**Oviphone Technology Limited Company: W200PL device LORAWAN protocol**

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#

# Overview

This agreement is applicable to the Oviphone W200P LoRaWAN watch. If downlink confirmation (full duplex mode) or other protocols are required, please consult with Oviphone Communication (Oviphone Communication has other customized protocol applications).

This protocol use for Oviphone W200P LoRaWAN wristband) .

If you need downlink confirmation (full-duplex mode) or other protocols, please check with Oviphone.

With the continuous improvement and enrichment of device functions, this agreement will be constantly updated. Please download the latest version from the server. This document will continue updape, please download the newest version. http://aiday.com.cn/Help/api/Device/LORA/

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 Oviphone

2: Another ABP network access mode

CAPPSKEY - EF6D6E2503F57AE2FA151CDA87455F18

CNWKSKEY - 2E8C8650B4041672BBB9A399F2DEB427

1. **Equipment instructions**

**2.1 Function and instructions of the equipment**

 General version: the default high frequency general is CN923(923.2-924.6), OTAA-CLASSA, if you need other frequency bands, please put forward your requirements

1. starting up:

 Please charge fully before the first use. When the charging reaches the power required for the device to start, the device will automatically start. 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, "Welcome" will appear on the interface

Note: The default wearing state is when the device is turned on. If no heart rate is detected, the watch will be removed and an alarm will be triggered

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 shows Byebye

Note: Charge while the device is on without shutting it down

1. SOS function:

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

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

1. signal condition:

No signal: the interface signal is a horizontal line, the device reports failure or is not in the network (not in the lora gateway range)

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

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 devices**

General version: The report must be within the scope of lora gateway, otherwise the report will fail. By default, the report will fail and the network will be reconnected every 5 minutes

1. Power signal reporting

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

1. Location related reporting

 GPS/broadband beacon: The default reporting frequency is 10 minutes. The default positioning priority is: Bluetooth> GPS. Bluetooth positioning takes precedence and cannot be located to switch GPS

Note: GPS is difficult to locate indoors. Please test in an open and unobstructed environment outdoors

(3) Alarm related reporting

SOS alarm (0xB5): initiated by the user, triggering method as described in the previous section

SOS cancellation (0x02): The user actively triggers the cancellation, as described in the previous section

Shutdown alarm (0x02): The device automatically shuts down or shuts down due to low power. The triggering method is described in the previous section

Wear off alarm (0x02): The device judges wear according to the frequency of health sampling reporting, reports wear alarm when heart rate is measured, and reports off alarm when heart rate is not measured

Sedentary Stay Alarm (0x02): Default 3-minute inactivity triggers reporting

Fall alarm (0x02): The device falls freely at a certain height and meets the triggering criteria of the fall algorithm

Low battery alarm (0x02): triggered when the current battery 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. Note that you should not miss any message. The message is a complete message and there will be no phenomenon of breaking in the middle of the next data packet

Eg:bdd6000119a9cf610445270387bf452708a1bc44279d18b74427e518b7f9bdf9010000006400002800000019a9cf61ca

This data packet contains the (0xD6) Bluetooth positioning and (0xF9) power signal message

(0xD6) Bluetooth positioning: bdd6000119a9cf610445270387bf452708a1bc44279d18b74427e518b7f9

(0xF9) Power signal: bdf9010000006400002800000019a9cf61ca

**2.3 Device downlink description**

General version: CLASSA Accepts downlink when the device reports

1. Equipment location report frequency 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

The data is reported according to the default reporting frequency outside the time period, such as: 00:00-18:00 5-minute location report

Report at the default reporting frequency of 10 minutes during the time period

1. Text message sent (0x28):

Unicode Encoding, up to 20 Chinese characters 40 bytes, one Chinese character occupies 2 bytes, one English letter occupies 1 byte

1. Equipment location priority is issued (0xCE01):

The default positioning priority is Bluetooth> GPS. If the positioning priority is Bluetooth beacon> GPS, bluetooth positioning cannot be switched off Gps, when the positioning is successful, will not switch to the next positioning priority to produce positioning

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

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

1. Time calibration (0xFF):

The device reports the FF00FF message every time it starts up, and needs to send this message immediately. After receiving the message, the device will calibrate the time according to the downlink time

(6)Drop alarm switch (0xCE07):

 The default drop alarm is in the open state. After the downlink shutdown command, the device closes the drop alarm trigger

1. Sitting alarm switch (0xCE08):

 The alarm for prolonged sitting is set to be on by default. After the shutdown command is sent down, the device shuts down 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):

 Downstream weather warning, the device 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 Type0: 4-level1: 5-level2: Percentage3: Voltage |
| 2 | u16 | Bat\_volt |  | -/- | Battery LevelIf 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 Type0: Percentage1: 5-level2: CSQ value |
| 2 | I16 | Signal\_strength |  |  | Signal\_strength |
| 1 | U8 | Other\_type |  |  | Extension Type0: Full Step Count1: Incremental Step Count2: Vibration |
| 4 | U32 | Num |  |  | Extended value |
| 4 | U32 | Timestamp | -/- | -/- | Utc Timestamp |

## 4.2 Positioning related reporting

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

|  |  |
| --- | --- |
| Message | MSG\_UPL\_GPS |
| Decription | 回馈GPS/BDS定位数据 |
| 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： BD03000000C0424C5E4000000000A5DC3C404E4541E62C616078

Lon: 000000C0424C5E40Lat: 00000000A5DC3C40 4E –N 45-E 41-A Time E62C6160

Lon:121.191574Lat: 28.861893

Status = A indicates that the information content is accurate. It can be resolved to V and can be abandoned.

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 | Falling alarm | Falling 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.Normal conditions do not trigger reporting

|  |  |
| --- | --- |
| 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 alarm1: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.

**4.4 Equipment 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**

### 4.5.1 Downlink feedback(MSGID=0xC0)--There is no general version yet

|  |  |
| --- | --- |
| 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)--There is no general version yet

|  |  |
| --- | --- |
| 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 status1: Read, received |
| 4 | U32 | serial number | -/- | -/- | (corresponding to 0X28 downlink) |
|  |  |  |  |  |  |

## 4.6 Health related reports

### 4.6.1 Health 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 |

BD32 00 7A 89 0F 60 06 00 0A 32 10 12 04 00 03

The timestamp in the protocol is 7A 89 0F 60, type 00 mixed type single data reported content full length 06 00.

 The ID is 0A, where 0A corresponds to 00001010 00001 010 (the first 5 bits are 01, and the following represent a reported length of 2 bytes). The last 2 digits behind the step count represent the number of steps.

 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

06 Diastolic pressure

07 Systolic pressure

08 Blood oxygen

10 Number of sit-ups

11 Running pace and distance

12 Skipping speed and count

Eg1:

BD3200B3C4F2630F000A1E00114B314A39711A4A0122BC0012

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.

### 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 03) |
| 4 | Uint32 | seqID | （Information id, uniqueness） |
| 1 | U8 | CONTENT LEN | Length (Contect Length) |
| N | N | CONTENT | (content, Chinese is GB2312 code, English is ascii code) |

Example： bd 28 03 03 00 00 00 0b 68 65 6c 6c 6f 2c 77 6f 72 6c 64dd

 Type: 03

seqId:03 00 00 00

CONTENT LEN: 0b (10)

CONTENT :68 65 6c 6c 6f 2c 77 6f 72 6c 64 ( 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: wifi positioning priority ( Bluetooth> gps): BDCE0100030003010033

gps positioning priority (gps> Bluetooth): BDCE0100030001030033

02 Health, such as step counting, blood pressure, etc. Main text First byte 00-all (01 Step counting 02 Heart rate 03 Temperature 04 Sleep 05 Blood pressure

06 Blood sugar 07 Blood oxygen--not supported for the time being)

Eg:BDCE 02 00 0300 00 0500 33---Report within 5 minutes

Type: 02; Valid: 00; length: 0300; First byte: 00; Second byte: 0500; checksum: 33

07 Falling alarm switch-default on

00---Start eg: BDCE0700000093

02---Close eg: BDCE0702000093

08 Stop alarm switch-default on

00---Start eg: BDCE0800000093

02---Close eg: BDCE0802000093

### 5.1.5 Set the delay alarm trigger time (MSGID=0XCC)

|  |  |
| --- | --- |
| Message | MSG\_HRD\_DATA |
| Decription | 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 stop alarm (unit: minutes; value range 2--60). The stop alarm will be triggered if there is no activity within this time length, |

Example：

bd cc 05 dd

05 -- 0x05 No activity for 5 consecutive minutes The watch reports a stay alarm (when the watch is worn)

### 5.1.6 Power off and restart (0x77) (issued in power on state, this command is invalid in power off state)

|  |  |
| --- | --- |
| Message | MSG\_CFG\_PWR |
| Decription | Set shutdown and restart Downlink (issued in the on state, this command is invalid in the off state) |
| 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 | -/- | 　 | 1 Turn off the machine |
| 1 | u8 | enable | -/- |  | 0 Restart |

Eg：

Shut down: "BD770193" Restart: "BD770093"

### 5.1.7Weather 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 | -/- | -/- | There are several groups of weather warnings |
| 1 | U8 | type | -/- | -/- | Weather warning type |
| 1 | U8 | Status | -/- | -/- | status |
| … | … | ……. |  |  | ….. |

Type：

|  |  |  |  |
| --- | --- | --- | --- |
| Type | Decription  | Status |  |
| 1 | A storm warning | 0 | Cancel the alarm |
| 1 - 8 |  |
| 2 | Heavy rain warning | 0 | Cancel the alarm |
| 1 |  |
| 2 |  |
| 3 |  |
| 3 | Thunderstorm warning | 0 | Cancel the alarm |
| 1 |  |
| 4 | Water warning | 0 | Cancel the alarm |
| 1 |  |
| 5 | Landslide 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 hazard 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 group of weather warnings

01 Storm warning

03 Strong wind signal No.3

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

10 sets of weather warnings; note that each set of weather warnings must be different, and the same type of warning cannot appear, otherwise it is invalid

### 5.1.8Personal information sent (MSGID=0XCA)--Special firmware support, no general version

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Byte size | Format | Name | Scale | Unit | Decription |
| 1 | U8 | count | -/- |  | Send out several sets of information |
| 1 | U8 | type | -/- |  | type |
| 1 | U8 | len | -/- |  | length |
| N | U8 | content | -/- |  | Content (unicode encoding, little-endian representation) |

Type:

1-Name 2-English name 3-Telephone number 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 The length is 6

0B7A 2759 8765 程大文

02 English name

18 The length is 24

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

03 phone number

10 The length is16

3900 3900 3800 3800 3600 3600 3300 3300 99886633

04 blood type

02 The length is 2

4100 A

**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