message | MSG\_HRD\_DATA | | | |
| Decription | Terminal =>Server | | | |
| Firmware | -/- | | | |
| Payload Length | 1 +n bytes | | | |
| Message structure | Hearer | Message ID | Payload | Checksum |
| token | 0xC0 | See below | CK\_sum |

payload contents

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Byte offset | Format | Name | Scale | Unit | Decription |
| 1 | U8 | length | -/- |  | Message ID length |
| N | n\*U8 | type | -/- |  | N Message ID |
|  |  |  |  |  |  |

This command is used for the feedback of downlink commands, returning the Message ID(s) received earlier (multiple Message ID can be returned collectively).

### 4.5.2Message status reporting(MSGID=0x28)---General firmware is not available

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Message | MSG\_HRD\_DATA | | | |
| Decription | Terminal =>Server | | | |
| Firmware | -/- | | | |
| Payload Length | 1 bytes | | | |
| Message structure | Hearer | Message ID | Payload | Checksum |
| token | 0x28 | See below | CK\_sum |

payload contents

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Bytes | Format | Name | Scale | Unit | Decription |
| 4 | U32 | timestamp | -/- | -/- | Time stamp |
| 1 | U8 | type | -/- | -/- | Type (corresponding to 0X28 downlink), currently 0x03 |
| 1 | U8 | status | -/- | -/- | Message status  1: Read, received |
| 4 | U32 | serial number | -/- | -/- | (corresponding to 0X28 downlink) |
|  |  |  |  |  |  |

## 4.6Health related reports

### 4.6.1Health Data (MSGID = 0 x 32)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. Message | MSG\_HRD\_DATA | | | |
| Decription | Heart rate data upload，Terminal=>Terminal Server | | | |
| Firmware | -/- | | | |
| Payload Length | 8+3n bytes | | | |
| Message structure | Hearer | Message ID | Payload | Checksum |
| token | 0x32 | See below | CK\_sum |

payload contents

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Byte offset | Format | Name | Scale | Unit | Decription |
| 1 | U8 | bp\_high | - | - | systolic pressure |
| 1 | U8 | bp\_low | - | - | diastolic pressure |
| 1 | U8 | Hrs |  |  | heart |
| 1 | U8 | Spo2 |  |  | blood oxygen |
| 2 | U16 | wrist Temp | - | - | Wrist temperature：2byte |
| 2 | U16 | Body Temp. |  |  | (body) temperature：2byte |
| 4 | U32 | Step |  |  | Step：4byte |
| 1 | U8 | Bat |  |  | Power level |
| 1 | U8 | sign |  |  | signal |
| 4 | Int32 | timestamp |  |  | Time stamp, small end |

Example：bd32 74 51 53 62 4b01 6d01 04040000 04 64 049ed361 96

32 : MSGID；

74: systolic pressure 116

51 : diastolic pressure 81

53： heart 83

62： blood oxygen 98

4b01 : littele Endian，Wrist temperature 33.1

6d01： littele Endian，(body) temperature 36.5

04040000： step 1028

04： Power level level 4

Value 0 - 4 Mean 20% - 100% (20% 40% 60% 80% 100%)

64 : signal intensity 100%

049ed361： Timestamp: Beijing time2022-01-04 09:08:20

96: check

The new version is used:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Byte offset | Format | Name | Scale | Unit | Decription |
| 1 | U8 | Type |  |  | 00 |
| 4 | U32 | Timestamp |  |  | Time stamp |
| 2 | U16 | contentLength |  |  | the total length of the following content |
| 1 | U8 | ID |  |  | ID (Type (5) + Reported Value Length (3)) |
| 2 | U16 | Val1 |  |  | Reported value of ID |
|  |  |  |  |  |  |
| 1 | U8 | ID |  |  | ID (Type (5) + Reported Value Length (3)) |
| 2 | U16 | Val1 |  |  | Reported value of IDn |

The ID codes are as follows (the protocol defines the high 5 bits of the ID):

01 Step count

02 Heart rate

03 Body temperature

04 Wrist temperature

05 Blood sugar--nonsupport

06 Diastolic pressure

07 Systolic pressure

08 Blood oxygen

10 Number of sit-ups--nonsupport

11 Running pace and distance--nonsupport

12 Skipping speed and count--nonsupport

Eg1:

BD3200B3C4F26311000A1E00114B314A39711A4A0122bc00416212

B3C4F263: 63f2c4b3(Hexadecimal timestamp)

0F00 :Total length excluding the last byte (checksum)

0A1E00：0x0A=00001 010. The first five bits are 00001, representing the data ID for step counting (0x01). The last three bits are 010, indicating that the length of the step count data is 2 bytes. 0x001E represents step count data, totaling 30 steps.

114B：0x11=00010001. The first five bits are 00010, representing the data ID for heart rate (0x02). The last three bits are 001, indicating that the length of the heart rate data is 1 byte. 0x4B represents the heart rate data, with a heart rate of 75.

314A：0x31=00110001. The first five bits are 00110, representing the data ID for diastolic blood pressure (0x06). The last three bits are 001, indicating that the length of the diastolic blood pressure data is 1 byte. 0x4A represents the diastolic blood pressure data, which is 74.

3971：0x39=00111 001. The first five bits are 00111, representing the data ID for systolic blood pressure (0x07). The last three bits are 001, indicating that the length of the systolic blood pressure data is 1 byte. 0x71 represents the systolic blood pressure data, which is 113.

1A4A01：0x1A=00011 010. The first five bits are 00011, representing the data ID for temperature (0x03). The last three bits are 010, indicating that the length of the temperature data is 2 bytes. 0x014A represents the temperature data, which is 330.

22BC00 ：0x22=00100 010. The first five bits are 00100, representing the data ID for wrist temperature (0x04). The last three bits are 010, indicating that the length of the wrist temperature data is 2 bytes. 0x00BC represents the wrist temperature data, which is 188.

4162:0x41=01000001 The top five are 01000, code data id blood oxygen (0x08), and the last three bits are 001, which means that the length of blood oxygen data is 1 byte. 0x62 is blood oxygen data, which is 98

### 4.6.2 Upload of device sleep analysis data (0xC5)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Message | MSG\_HTB\_UPL | | | |
| Decription | AnalyseSlepp Data；Report time: 21:00-08:00 | | | |
| Firmware | -/- | | | |
| Payload Length | 14 bytes | | | |
| Message structure | Hearer | Message ID | Payload |  |
| token | 0xC5 | See below | -/- |

payload contents

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Byte offset | Format | Name | Scale | Unit | Decription |
| 4 | Int32 | DateTime |  | -/- | Upload UTC start time |
| 4 | Int32 | DateTime |  |  | Upload UTC end time |
| 2 | Int16 | Sleepminute |  |  | Upload minutes of sleep time |
| 4 | Int32 | Type |  |  | Upload type, 1 for deep sleep, 2 for light sleep, 3 for awake duration |
|  |  |  |  |  |  |

BDC5AC338860693B8860210001000000D1

It indicates 1 for deep sleep, start time 2021/4/27 23:54:20, end time 2021/4/28 0:27:21, duration 33 minutes.

# **5 Setting**

## 5.1 Downward instructions

### 5.1.1 Set periodic upload（0x17）

The platform sets 1-4 time slots to send to the terminal. After the terminal receives the data, it uploads the data within the specified time slot.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Message | MSG\_NB\_SLT | | | |
| Decription | downlink | | | |
| Firmware | -/- | | | |
| Payload Length | 28 bytes | | | |
| Message structure | Hearer | Message ID | Payload | Checksum |
| token | 0x17 | See below | CK\_sum |

payload contents

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Byte offset** | **Format** | **Name** | **Scale** | **Unit** | **Decription** |  |
| 1 | u8 | enable | -/- | -/- | Enabled? | Time Slot 1 |
| 1 | U16 | Interval |  |  | Time interval (minutes) |
| 1 | u8 | time\_start\_h |  |  | -h |
| 1 | u8 | time\_start\_m |  |  | -m |
| 1 | u8 | time\_end\_h |  |  | -h |
| 1 | u8 | time\_end\_m |  |  | -m |
| 1 | u8 | enable | -/- | -/- | Enabled? | Time Slot 2 |
| 1 | U16 | Interval |  |  | Time interval (minutes) |
| 1 | u8 | time\_start\_h |  |  | -h |
| 1 | u8 | time\_start\_m |  |  | -m |
| 1 | u8 | time\_end\_h |  |  | -h |
| 1 | u8 | time\_end\_m |  |  | -m |
| 1 | u8 | enable | -/- | -/- | Enabled? | Time Slot 3 |
| 1 | U16 | Interval |  |  | Time interval (minutes) |
| 1 | u8 | time\_start\_h |  |  | -h |
| 1 | u8 | time\_start\_m |  |  | -m |
| 1 | u8 | time\_end\_h |  |  | -h |
| 1 | u8 | time\_end\_m |  |  | -n |
| 1 | u8 | enable | -/- | -/- | Enabled? | Time Slot 4 |
| 1 | U16 | Interval |  |  | Time interval (minutes) |
| 1 | u8 | time\_start\_h |  |  | -h |
| 1 | u8 | time\_start\_m |  |  | -m |
| 1 | u8 | time\_end\_h |  |  | -h |
| 1 | u8 | time\_end\_m |  |  | -m |

Example：

bd 17 01 03 00 00 00 13 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 dd

From 0:00 to 19:00, location is updated every 3 minutes.

BD17010A000000173B00000000000000000000000000000000000000000097

From 0:00 to 23:59, location is updated every 10 minutes.

### 5.1.2 Message Send（MSGID=0X28）

|  |  |  |  |
| --- | --- | --- | --- |
| Byte size | Format | Name | Decription |
| 1 | U8 | type | Message type, if it is downlink information, the fixed value is 05 |
| 4 | Uint32 | seqID | The id of the information, the uniqueness（Information id, uniqueness） |
| 1 | U8 | CONTENT LEN | Contect Length |
| N | N | CONTENT | Content, Unicode coding, small end expression |

Example： bd 28 05 03 00 00 00 16 68 00 65 00 6c 00 6c 00 6f 00 2c 00 77 00 6f 00 72 00 6c 00 64 00 dd

Type: 05

seqId:03 00 00 00

CONTENT LEN: 16 (22)

CONTENT :6800 6500 6c00 6c00 6f00 2c00 7700 6f00 7200 6c00 6400 ( hello,world)

### 5.1.3 Setting（0XCE）---See detailed instructions-Important Downside

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Message | MSG\_HRD\_DATA | | | |
| Decription | setting，Server => Terminal downlink | | | |
| Firmware | -/- | | | |
| Payload Length | 4+n bytes | | | |
| Message structure | Header | Message ID | Payload | Checksum |
| token | 0xCE | See below | CK\_sum |

payload contents

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Byte offset | Format | Name | Scale | Unit | Decription |
| 0 | u8 | Type | -/- | -/- | Type see below |
| 1 | u8 | Valid | -/- | -/- | Temporary valid, always valid |
| 2 | U16 | Len | -/- | -/- | Length of the following instruction |
| 4 | n |  | -/- | -/- | Main text |
|  |  |  |  |  |  |

Type 01 Positioning 02 health 03 Alarm (not reserved yet) 04 Local storage (not reserved yet)

05Bluetooth radio switch 06Position and health data reporting switch 07 Fall alarm switch 08 Stay alarm switch, expandable at the back

Valid 00 Always valid 01 Effective this time 02 Off

Length Length of the following instruction

Main text:

Type

01 Positioning function The main text can only be the basic class 01 - gps 02 - wifi 03 - Bluetooth beacon 04 - LBS base station 05 - 125k and later expanded basic class The main text can be a combination of 01 or 010204;

Such as 010203 means using gps wifi Bluetooth beacon;The lora device does not support wifi

Example: ( Bluetooth> gps): BDCE0100030003010033

gps positioning priority (gps> Bluetooth): BDCE0100030001030033

03 The local alarm function can set heart rate alarm, and the blood pressure alarm falls off. which can be expanded after falling (type definition to be added) - -reserved for no

04 Local storage function (reserved) Keep those data in time-reserved temporarily

07 Fall alarm switch

00---open eg:BDCE0700000093

02---close eg:BDCE0702000093

08 Stay alarm switch

00---open eg:BDCE0800000093

02---close eg:BDCE0802000093

### 5.1.4 Issuance of dwell alarm trigger time（MSGID=0XCC）

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Message | MSG\_HRD\_DATA | | | |
| Decription | Issuance of dwell alarm trigger time，Server => Terminal | | | |
| Firmware | -/- | | | |
| Payload Length | 4+n bytes | | | |
| Message structure | Hearer | Message ID | Payload | Checksum |
| token | 0xCC | See below | CK\_sum |

payload contents

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Byte offset | Format | Name | Scale | Unit | Decription |
| 0 | U8 | minute | -/- | -/- | The duration of the stay alarm (unit: minutes; value range 2-60), during which no activity will trigger the stay alarm |

Example：

bd cc 05 dd

05 -- 0x05 Report a stop alarm for 5 consecutive minutes of inactivity on the watch (when the watch is worn)

### 5.1.5 Shutdown and restart (0x77) (issued when the device is turned on, this command is invalid when the device is turned off)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Message | MSG\_CFG\_PWR | | | |
| Decription | Shutdown and restart （issued when the device is turned on, this command is invalid when the device is turned off） | | | |
| Firmware | -/- | | | |
| Payload Length | 1 bytes | | | |
| Message structure | Hearer | Message ID | Payload | Checksum |
| token | 0x77 | See below | CK\_sum |

payload contents

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Byte offset | Format | Name | Scale | Unit | Decription |
| 1 | u8 | enable | -/- |  | 1shut down |
| 1 | u8 | enable | -/- |  | 0 restart |

Eg：

restart："BD770193"

shut down："BD770093"

### 5.1.6 Weather warning（0XCB）

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Message | MSG\_HRD\_DATA | | | |
| Decription | Server => Terminal | | | |
| Firmware | -/- | | | |
| Payload Length | 4+n bytes | | | |
| Message structure | Hearer | Message ID | Payload | Checksum |
| token | 0xCB | See below | CK\_sum |

payload contents

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Byte offset | Format | Name | Scale | Unit | Decription |
| 0 | U8 | Count | -/- | -/- | Several sets of weather warnings |
| 1 | U8 | type | -/- | -/- | Weather warning type |
| 1 | U8 | Status | -/- | -/- | status |
| … | … | ……. |  |  | ….. |

Type：

|  |  |  |  |
| --- | --- | --- | --- |
| Type | Decription | Status |  |
| 1 | Storm warning | 0 | Cancel the alarm |
| 1 - 8 |  |
| 2 | rainstorm warning | 0 | Cancel the alarm |
| 1 |  |
| 2 |  |
| 3 |  |
| 3 | Thunderstorm warning | 0 | Cancel the alarm |
| 1 |  |
| 4 | Flood warning | 0 | Cancel the alarm |
| 1 |  |
| 5 | Mountain mud pouring warning | 0 | Cancel the alarm |
| 1 |  |
| 6 | Strong monsoon warning | 0 | Cancel the alarm |
| 1 |  |
| 7 | Frost warning | 0 | Cancel the alarm |
| 1 |  |
| 8 | Fire danger warning | 0 | Cancel the alarm |
| 1 |  |
| 2 |  |
| 9 | Temperature warning | 0 | Cancel the alarm |
| 1 |  |
| 2 |  |
| 10 | Tsunami warning | 0 | Cancel the alarm |
| 1 |  |
| 11 | Heat index | 0 | Cancel the alarm |
| 1 |  |
| 2 |  |
| 3 |  |

Example：

bd cb 01 01 03 dd

01 A total of 1 set of weather warning

01 SStrong Wind Signal No.3

BD CB 0A 0101 0201 0301 0401 0501 0601 0701 0801 0901 0A01 F5

10 sets of weather warning; note that each group of weather warning must be different, not the same type of warning, otherwise it is invalid

### 5.1.7 Personal information issued（MSGID=0XCA）

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Byte size | Format | Name | Scale | Unit | Decription |
| 1 | U8 | count | -/- |  | Issue a few groups of information |
| 1 | U8 | type | -/- |  | type |
| 1 | U8 | len | -/- |  | len |
| N | U8 | content | -/- |  | Content (unicode coding, small end representation) |

Type:

1 – name 2 – English name 3 – telephone 4 – blood type

Example：

bd CA 04 01 06 0B7A 2759 8765 02 18 4300 6800 6100 6e00 2000 5400 6100 6900 2000 4d00 6100 6e00

03 10 3900 3900 3800 3800 3600 3600 3300 3300 04 02 4100 dd

01 name

06 length 6

0B7A 2759 8765 程大文

02 English name

18 length 24

4300 6800 6100 6e00 2000 5400 6100 6900 2000 4d00 6100 6e00 Chan Tai Man

03 telephone

10 length 16

3900 3900 3800 3800 3600 3600 3300 3300 99886633

04 blood type

02 length 2

4100 A

### 5.1.8 Set the health data sampling and reporting cycle（MSGID=0X1C）

The platform sets 1 to 4 periods to be sent to the terminal. After receiving, the terminal uploads data within the specified period

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Message | MSG\_NB\_SLT | | | |
| Decription | Server => Terminal | | | |
| Firmware | -/- | | | |
| Payload Length | 28 bytes | | | |
| Message structure | Hearer | Message ID | Payload | Checksum |
| token | 0x1C | See below | CK\_sum |

payload contents

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Byte offset** | **Format** | **Name** | **Scale** | **Unit** | **Decription** |  |
| 1 | u8 | enable | -/- | -/- | Enabled? | Time Slot 1 |
| 1 | U16 | Interval |  |  | Time interval (minutes) |
| 1 | u8 | time\_start\_h |  |  | -h |
| 1 | u8 | time\_start\_m |  |  | -m |
| 1 | u8 | time\_end\_h |  |  | -h |
| 1 | u8 | time\_end\_m |  |  | -m |
| 1 | u8 | enable | -/- | -/- | Enabled? | Time Slot 2 |
| 1 | U16 | Interval |  |  | Time interval (minutes) |
| 1 | u8 | time\_start\_h |  |  | -h |
| 1 | u8 | time\_start\_m |  |  | -m |
| 1 | u8 | time\_end\_h |  |  | -h |
| 1 | u8 | time\_end\_m |  |  | -m |
| 1 | u8 | enable | -/- | -/- | Enabled? | Time Slot 3 |
| 1 | U16 | Interval |  |  | Time interval (minutes) |
| 1 | u8 | time\_start\_h |  |  | -h |
| 1 | u8 | time\_start\_m |  |  | -m |
| 1 | u8 | time\_end\_h |  |  | -h |
| 1 | u8 | time\_end\_m |  |  | -n |
| 1 | u8 | enable | -/- | -/- | Enabled? | Time Slot 4 |
| 1 | U16 | Interval |  |  | Time interval (minutes) |
| 1 | u8 | time\_start\_h |  |  | -h |
| 1 | u8 | time\_start\_m |  |  | -m |
| 1 | u8 | time\_end\_h |  |  | -h |
| 1 | u8 | time\_end\_m |  |  | -m |

Example：

BDBDBDBD 1C 01 03 00 00 00 13 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 dd

From 0 to 19, the data of heart rate, blood pressure, blood oxygen and temperature are sampled every 3 minutes and reported

BDBDBDBD 1C 010A000000173B00000000000000000000000000000000000000000097

0-23:59, health data is sampled every 10 minutes and reported

Note: After setting, report according to the time period, and do not report outside the time period. One day is 00:00-23:59

## 5.2 Server time synchronization

### 5.2.1 Request time calibration data command

|  |  |  |  |
| --- | --- | --- | --- |
| Byte offset | Format | Name | Decription |
| 1 | U8 | HEADER | 0xFF |
| 1 | U8 | SeqId | 0x00 |
| 1 | U8 | End | 0xFF |

Example：FF00FF

### 5.2.2 Time calibration request data reply format

|  |  |  |  |
| --- | --- | --- | --- |
| Byte offset | Format | Name | Decription |
| 1 | U8 | HEADER | 0xFF |
| 1 | U8 | SeqId | 0x10 |
| 2 | U16 | years | years |
| 1 | U8 | month | month |
| 1 | U8 | Day | Day |
| 1 | U8 | time | time |
| 1 | U8 | Minute | Minute |
| 1 | U8 | Seconds | Seconds |
| 1 | U8 | End | 0xFF |

Example：FF1007E409020B1B28FF

FF : Header

10 : Seqid

07E4: Year（2020）

09 : Month，（09）

02 : Day，（02）

0B : Hour，（11）

1B : Minitus，（27）

28 : Second，（40）

FF : End

Note：After the device is turned on, it will automatically send a request time synchronization command. Need to reply to the synchronization time data frame after receiving the synchronization instruction to synchronize the device time