**Oviphone W200L LoRaWAN Device Protocal**

**欧孚通信W200L LoRaWAN设备协议**

**2022-05-10**

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本协议合适用于欧孚W200L LoRaWAN手表。若需要下行确认（全双工模式）或其他协议，请咨询欧孚通信（欧孚通信有其他定制协议的应用）。

This protocol use for Oviphone W2005L LoRaWAN wristband) .

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

设备功能的不断完善和丰富，本协议会不断更新，请从服务器下载最新版本。This document will continue updape, please download the newest version. <http://aiday.com.cn/Help/api/Device/LORA/>

在那的模组：

手表加网方式（wristband register network）：

1：Over-the-Air Activation (空中激活方式，OTAA-CLASSA)

Default APPKEY： 2B7E151628AED2A6ABF7158809CF4F3C

If you need special KEY, please contact with Oviphone

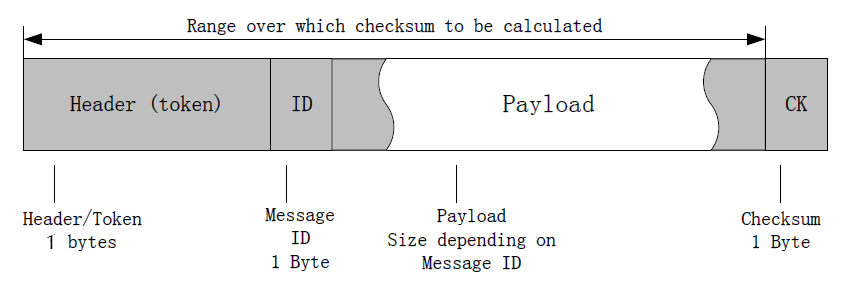
2：Activation by Personalization(独立激活方式，ABP)

CAPPSKEY - EF6D6E2503F57AE2FA151CDA87455F18

CNWKSKEY - 2E8C8650B4041672BBB9A399F2DEB427

# 一、协议数据包结构(Protocol packet structure)

一条基本的协议数据包结构(A basic protocol data packet structure)



说明(Description）：

hearder ： BD（固定值，Fixed）

messageID： 协议id号

payload: 具体消息内容，里面的变量均为小端模式( message content, all the message use little endian)

CK： 校验和所加内容包括payload(The content of the checksum includes the payload)

其算法如下所示，其中Buffer[N]表示需要累加的数据

(The algorithm is shown below, where Buffer[N] represents the data that needs 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

# 上行

**2.1 设备信息相关**

### 2.1.1电量上传(BatteryPower upload)（MSGID=0XF6）

payload contents

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Byte offset | Format | Name | Scale | Unit | Decription |
| 2 | u16 | Bat\_volt |  | -/- | 电池电量格数(Battery Level) |
| 4 | U32 | Step\_num |  |  | 记步数据(Prodemeter Step) |
| 1 | U8 | Signal\_strength |  |  | 信号强度(Signal level) |
| 4 | Int32 | timestamp |  |  | 时间戳小端  (timestamp, little endian) |

Example：bdf60300940400005028F2CD5F2a

F6 : MSGID

0300 : 小端（littele Endian），电量3格(Battery Level 3).

Value 0 - 5 Mean 0% - 100% (0% 20% 40% 60% 80% 100%)；

94040000： 小端（littele Endian），0x00000494：Prodometer 1172步 (step)；

50 ： 信号强度80%( Signal Level 80%(

28F2CD5F： 时间戳：北京时间2020-12-07 17:13:12 (Timestamp: Beijing time2020-12-07 17:13:12)

2a： 校验(check)

**2.2设备定位相关**

### 2.2.1GPS位置上传(GPS Location upload)（MSGID=0X03）

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 |  |  | 时间戳(Timestamp) |

Example：bd0322fb20cb827a5c4021ea3e00a99536404e4541cf084e5f13

03: MSGID

22fb20cb827a5c40 : 小小端（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：22.5846100000000（dd.dddd格式）；(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 ；

13 : 校验(check)

### 2.2.2 wifi和基站位置上传(Wifi and LBS Location)（MSGID=0XA3）--lora版本无

Payload contents:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Byte Offset | Format | Name | Scale | Unit | Description |
| 4 | U32 | UtcTime |  |  | Search Time |
| 1 | u8 | Cell\_cnt | 1 | - | Number of cell info payload.Valid value:1~7 |
| 2 | u16 | Cell[0].MCC | - | - | mobile country code of cell[0] |
| 2 | u16 | Cell[0].MNC | - | - | mobile network code of cell[0] |
| 2 | u16 | Cell[0].LAC | - | - | Location area code of cell[0] |
| 2 | u16 | Cell[0].CELL\_ID | - | - | Cell id of cell[0] |
| 2 | i16 | Cell[0].RSSI | - | dbm | RSSI in dbm of cell[0] |
| … |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| 2 | u16 | Cell[cell\_cnt-1].LAC | - | - | Location area code of cell[[cell\_cnt-1] |
| 2 | u16 | Cell[cell\_cnt-1].CELL\_ID | - | - | Cell id of cell[[cell\_cnt-1] |
| 2 | i16 | Cell[cell\_cnt-1].RSSI | - | dbm | RSSI in dbm of cell[[cell\_cnt-1] |
|  |  |  |  |  |  |
| 1 | U8 | Wifi\_cnt |  |  | Number 0f wifi |
| 1 | U8 | Wifi[0].bssid[0] |  |  |  |
| 1 | U8 | Wifi[0].bssid[1] |  |  |  |
| 1 | U8 | Wifi[0].bssid[2] |  |  |  |
| 1 | U8 | Wifi[0].bssid[3] |  |  |  |
| 1 | U8 | Wifi[0].bssid[4] |  |  |  |
| 1 | U8 | Wifi[0].bssid[5] |  |  |  |
| 4 | I32 | Wifi[0].rssi |  |  |  |
|  |  |  |  |  |  |
| 1 | U8 | Wifi[Wifi\_cnt-1].bssid[0] |  |  |  |
| 1 | U8 | Wifi[Wifi\_cnt-1].bssid[1] |  |  |  |
| 1 | U8 | Wifi[Wifi\_cnt-1].bssid[2] |  |  |  |
| 1 | U8 | Wifi[Wifi\_cnt-1].bssid[3] |  |  |  |
| 1 | U8 | Wifi[Wifi\_cnt-1].bssid[4] |  |  |  |
| 1 | U8 | Wifi[Wifi\_cnt].bssid[5] |  |  |  |
| 4 | I32 | Wifi[wifi\_cnt].rssi |  |  |  |
|  |  |  |  |  |  |

标注: 总计提供7个基站信息，即驻留的服务小区和邻近的6个小区 (Note: total of 7 base stations are provided, that is, the service cell that resides and the 6 neighboring cells)

如果没有基站，只有wifi，示例报文为：(If there is no base station, only wifi, the sample message is)

bda33afabd5e0004061970fcfa9faeffffff001970fcfa9facffffff2c6104f707efa6ffffff40d63c20e7f2a2ffffff74bdbdbdbdb6230131bdbdbdbdf60100000000001400

### 2.2.3蓝牙定位信息(LBE Location)（MsgId=0xD6）

Payload:

|  |  |  |  |
| --- | --- | --- | --- |
| Format | Name | Scale | Description |
| U8 | Type | 1 | 目前固定为0 (Fix value 0) |
| U8 | Total\_groups | 1 | 总组数,可能有多组信息,每组里可能有多个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 | Utc时间戳 (the UTC timestamp of the first group) |
| U8 | Total\_PackCount | 1 | 当前时间的包总数 (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时间戳(UTC timestamp of the second group) |
| U8 | Total\_PackCount | 1 | 当前时间的包总数(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

**bdbdbdbd - header**

**d6 - msgID**

**00 - type**

**01 -- 只有一组ibeacon数据（total groups of beacons data :1）**

be20315f -- 第一组beacon时间戳 ( the first group’s timestamp): 0x5f3120be=1597055166

04 --第一组 有4个beacon信息 （the beacon’s count of this group: 4 ）

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 --校验码（checksum）

### 2.2.4无定位包（can not location message）（MsgId=0xC7）

|  |  |  |  |
| --- | --- | --- | --- |
| Byte offset | Format | Name | Decription |
| 1 | U16 | Status | 无定位: 该值为定值 0x0020 (can not location) |
| 4 | Int32 | timestamp | 时间戳 |

Example：BDC7200028F2CD5FAB

**2.3设备健康相关**

### 2.3.1心率和血压上传(Heart Rate and Blood)（MSGID=0XC2）

payload contents

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Byte offset | Format | Name | Scale | Unit | Decription |
| 2 | U16 | bp\_high | - | - | 收缩压：2byte |
| 2 | U16 | bp\_low | - | - | 舒张压：2byte |
| 2 | U16 | Bp\_heart | - | - | 心率：2byte |
| 4 | Int32 | timestamp |  |  | 时间戳，小端 |

Example：bdc200000000480028F2CD5F01

C2 : MSGID；

0000 : 小端（littele Endian），0x0000，收缩压（为预留，无功能）；Systolic blood pressure (reserved, no function)

0000 : 小端（littele Endian），0x0000，舒张压（为预留，无功能）；Diastolic blood pressure (reserved, no function);

4800 : 小端（littele Endian），0x0048，心率值72 (Heart Rate Value 72)

28F2CD5F : 时间戳：北京时间2020-12-07 17:13:12 (Timestamp: Beijing time2020-12-07 17:13:12)

01: 校验(check)

### 2.3.2温度上传（Temperature）（MsgId=0xBA）

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Byte size | Format | Name | Scale | Unit | Decription |
| 1 | U8 | 时间戳标识 | 必选  Must |  | 00 - 带时间戳with timestamp；  01 - 不带时间戳-without timestamp |
| 4 | Int32 | 时间戳timestamp | 可选  Optional |  | 如果时间戳标识为01，则不需要此字段  timestamp ID is 01, this field is not required |
| 1 | U8 | 温度类型  （Temp. type） | 必选  Must |  | 1：表示上传体表温度和体温：  (1: upload wrist and body temp).  2：表示上传体表温度，体温和环境温度  2:upload wrist, body and environment temp. |
| 2 | S16 | 体表温度  （wrist Temp.） | 可选  Optional |  | 体表温度小数点后面保留一位 （×10） 上报值为整数，根据温度类型决定是否有此字段  One digit after the decimal point is reserved for body surface temperature (×10). The reported value is an integer. It is determined whether there is this field according to the temperature type |
| 2 | S16 | 体温  （Body Temp.） | 可选  Optional |  | 体温小数点后面保留一位 （×10） 上报值为整数，  根据温度类型决定是否有此字段  One digit after the decimal point is reserved for body surface temperature (×10). The reported value is an integer. It is determined whether there is this field according to the temperature type |
| 2 | S16 | 环境温度  (environment temperature) | 可选  Optional | / | 环境温度小数点后面保留一位 （×10） 上报值为整数，根据温度类型决定是否有此字段  One digit after the decimal point is reserved for body surface temperature (×10). The reported value is an integer. It is determined whether there is this field according to the temperature type |

**2.4消息反馈**

### 2.4.1 信息状态上传(Status Upload)（MSGID=0X28）

|  |  |  |  |
| --- | --- | --- | --- |
| Byte size | Format | Name | Decription |
| 4 | U32 | timestamp | 时间戳 |
| 1 | U8 | type | 和下行type一致，这里固定为3 |
| 1 | U8 | Status | 状态：  1.信息已读  Status: 1. Message has been read |
| 4 | U32 | seqId | 信息的id，和下发的信息ID保持一致性  The id of the message is consistent with the issued message ID |

Example：bd28fafef75f0301030000008e

消息已读 （Message has been read）

Notes: W200L not Suppot now; W116L Support.

### 2.4.2下行反馈(msg response)（MsgId=0xC0）

|  |  |  |  |
| --- | --- | --- | --- |
| Format | Name | Scale | Description |
| U8 | length | 1 | 可能一次下行多个msgID，msgId的个数，通常情况下为1个 （It is possible to downlink multiple msgIDs at a time, the number of msgIds, but generally 1） |
| U8 | msgId | 1 | 和下行MSGid 保持一致  （Consistent with the downstream MsgId） |

Eg : 如果下发了周期定位设置0x17，则回复如下（If the server sends the periodic positioning setting 0x17, the reply is as follows）：

BDC00117

### 2.4.3获取下行消息(Get message)（MsgId=0x00）

只需要上传一个字节 00 不需要前缀BDBDBDBD

Example**：00**

**2.5设备报警相关**

### 2.5.1 SOS上传（SOS Message）（MSGID=0XB5）

|  |  |  |  |
| --- | --- | --- | --- |
| Byte offset | Format | Name | Decription |
| 1 | U8 | Status | 状态：1:SOS |
| 4 | Int32 | timestamp | 时间戳，小端（timestamp littele Endian） |

Example：**bdb50128F2CD5F55**

28F2CD5F: 时间戳：北京时间2020-12-07 17:13:12 (Timestamp: Beijing time2020-12-07 17:13:12)

### 2.5.2报警数据上传(Alarm message)（MsgId=0x02）

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Message | LNK-WRN | | | |
| Description | Terminal uploads its warnings to terminal server. | | | |
| Firmware |  | | | |
| Direction | Terminal => Terminal Server | | | |
| Payload length | 2 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 |
| 4 | Int32 | timestamp |  |  | 时间戳timestamp |

Bitfield WRN:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 15 |  |  |  |  |  |  | 8 |  |  |  | 4 |  |  | 1 | 0 |

|  |  |  |  |
| --- | --- | --- | --- |
| Bit | Name | Description | Code |
| 10 | 退出休眠 | Wake up |  |
| 9 | 进入休眠 | Sleep mode |  |
| 8 | 设备佩戴 | 设备佩戴(wristband on hand-wear status) | 7 |
| 7 | SOS 取消 | SOS 取消(SOS cancel) | 8 |
| ...... |  |  |  |
| 4 | 摘掉设备 | 摘掉设备(take off wristband) | 11 |
| ...... |  |  |  |
| 2 | 关机 | 关机(power off) | 13 |
| 1 | SoS |  | 14 |
| 0 | 低电量 | 低电量(low power) | 15 |

Example**：**

关机报文（Power off） BD02040028F2CD5F C1

低电报文（Low battery） BD02010028F2CD5F C4

佩戴报文（Wear status） BD02000128F2CD5F C4

摘掉报文（Takeoff status） BD02100028F2CD5F C4

进入休眠（Sleep mode） BD02 0002 28F2CD5F C4

退出休眠（Wake up mode）BD02 0004 28F2CD5F C4

# 三、下行

**3.1服务器时间同步信息(Server time synchronization)**

### 3.1.1 请求时间校准数据指令(Request time calibration data command)

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

Example：FF00FF

### 3.1.2 时间校准请求数据回复格式(Time calibration request data reply format)

|  |  |  |  |
| --- | --- | --- | --- |
| Byte offset | Format | Name | Decription |
| 1 | U8 | HEADER | 填充：0xFF |
| 1 | U8 | SeqId | 填充：0x10 |
| 2 | U16 | years | 年份数据 |
| 1 | U8 | month | 月份数据 |
| 1 | U8 | Day | 日，数据 |
| 1 | U8 | time | 时钟，数据 |
| 1 | U8 | Minute | 分钟，数据 |
| 1 | U8 | Seconds | 秒钟，数据 |
| 1 | U8 | End | 填充：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

注明：设备开机后，会自动发送请求时间同步指令。需要收到同步指令后回复同步时间数据帧进行设备时间同步

（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)

**3.2 下行指令**

### 3.2.1 设置周期定位（Set periodic positioning）（MSGID=0X17）

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Byte offset | Format | Name | Scale | Unit | Decription |  |
| 1 | u8 | enable | -/- | -/- | 是否启用(Enable or not) | 时间段1  (period 1) |
| 2 | U16 | Interval |  |  | 时间间隔（分钟）(Period Minutes) |
| 1 | u8 | time\_start\_h |  |  | -时Hour |
| 1 | u8 | time\_start\_m |  |  | -分Minute |
| 1 | u8 | time\_end\_h |  |  | -时Hous |
| 1 | u8 | time\_end\_m |  |  | -分Minutes |
| 1 | u8 | enable | -/- | -/- | 是否启用(Enable or not) | 时间段2  (period 2) |
| 2 | U16 | Interval |  |  | 时间间隔（分钟）(Period Minutes) |
| 1 | u8 | time\_start\_h |  |  | -时Hour |
| 1 | u8 | time\_start\_m |  |  | -分Minute |
| 1 | u8 | time\_end\_h |  |  | -时Hous |
| 1 | u8 | time\_end\_m |  |  | -分Minutes |
| 1 | u8 | enable | -/- | -/- | 是否启用(Enable or not) | 时间段3  (period 3) |
| 2 | U16 | Interval |  |  | 时间间隔（分钟）(Period Minutes) |
| 1 | u8 | time\_start\_h |  |  | -时Hour |
| 1 | u8 | time\_start\_m |  |  | -分Minute |
| 1 | u8 | time\_end\_h |  |  | -时Hous |
| 1 | u8 | time\_end\_m |  |  | -分Minutes |
| 1 | u8 | enable | -/- | -/- | 是否启用(Enable or not) | 时间段4  (period 4) |
| 2 | U16 | Interval |  |  | 时间间隔（分钟）(Period Minutes) |
| 1 | u8 | time\_start\_h |  |  | -时Hour |
| 1 | u8 | time\_start\_m |  |  | -分Minute |
| 1 | u8 | time\_end\_h |  |  | -时Hous |
| 1 | u8 | time\_end\_m |  |  | -分Minutes |

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

0点到19点，每隔3分钟定位一次(0 o'clock to 19 o'clock, positioning once every 3 minutes)

### 3.2.2 信息下发(Message Send)（MSGID=0X28）

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Message | MSG\_HRD\_DATA | | | |
| Decription | Server =>Terminal下行 | | | |
| Firmware | -/- | | | |
| Payload Length | 7+n bytes | | | |
| Message structure | Hearer | Message ID | Payload |  |
| token | 0x28 | 见下方定义 | -/- |

payload contents

|  |  |  |  |
| --- | --- | --- | --- |
| Byte size | Format | Name | Decription |
| 1 | U8 | type | 消息类型，如果是下行信息，固定值为03  (Message type, if it is downlink information, the fixed value is 03) |
| 4 | Uint32 | seqID | 信息的id，唯一性 （Information id, uniqueness） |
| 1 | U8 | CONTENT LEN | 内容长度  (Contect Length) |
| N | N | CONTENT | 内容,中文为GB2312编码，英文为ascii编码  (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)