

Eview Pet Tracker Communication Protocol

Release V20221115

Preface

'Eview Pet Tracker Communication Protocol' is developed by Shenzhen Eview GPS Technology, as the data protocol of the following products:

EV-201G, EV-201M, EV-206M, EC-series

For the reception and accurate interpretation of alarm information from these devices by your data communication system, it's indispensable to complete the integration of this protocol there, including ACK. Meanwhile, if your system is totally free of mobile-data services, indicating any program related to 'server', 'APP', 'internet', 'web', 'online', SMS text messages should be the method for you to communicate with the device. In that case, you are supposed to check 'Eview SMS protocol' instead.

Please note that this is a hexadecimal protocol of TCP data format only.

In order to ensure that device works well with your data system, you need to be ready in certain points:

- ✓ Your system has completely integrated this protocol
- ✓ The mobile data service in the device is on
- ✓ The server IP & port in the device has been set correctly
- ✓ There is a valid SIM card (available in mobile data services) inserted in the device
- ✓ APN is correctly set in the device

To help you integrate the protocol, some demo source code is provided. Please contact us for more information.

For your reference, there are other ways to integrate the system, with no need to integrate the protocol, if you are not available in doing so. For some alternative solutions, please check the document “Eview-Platform solutions”. Additionally, you are free to consult some IT partners that have integrated our protocol and provide respective services.



Flespi: API service

<http://flespi.com/>


Wialon: tracking platform

<https://wialon.com/>


Traccar: tracking platform

<https://www.traccar.org/>


GPSWOX: tracking platform

<https://www.gpswox.com/>


GPS server: tracking platform

<https://www.gps-server.net/>

Explanation of special tags:

Example	Explanation
Optional	Not obligatory to integrate
Unfinished	Not completed yet
Reserved	Reserved byte or bit
CTM	Customized for particular version. not necessary to check
EV201M/EV206M Only	For more than one product model (eg. EV-201M and EV-206M) only
Read Only	Not allowed to modify
Write Only	Key is not displayed

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1. OVERVIEW

This document explains the way and the format in which the device communicates with the server. The Command List shows the messages (commands) sent from the server to the device, in order to request data/information from the device.

Note:

The device uses **Epoch & Unix Timestamp**. The Unix epoch (or Unix time or POSIX time or Unix timestamp) is the number of seconds that have elapsed since January 1, 1970 (midnight UTC/GMT), not counting leap seconds (in ISO 8601: 1970-01-01T00:00:00Z).

The **Byte order** is related to little-endian in this document. Such as one Uint32_t a = 0x12345678, then the transmission time in accordance with the byte from low to high order 0x78, 0x56, 0x34, 0x12.

All characters should be recognized as 16-bit HEX as default in this document. The special cases will be stated if other formats used in this document.

In some **Bytes Table** there are values in the specific byte which contains a **Value Table** with **Bit format**. They should be converted to Decimal system to give the value. We will point out all of these in the next version of instruction.

For example: [Flag Table for Call Records 3.1.12 Call Records \(0x25\) – Bit 4-7](#)

All the **Bit** should be converted from HEX to BIN and compare with its own Bit Table.

The digits ([phone number digits](#)) should be converted from HEX to Decimal system one by one. Then checked by the ASCII char table.

In order to ensure the liability of data transmission, the Server must give response if the **ACK Flag** bit marked as “1” after receiving the data. Please check the <The ACK Instruction V1> to have the detailed information related to ACK.

A Sequence ID is requested, and it should be the same ID If the ACK is requested.

Both device and server will communicate by raw String. This means a readable text code should be converted from raw String to HEX or in other formats.



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2. STRUCTURE OF MESSAGE

Each message include header, properties length, sequence ID, check sum and Message body, as shown below:

Header (0xAB)	1 Byte
Properties	1 Byte
Length	2 Bytes
Checksum	2 Bytes
Sequence ID	2 Bytes
Message Body	N Bytes

2.1 MESSAGE HEADER

It takes 1 byte. The initial part of the message should be 0xAB

2.2 MESSAGE PROPERTIES

It takes 1 byte. The properties included:

Encryption	Bit 7	00: Not encrypted
	Bit 6	01: Encrypted by RSA
Error Flag	Bit 5	0: Not Applied
		1: Not Applied
ACK Flag	Bit 4	0: ACK not requested
		1: ACK requested
Version	Bit 3	Default: 0
	Bit 2	Not Applied.
	Bit 1	
	Bit 0	

Note:

Bit 6-Bit 7: The encryption will be only for the Message Body.

Bit 5: Error flag. It's not used yet.

Bit 0-Bit 3: Protocol version number. Default 0. Not used yet.

2.3 MESSAGE LENGTH

Message length is the length of the entire Message Body. It takes 2 bytes. Maximum 1024 bytes.

2.4 CHECKSUM

Message checksum CRC16 for all bytes of the message body. It takes 2 bytes.

2.5 SEQUENCE ID

Message sequence ID takes 2 bytes. Starting from 0x0100 after device restarted.

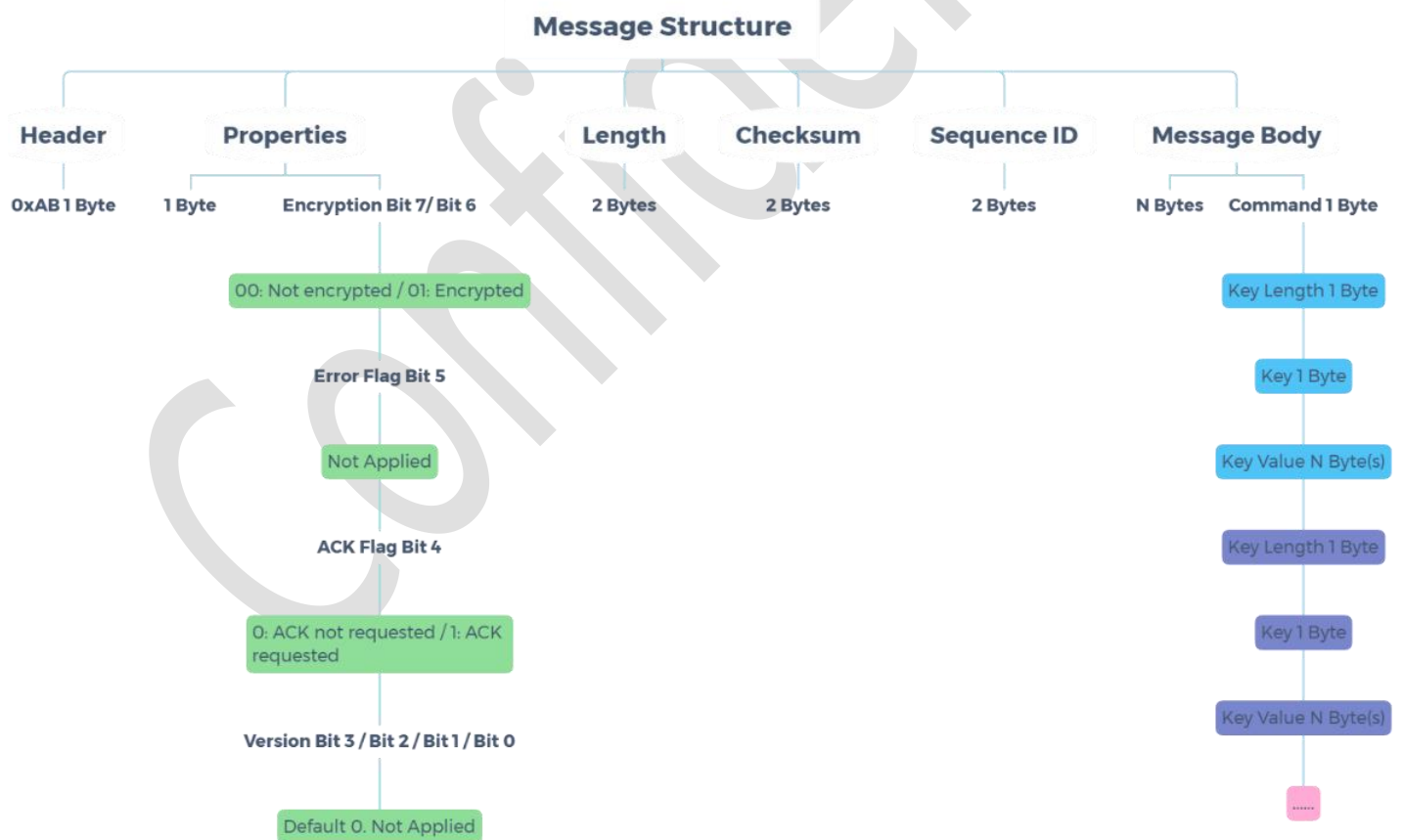
2.6 MESSAGE BODY

Command	1 Byte
Key Length	1 Byte
Key	1 Byte
Key Value	N Byte(s)
Key Length	1 Byte
Key	1 Byte
Key Value	N Byte(s)
.....

Note:

Message Body consists of at least and only one Command and one or more Key Body. Each Key Body consists of Key Length, Key and Key Value.

Key Value should be NULL if Key Length is 1.



An example:

“AB 10 0F 00 EB 7E 01 01 02 0D 30 E0 31 37 35 31 32 30 39 31 32 38 39”

AB -->Header

10 -->Properties

0F 00 -->Length

EB 7E -->Checksum

01 01 -->Sequence ID

Message Body

02 -->Command

0D -->Key Length

30 -->Key

E0 -->Function Flag (Set up Authorized Number)

31 37 35 31 32 30 39 31 32 38 39 --> Authorized number: 17512091289

To get the Phone number digits

Convert 31 from HEX to Decimal System and we will have 49. Then check the 49th in the ASCII Char list which is ‘1’.

Convert 37 from HEX to Decimal System and we will have 55. Then check the 55th in the ASCII Char list which is ‘7’.

And so on. Then we will have the number ‘17512091289’

ASC II Table:

<http://www.asciitable.com/>

An example for ACK (check ACK instruction to get more details):

The structure of ACK should be a complete message

“AB 10 0F 00 EB 7E 01 01 02 0D 30 E0 31 37 35 31 32 30 39 31 32 38 39”

AB -->Header

10 -->Properties

0F 00 -->Length

EB 7E -->Checksum

01 01 -->Sequence ID

Message Body

02 -->Command

0D -->Key Length

30 -->Key

E0 -->Function Flag (Set up Authorized Number)

31 37 35 31 32 30 39 31 32 38 39 --> Authorized number: 17512091289

To reply the ACK from the server

AB 00 03 00 08 C7 01 01 7F 01 00

Head: AB

properties: 00

Encryption: 00
ERR: N/A
ACK: 00
Version: 00
Length: 00 03
CRC: C7 08
Sequence ID: 01 01 (Corresponding Sequence ID)
Command: 7F (Corresponding command)
Key Length: 01
Key: 00 (Refer to Negative Response List)

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3. COMMAND TABLE LIST

Hex	Description	Remark
01	Data Command	3.1 Data Command (0x01) Key List
02	Configuration	3.2 Configuration Command (0x02) Key List
03	Services	3.3 Services Command(0x03) Key List
04	System Control	3.4 System Control Command(0x04) Key List
7E	Firmware Update	
7F	Negative Response	

3.1 DATA COMMAND (0X01) KEY LIST

Hex	Description	Remark
01	Device ID	This key should be contained in each data command
02	Alarm Code	Send this key if there is an alarm
03	Custom ID	A device ID defined by User rather than IMEI Optional
10	Historical data completed	From device to server
12	Single locating	From server to device
13	Continue locating	From server to device
20	GPS location	
21	Cell Towers	
22	Wi-Fi towers	
23	BLE	
24	General data	It contains timestamp. Each location data must contain this Key.
26	BLE location2	
28	Beacon location	
31	Activity degree	

Remarks:

- Multiple pieces of data together with one Command being sent to the server in once is allowed. Maximum size of one message is 1KB.
- The ACK message to request data that has been responded will be deleted in the device. The ACK message to request data, otherwise, will remain in the device to be proceeded along with new data next time.

3.1.01 Device ID (0x01)

Byte No.	Parameter	Description
1	Length	0x10
2	Key	0x01
3-17	Device ID	It is IMEI, 15 bytes

Note: Each data frame must contain a Device ID, as fixed at the first KEY.

3.1.02 Alarm Code (0x02)

Byte No.	Parameter	Description
1	Length	0x09/0x0D/Extendable
2	Key	0x02
3-6	Alarm Code	Defined by the Alarm Code table below
7-10	UTC	
11-14	Alarm Code Extend	Defined by the Alarm Code table below

Alarm Code Table

Bit No.	Description	Bit No.	Description
0	Battery-Low Alert	25	Beacon come home alert
4	GEO-1 Alert	30	BLE disconnected
5	GEO-2 Alert	24	Beacon absence, Leave home alarm
6	GEO-3 Alert	25	Beacon absence, At home alarm
7	GEO-4 Alert	26	GEO-1 Alert in (When Bit4 is 1, 1-Enter the fence alarm; 0-Exits the fence alarm. When Bit4 is 0, this bit is invalid)
8	Power OFF Alert	27	GEO-2 Alert in(When Bit5 is 1, 1-Enter the fence alarm; 0-Exits the fence alarm. When Bit5 is 0, this bit is invalid)
9	Power ON Alert	28	GEO-3 Alert in (When Bit6 is 1, 1-Enter the fence alarm; 0-Exits the fence alarm. When Bit6 is 0, this bit is invalid)
11	No-Motion Alert	29	GEO-4 Alert in(When Bit7 is 1, 1-Enter the fence alarm; 0-Exits the fence alarm. When Bit7 is 0, this bit is invalid)
24	Beacon leave home alert (EV201M/EV206M Only)	30	Ble disconnected
		31	Bark detection (Pet Only)

 3.1.03 Custom ID (0x03) Optional

Byte No.	Parameter	Description
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1	Length	N
2	Key	0x03
3-N	Customized ID	An ID to identify the device besides the IMEI

3.1.04 ICCID (0x04) EV206M EV201

Byte No.	Parameter	Description
1	Length	0x15
2	Key	0x04
3-22	ICCID	

3.1.10 Historical Data Completed (0x10)

Byte No.	Parameter	Description
1	Length	0x01
2	Key	0x10
This command is to confirm the Historical data has been completely sent from the device to the server.		

3.1.12 Single Locating (0x12)

Byte No.	Parameter	Description
1	Length	0x01
2	Key	0x12
This command is sent from server to the device to request an update of location data.		

3.1.13 Continue Locating (0x13)

Byte No.	Parameter	Description
1	Length	0x01
2	Key	0x13
This command is from the server to the device, to request updates of the location in accordance with a preset interval during a preset period of time.		

3.1.14 Walk Pet (0x14)

Byte No.	Parameter	Description
1	Length	0x09
2	Key	0x14
3-6	Start Timestamp	Epoch & Unix Timestamp. 4 bytes
7-10	Stop Timestamp	Epoch & Unix Timestamp. 4 bytes

3.1.15 Walk Pet ON/OFF switch(0x15)

Byte No.	Parameter	Description
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1	Length	0x02
2	Key	0x15
3	Enable	0-End walking the pet 1-Start walking the pet
This command is for the device to start or stop walking the pet.		

3.1.20 GPS Location (0x20)

Byte No.	Parameter	Description
1	Length	0x16
2	Key	0x20
3-6	Latitude	Decimal Degrees. Unit: ten millionth of a degree, Signed number. 4 bytes
7-10	Longitude	Decimal Degrees. Unit: ten millionth of a degree, Signed number. 4 bytes
11-12	Speed	Unit: KM/H. 2 bytes
13-14	Direction	Indicates the heading direction. Unit: Degree. "0" means the North. Range: 0 - 359. 2 bytes
15-16	Altitude	Unit: meter. 2 bytes
17-18	Horizontal positioning accuracy	Unit: 1/10. The smaller value indicates more accurate positioning. Range: 0.5 to 99.9 When the accuracy value is 0, the signal is invalid. 2 bytes
19-22	Mileage	Unit: meter Available if using GPS data to calculate. This value is editable. 4 bytes
23	Number of Satellites	Indicates the number of fixed GPS satellites. 1 byte

3.1.21 Cell Towers (0x21)(for 2G devices)

Byte No.	Parameter	Description
1	Length	1+3+5*n, n is the number of the covered Cell Towers, and the range is from 1 to 6.

2	Key	0x21
3-4	MCC	
5	MNC	
6	RXL	
7-8	LAC	
9-10	CELLID	

Byte 6 to Byte10 will be repeatedly displaying the Cell Tower information if more Cell Towers detected.

3.1.22 Wi-Fi Towers (0x22)

Byte No.	Parameter	Description
1	Length	1+7*n, n is the number of Wi-Fi sources (MAC Addresses).
2	Key	0x22
3	RSSI	The measured current signal strength in dBm. Signed number
4-9	MAC	The MAC address of the Wi-Fi source.

Byte 3 to Byte10 will be repeatedly displaying the Wi-Fi information if more Wi-Fi MAC addresses detected.

3.1.23 BLE Location (0x23)

Byte No.	Parameter	Description
1	Length	0x01 or 0x07 or 0x0f or more
2	Key	0x23
3-8	MAC	MAC address of the tracker connected to the base.
9-12	Latitude	Decimal Degrees. Signed number
13-16	Longitude	Decimal Degrees. Signed number
17-N	Address description	Describe the location in English. Maximum 32 Bytes

The tracker sends a request to read the BLE location from the connected docking or mobile APP, 0x01+0x23;

If the device has read the preset GPS coordinates from the connected docking or mobile APP successfully, it returns: 0x0f+0x23+mac+lat+lot;

Otherwise return: 0x7+0x23+mac.

3.1.24 General Data(0x24)

Byte No.	Parameter	Description
1	Length	0x09 Or 0x0D
2	Key	0x24
3-6	Timestamp	Epoch & Unix Timestamp. 4 bytes
7-10	Status	Status of tracker. 4 bytes

		Defined by the Status Table below	
11 ~ 14	Status2	Status of device. 4 bytes Defined by the Status2 Table below	
Timestamp Calibration Methods		Cell network (supported by Cell network)	
		GPS (must be calibrated once GPS positioning fixed)	
		GPRS (supported by the server)	
		BLE (supported by the mobile APP)	
This key must be included in each stored data and each uploaded data. Timestamp must be calibrated as described above.			
Status Table (4 Bytes)			
Bit No.	Description	Bit No.	Description
0	GPS	10	Smart Locating
1	Wi-Fi Source	11	Beacon location
2	Cell Tower	12	BLE Connected
3	BLE Location	14	Home Wi-Fi location
4	In-Charging	15	Indoors (0:outdoors 1:indoors) (EV201M/EV206M Only)
5	Fully Charged	16-18	Working Mode
6	Reboot	19-23	Cell Network Signal Strength
7	Historical Data	24-31	Battery Level
8	AGPS Data Valid		
9	Motion		

3.1.12 Call Records (0x25) EV09 Only

Byte No.	Description	Remark
1	Length	10+n
2	Key	0x25
3-6	Timestamp	Epoch & Unix Timestamp. 4 bytes
7	Flag	Defined by Flag Table below
8-9	Time	
10	Return code	
11-n	Number	Phone number, n byte
Flag Table for Call Records		
Bit 0	Call Status 1	0: Dialing out / 1: Incoming call
Bit 1	Call Status 2	0: Answered / 1: Missed
Bit 2-3	Reserved	

Bit 4-7	Type	0x00 - Normal Dialing /0000 0x01 - SOS Button Dialing /0001 0x02 - Side Button Dialing /0010 0x03 - Dialing for Alert /0011 0x04 - Call Back /0100 0x05 - Listen-in /0101 0x06 - Auto Answer /0110
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3.1.28 Beacon Location (0x28)

Byte No.	Parameter	Description
1	Length	19~N
2	Key	0x28
3	Flag	Beacon collection information: Bit6 ~ 7: Bit7: LAT/LNG Bit6: Beacon description Bit0~3 Beacon list index 0 ~ 15
4-9	MAC	MAC address of the tracker scan nearest.
10	RSSI	The measured current signal strength in dBm. Signed number
11	1M RSSI	The 1meter distance signal strength in dBm. Signed number. This define in beacon
12-15	Latitude	Unit: ten millionth of a degree, Signed number.
16-19	Longitude	Unit: ten millionth of a degree, Signed number.
20~N	description	To describe your location in English. Maximum 16 Byte
It will be repeatedly displaying the Beacon information from Byte 1 if more beacon MAC addresses detected.		

3.1.29 Cell Towers (0x29) (EV201M/EV206M Only)

Byte No.	Parameter	Description
1	Length	$1+3+7*n$, n is the number of the covered Cell Towers, and the range is from 1 to 6.
2	Key	0x29
3-4	MCC	
5	MNC	
6	RXL	

7-8	LAC	
9-12	CELLID	4Bytes
Byte 6 to Byte12 will be repeatedly displaying the Cell Tower information if more Cell Towers detected.		
This new added Key is to replace the previous Key 3.1.8 Cell Towers (0x21). Since the 3G and 4G Cell-ID will be more than 2 bytes. If you are using 2G and 4G trackers at the same time, please add this new Key 0x29.		

3.1.2A Home Wi-Fi Location (0x2A)

Byte No.	Parameter	Description
1	Length	19~N
2	Key	0x2A
3	Flag	Wi-Fi collection information: Bit6 ~ 7: Bit7: LAT/LNG Bit6: Wi-Fi description Bit0~5
4-9	MAC	The MAC address of the scanned Wi-Fi sources.
10	RSSI	The measured current signal strength in dBm. Signed number
11-14	Latitude	Decimal Degrees. Signed number
15-18	Longitude	Decimal Degrees. Signed number
19~N	description	To describe your location in English. Maximum 16Bytes

3.1.2C BeaconV2 Location (0x2C)

Byte No.	Parameter	Description
1	Length	20~N
2	Key	0x2C
3	Flag	Beacon collection information: Bit6 ~ 7: Bit7: LAT/LNG Bit6: Beacon description Bit0~3 Beacon list index 0 ~ 15
4-9	MAC	MAC address of the device scan nearest.
10	RSSI	The measured current signal strength in dBm. Signed number

11	1M RSSI	The 1meter distance signal strength in dBm. Signed number. This define in beacon
12	Battery level	The Beacon battery level 0~100
13-16	Latitude	Unit: ten millionth of a degree, Signed number.
17-20	Longitude	Unit: ten millionth of a degree, Signed number.
21	Description length	The description length
22~N	description	To describe your location in English. Maximum 16Byte
N ~ N+2	Temperature	Celsius degree*10, Signed number.

It will be repeatedly displaying the Beacon information from Byte 1 if more beacon MACs detected.

3.1.31 Activity (0x31)

Byte No.	Parameter	Description
1	Length	0x09
2	Key	0x31
3-6	Timestamp	Epoch & Unix Timestamp. 4 bytes
7-10	Activity	Activity analyzing. 4 bytes This will be recorded and analyzed every 5 minutes
	Timestamp	Epoch & Unix Timestamp. 4 bytes
	Activity	Activity analyzing. 4 bytes This will be recorded and analyzed every 5 minutes

Support multiple same Keys in a single message

3.1.35 Eddystone-UID Beacons List (0x35)

Byte No.	Parameter	Description
1	Length	n
2	Key	0x35
3-6	Timestamp	Epoch & Unix Timestamp. 4 bytes
7-8	UUID 16bit	0xFEAA
9-18	Namespace ID	
19-25	Instance ID	
26	Tx power	
27	RSSI	Read RSSI
	Namespace ID	
	Instance ID	

	Tx power	
	RSSI	Read RSSI

3.1.36 Private Beacon Events (0x36)

Byte No.	Parameter	Description
1	Length	n
2	Key	0x36
3-6	Timestamp	Epoch & Unix Timestamp. 4 bytes
7-12	MAC	MAC address of the connected docking.
13	RSSI	
14~..	Event1	The Content of Beacon event1
	
N	Event<T>	

The detail of Beacon Event

3.1.37 Dog Barking count(0x37) (EC208 Only)

Byte No.	Parameter	Description
1	Length	N/Extendable
2	Key	0x37
3-6	Time	Unix Timestamp. 4 bytes
7-10	Status	Bit31 1:stop upload 0:alert continue Bit0-30 Dog barking count upload

3.2 CONFIGURATION COMMAND(0X02) KEY LIST

Hex	Parameter	Remark
Systems		
01	Module Number	
02	Firmware Version	
03	IMEI	
04	ICCID	
05	MAC	
06	Setting Time	
07	Run Times	
08	Firmware Information	
0A	Working Mode	
0D	Password Protect	
0E	Time Zone	
0F	Enable Control	
13	Device name	For BLE connection only
14	Battery	
15	BLE locating	
16	Set whitelist device	
17	SMS GPS URL	
18	SMS Wi-Fi/LBS URL	
1A	FW	
1B	GSM Module	
1D	AGPS Reference location	
1F	System Language	
Phone Setting		
30	Set Authorized Number	
31	SMS Reply Prefix Text	
33	SMS Reply Prefix Text	
GPRS Setting		
40	APN	
41	APN Username	
42	APN Password	

43	Sever IP &Port	
44	Time Interval	
45	Continue Locating Time Interval	
Alert Setting		
50	Power Alert	
51	GEO Alert	
53	No-motion Alert	
60	Device Power Information	
62	WIFI white list	
LED Settings		
E0	LED default state EV202 Only	
Operation		
0xF0	Read	Append keys to Read Only . Don't add this key after writing Configuration file.

3.2.01 Module Number (0x01) Read Only

Byte No.	Parameter	Description
1	Length	0x05
2	Key	0x01
3-6	Module Number	(20 01 18 20,2018-01-20)

3.2.02 Firmware Version (0x02) Read Only

Byte No.	Parameter	Description
1	Length	0x05
2	Key	0x02
3-6	Firmware Version	

3.2.03 IMEI (0x03) Read Only

Byte No.	Parameter	Description
1	Length	0x10
2	Key	0x03
3-17	IMEI	

3.2.04 ICCID (0x04) Read Only

Byte No.	Parameter	Description
1	Length	0x15
2	Key	0x04
3-22	ICCID	

3.2.05 BLE-MAC (0x05) Read Only

Byte No.	Parameter	Description
1	Length	0x07
2	Key	0x05
3-8	BLE-MAC	

3.2.06 Setting Time (0x06)

Byte No.	Parameter	Description
1	Length	0x05
2	Key	0x06
3-6	Timestamp	Send Time parameter to the device to sync

3.2.07 Run Times (0x07) Read Only

Byte No.	Parameter	Description
1	Length	0x05
2	Key	0x07
3-6	Runtime	Unit: second. Read only
It starts from 0 after every power ON.		

3.2.0A Working Mode (0x0A)

Byte No.	Parameter	Description
1	Length	0x05
2	Key	0x0A
3-5	Time/Interval (For Locating and for data uploading)	Not Applied if Mode = 1/2/3/6 If Mode=4, value range is 10*60-60*60*24*7. Default: <u>60*60</u> If Mode=5, value range is 10*60-60*60*24*7, Default: <u>1*60*60</u>
6	Mode	Value range: 1 to 6. Default: 1.

3.2.0D Password Protect (0x0D)

Byte No.	Parameter	Description
1	Length	0x05
2	Key	0x0D
3-6	Password	4 bytes Bit31: 1, Enable. Default: <u>0</u> Bit 30 to Bit 0: 000000-999999. Default: <u>123456</u>

3.2.0E Time Zone (0x0E)

Byte No.	Parameter	Description
1	Length	0x02
2	Key	0x0E
3	Time zone	1 Byte. Signed char. Unit: 15minutes. Range: -48 to +56 Default: <u>0</u>

3.2.0F Enable Control (0x0F)

Byte No.	Parameter	Description
1	Length	0x05

2	Key	0x0F	
3-6	Enable control	Default: 7F Defined by the Table below	
Table for Enable Control			
Bit No.	Description	Bit No.	Description
0	LED	12	Alert TCP Fast
2	Vibration	14	Beacon location
3	Cell Tower Locating	15	Activity function
4	Wi-Fi	16	Step count function
7	BLE Stay Connected	17	Home Wi-Fi location
8	BLE Locating	30	Auto Update
10	BLE Always ON	31	AGPS
11	GPS loc (GPS locate switch)		

3.2.13 Device Name (0x13)

Byte No.	Parameter	Description
1	Length	1+N N maximum 20
2	Key	0x13
3-N	Device name	Example: "EV201". For BLE connection only

3.2.14 Battery (0x14)

Byte No.	Parameter	Description
1	Length	1+3
2	Key	0x13
4	Battery level	0-100%
5-6	Voltage	mV

3.2.15 Set BLE Location (0x15).

*This is not for the device to store, but for the docking station

Byte No.	Parameter	Description
1	Length	1 or 9+N
2	Key	0x15
3-6	Latitude	
7-10	Longitude	
11-N	string	Describe in English. Maximum 32 Bytes

3.2.17 Set SMS GPS URL (0x17)

Byte No.	Parameter	Description
1	Length	N
2	Key	0x17
3-N	GPS URL	Describe in English. Maximum 40 Bytes
For example: <i>www.google.com/maps?q=%f,%f</i>		

3.2.18 Set SMS Wi-Fi/LBS URL (0x18)

Byte No.	Parameter	Description
1	Length	N
2	Key	0x18
3-N	URL	Describe in English. Maximum 40 Bytes
For example: <i>smart-locator.com/web/geolocation/%s/%s</i>		

3.2.1A Firmware Version(0x1A)

Byte No.	Parameter	Description
1	Length	
2	Key	0x1A
3-n	Firmware Version	ASCII (American Standard Code for Information Interchange)

3.2.1B GSM Module (0x1B) Read Only

Byte No.	Parameter	Description
1	Length	n
2	Key	0x1B
3-n	GSM Module	

3.2.1E AGPS Reference Location (0x1D)

Byte No.	Parameter	Description
1	Length	0x10
2	Key	0x1D
3	Flag	Bit 7: Enable Update when GPS located
4-7	Latitude	Decimal Degrees. Signed number. (*10,000,000) 4 bytes
8-11	Longitude	Decimal Degrees. Signed number. (*10,000,000) 4 bytes

3.2.30 Set Contact Numbers (0x30)

Byte No.	Parameter	Description	
1	Length	n+2	
2	Key	0x30	
3	flag	Defined by Flag table below. Default: 0	
4-n	Number	The phone number is less than 20 bytes.	
Flag Table for Authorized Numbers			
Bit 7	Enable	Bit 4	No SIM Dialing
Bit 6	Accept SMS	Bit 3-0	Value Range: 0-9. The serial number of the contacts. 0000/0001/0010/0011/0100/0101/0111/1000/1001

3.2.33 Set Authorized Numbers (0x30)

Byte No.	Parameter	Description	
1	Length	n+2	
2	Key	0x30	
3	flag	Defined by Flag table below. Default: 0	
4-n	Number	The phone number is less than 20 bytes.	
Flag Table for Authorized Numbers			
Bit 7	Enable	Bit 4	No SIM Dialing
Bit 6	Accept SMS	Bit 3-0	Value Range: 0-9. The serial number of the contacts. 0000/0001/0010/0011/0100/0101/0111/1000/1001
Bit 5	Accept Phone Call		

3.2.31 SMS Reply Prefix Text (0x31)

Byte No.	Parameter	Description
1	Length	n+1
2	Key	0x31
3	Flag	Bit7: enable
4-n	Text	n byte, n<20. Default: <u>null</u>

3.2.33 Phone Switches (0x33)

Byte No.	Parameter	Description
1	Length	0x05
2	Key	0x33
3-6	Flag	Defined by Flag table below

Flag Table for Phone Switches

Byte No.	Parameter	Description
23-16	reserve	0x05
14	A1 phone monitor(value 1:enable,0:disable)	Default:1
12-13	Reserved	Default: 0
11	Enable SMS Whitelist (Only accept SMS from Contact number)	Default: 0
10	Reserved	Default: 0
9	Enable Button hang-up	Default: 1
8	Enable Call In White List (Only authorized number call in)	Default: 0
7	Auto answer enable	Default: 1
6-0	Auto answer after rings	0-10. Default: 3

3.2.40 APN (0x40)

Byte No.	Parameter	Description
1	Length	n+1
2	Key	0x40
3-n	APN	n byte, n<32. Default: <u>null</u>

3.2.41 APN Username (0x41)

Byte No.	Parameter	Description
1	Length	n+1
2	Key	0x41
3-n	APN Username	n byte, n<16. Default: <u>null</u>

3.2.42 APN Password (0x42)

Byte No.	Parameter	Description
1	Length	n+1
2	Key	0x42
3-n	APN Password	n byte, n<16. Default: <u>null</u>

3.2.43 Sever IP & Port (0x43)

Byte No.	Parameter	Description
1	Length	n+5
2	Key	0x43
3	Flag	Bit7

		1: GPRS enable Bit0 0: TCP (Default) 1: UDP
4-5	Port	0-65535. Default: <u>5050</u>
6-n	IP Address or Domain Name	N byte, n<50. Default: <u>www.smart-locator.com</u>

3.2.44 Time Interval (0x44)

Byte No.	Parameter	Description
1	Length	0x0d
2	Key	0x44
3-6	Heartbeat Interval	Bit31 1 enable (Default) Unit: second, Default: <u>200</u> . Range: 60s to 86400s.
7-10	Auto Upload Interval	Unit: second. Default: <u>180</u> , >10s
11-14	Auto Upload Lazy Interval	Unit: second. Default: <u>600</u> , >300s

3.2.45 Continue Locate Time Parameter (0x45)

Byte No.	Parameter	Description
1	Length	0x05
2	Key	0x45
3-4	Interval	Default: <u>10s</u> . Range: 10-600
5-6	Time	Unit: second. Default: <u>600</u> . Range: 60-1800s

S3.2.47 Device ID (0X47) **Optional**

Byte No.	Parameter	Description
1	Length	n
2	Key	0x47
3-n	Device ID	Customized Device ID follows the IMEI in every message. Default: <u>null</u>

3.2.48 Static AES128 Set (0X48) **Write Only**

Byte No.	Parameter	Description
1	Length	37
2	Key	0x48

3-6	KEY_ID	Please refer to the 4.2 Encryption
7-22	AES Key	
23-38	AES IV	

3.2.49 Read Static AES128 CRC (0X49) Read Only

Byte No.	Parameter	Description
1	Length	9
2	Key	0x49
3-6	KEY_ID	
7-10	CRC	This will be 0 (Default) if Static AES disabled. Or should be the value of CRC32 Algorithm from AES Key & AES IV

3.2.4B Cat-M Setting (0X4B) (NB eMTC Only: EV-201M, EV-206M)

Byte No.	Parameter	Description
1	Length	6
2	Key	0x4B
3	IOT Mode	0 eMTC 1 NB-IoT 2 eMTC & NB-IoT
4	eMTC eDRX Requst paging time window	0:1.28s 1:2.56s 2:3.84s 3:5.12s 4:6.4s 5:7.68s 6:8.96s 7:10.24s 8:11.52s 9:12.8s 10:14.08s 11:15.36s 12:16.64s 13:17.92s 14:19.2s 15:20.48s FF: OFF eDRX
5	eMTC eDRX Value	0:5.12s 1:10.24s 2:20.48s 3:40.96s 4:61.44s 5:81.92s 6:102.4s 7:122.88s 8:143.36s 9:163.84s 10:327.68s 11:655.36s 12:1310.72s 13:2621.44s 14:5242.88s 15:10485.76s FF: OFF eDRX
6	NB-IoT eDRX Requst paging time window	0: 2.56s 1:5.12s 2:7.68s 3:10.24s 4:12.8s 5:15.36s 6:17.92s 7:20.48s 8:23.04s 9:25.6s 10:28.16s 11:30.72s 12:33.28s 13:35.84s 14:38.4 s 15:40.96s FF: OFF eDRX
7	NB-IoT eDRX Value	0:5.12s 1:10.24s 2:20.48s 3:40.96s 4:61.44s 5:81.92s 6:102.4s 7:122.88s

		8:143.36s 9:163.84s 10:327.68s 11:655.36s 12:1310.72s 13:2621.44s 14:5242.88s 15:10485.76s FF: OFF eDRX
8	GSM	0: No change 01:GSM 900 02:GSM 1800 04:GSM 850 08:GSM 1900 0F: all Freq
9-20	EMTC	BAND1 (1<<0) BAND2 (2<<0)
21-32	NBIOT	BAND1 (1<<0) BAND2 (2<<0)

3.2.4E GSM Feature Band (0x4E)

Byte No.	Parameter	Description
1	Length	2
2	Key	0x4E
3	Value	0x00-ALL 0x01-US 0x02-EUROPE 0x03-KOREA 0x04-AUSTRALIA 0x05-MID_EAST 0x06-JAPAN 0x07-CHINA 0x08-INDIA 0x09-MEXICO

3.2.50 Power Alert (0x50)

Byte No.	Parameter	Description
1	Length	0x05
2	Key	0x50
3-6	Flag	Defined by Flag table below
Flag Table For Power Alert		
Bit 31	Alert Power OFF	Bit 25 Power OFF Loc first 1=Enable,0=Disable(default)

Bit 30	Alert Power ON	Bit 24	User Low Power Alert (CTM: ev07bx_0106)
Bit 29	Low Power Alert	Bit 23-16	User Low Power Alert Threshold. Default: <u>5</u> Range:1-10 (CTM: ev07bx_0106) Low Power Voice Prompt Threshold. Default: <u>20</u> Range: 10-50
Bit 28	Low Power Voice Prompt	Bit 15-8	
Bit 27	Power OFF SMS 1=Enable,0=Disable(default)	Bit 7-0	Low Power Alert Threshold. Default: <u>15</u> Range: 10-50
Bit 26	Power ON SMS 1=Enable,0=Disable(default)		

3.2.51 GEO Alert (0x51)

Byte No.	Parameter	Description	
1	Length		
2	Key	0x51	
3-6	Flag	Defined by Flag table below	
7-10	Latitude 1		
11-14	Longitude 1		
	Latitude n		
	Longitude n		
Flag for GEO Alert (32 bits)			
Bit 31-16	Radius	Bit 8	Enable. Default: <u>0</u>
Bit 15-11	Reserved	Bit 7-4	Points
Bit 10	Type <u>0</u> : Circle (Default) 1: Polygon	Bit 3-0	Index
Bit 9	Direction <u>0</u> : Out (Default) 1: In		

3.2.53 No-Motion Alert (0x53)

Byte No.	Parameter	Description
1	Length	0x05
2	Key	0x53

3-6	Value	Defined by the below Value table
Value Table (32bits)		
Bit 31	1: Enable; 0: Disable	0 (Default)
Bit 30	1: Dial; 0: No action	0 (Default)
Bit 29-0	Continued static period to activate the alert.	300 (Default) Unit: Second Range: 60-36000

3.2.60 Device Power Information (0x60) (EV09G Only)

Byte No.	Parameter	Description
1	Length	0x02
2	Key	0x60
3	Calibration Flag	BT - 0x01 FT - 0x10
4	Charging Status	0x00 - Not Charging 0x01 - Fully Charged 0x02 - Charging
5	Battery Level	Percentage. Range: 0-100
6-7	Battery Voltage	Unit: mV
8-9	Charge Current	Unit: mA
10-11	Charge Voltage	Unit: mV

3.2.5C Dog Barking Settings (0x5C)(EC208 Only)

Byte No.	Parameter	Description
1	Length	0x06/Extendable
2	Key	0x5C
3	Barking level	Bit7: Bark detection enable 0 disable 1 enable Bit0~Bit6: Default 5, Range: 1~9 1-low level 9- high level
4-7	Barking time upload	Default:1min Range 10 s-1h

3.2.61 SIM Card MSISDN (0x61) Read Only

Byte No.	Parameter	Description
1	Length	n+1
2	Key	0x61
3-n	Number	The phone number should be less than 20 bytes.

This is the phone number that includes a country code and a National Destination Code which identify the subscriber's operator.

3.2.62 WIFI Whitelist (0x62)

Byte No.	Parameter	Description
1	Length	16+n
2	Key	0x62
3	Flag	Bit7: Enable. Bit [0-6]: index (0~49)
4-9	Wi-Fi MAC	Wi-Fi hot spot MAC address
10-13	Latitude	
14-17	Longitude	
17-17+n	Wi-Fi description	String (max length=16bytes) end by '\0'

3.2.64 Mobile Network Information (0x64)

Byte No.	Parameter	Description
1	Length	0x05
2	Key	0x64
3	Strength	Current signal strength
4 ~ 7	Band	Absolute RF Channel Number
8 ~ n	Operator name	

3.2.65 Device Network Status (0x65)

Byte No.	Parameter	Description
1	Length	0x05
2	Key	0x65
3	Strength	Current signal strength
4	Status	Mobile network status: 0-Searching network 1-No service 2-Limited service, emergency call only 3-Full service

5	Server status	Connect Server status: 0-disconnect status 1-connected status
6 ~ 11	PLMN	Network PLMN
12 ~ 17	PLMN	Home PLMN

3.2.66 IMSI Information (0x66) **Read Only**

Byte No.	Parameter	Description
1	Length	n+1
2	Key	0x66
3-n	Number	The IMSI number should be less than 15 bytes.
*IMSI=International Mobile Subscriber Identification Number		

3.2.68 Operator Information (0x68) **Read Only**

Byte No.	Parameter	Description
1	Length	0x05 Extendable
2	Key	0x68
3-4	MCC	
5-6	MNC	2Bytes

3.2.73 Set Beacon Location List (0x73)

Byte No.	Parameter	Description
1	Length	15+n
2	Key	0x73
3	Flag	Bit7 :enable bit[0-6]: index
4-9	Beacon MAC	6bytes
10-13	Latitude	Int32
14-17	Longitude	Int32
17-17+n	Beacon description	String (max length=16bytes) end by '\0'

3.2.F0 Read (0xF0)

Byte No.	Parameter	Description
1	Length	1+n
2	Key	0xF0
n	Read key	No content. Read all parameters. Can be a combination of any parameter keys.

3.3 SERVICES COMMAND(0X03)KEY LIST

Hex	Description	Remark
01	Device ID	Each uploaded data must contain this key which is IMEI (0x10, default). It's not fixed. Could be a Custom ID.
10	Heartbeat	
11	Translates addresses	
12	Get Timestamp	Get UTC timestamp from the server
13	Weather data request	
21	Cell Towers	
22	Wi-Fi Towers	
0x24	General data	

3.3.10 Heartbeat(0x10)

Byte No.	Parameter	Description
1	Length	0x02
2	Key	0x10
3	0x5A	Fixed data

It can only be sent from the device to the server and sent at the set time interval to maintain the connection.

Available option for customization (not obligatory):

Heartbeat with status format: [Device ID\(0x01\)](#) + Heartbeat(0x10) + [General data\(0x24\)](#). For example:

AB 18 1F 00 AC 33 0B 01 ->Head

03 10 01 38 36 38 38 33 32 30 34 37 30 30 30 31 30 31 ->Device ID

02 10 5A ->Heartbeat

09 24 E4 51 E3 5C 10 00 A9 2C ->General data

3.3.11 Translates Addresses(0x11)

Byte No.	Parameter	Description
1	Length	0x09
2	Key	0x11
3-6	Latitude	
7-10	Longitude	

This is a request from the device

Byte No.	Parameter	Description
1	Length	0x09+n
2	Key	0x11
3-6	Latitude	

7-10	Longitude	
11-n	text	String text, end with '\0'
This is a response from the server		

3.3.12 Get Timestamp(0x12)

Byte No.	Parameter	Description
1	Length	0x01
2	Key	0x12, sent by device
This is a request from the device		

Byte No.	Parameter	Description
1	Length	0x05
2	Key	0x12, sent by server
3-6	Timestamp	
This is a response from the server		

3.3.21 Cell Towers (0x21) (EV09G Only)

Byte No.	Parameter	Description
1	Length	1+3+5*n, n is the number of Cell Towers. Range: 1-6
2	Key	0x21
3-4	MCC	
5	MNC	
6	RXL	
7-8	LAC	
9-10	CELLID	
Byte 6 to Byte 10 will be repeatedly displaying the Cell Tower information if more Cell Towers detected.		
This is scanned Cell Tower information sent from the device		

Byte No.	Parameter	Description
1	Length	>=9
2	Key	0x21
3-6	Latitude	
7-10	Longitude	
n	Address	String
This is analyzed location data sent from the server		

3.3.5 Wi-Fi Towers (0x22)(EV09G Only)

Byte No.	Parameter	Description
1	Length	1+7*n, n is the number of Wi-Fi MAC addresses Range: 1-6.
2	Key	0x22
3	RSSI	The measured current signal strength in dBm. Signed number
4-9	MAC	The MAC address of the Wi-Fi node.
Byte 3 to Byte 10 will be repeatedly displaying the Wi-Fi information if more Wi-Fi sources detected.		
This is scanned Wi-Fi information sent from the device		

Byte No.	Parameter	Description
1	Length	>=9
2	Key	0x22
3-6	Latitude	
7-10	Longitude	
n	Address	String
This is analyzed location data sent from the server		

3.4 SYSTEM CONTROL COMMAND(0X04) KEY LIST

Hex	Description	Remark
01	Device ID	Device IMEI
10	Reset all record	Remove historical data
11	Factory recovery	Reset
12	Device reboot	
13	Find me	Looking for equipment
14	Power off	
15	LED blink	
16	Scan BLE	
17	Firmware recovery	
19	Start auto-setting beacon location list	

3.4.01 Device ID (0x01)

Byte No.	Parameter	Description
1	Length	0x10
2	Key	0x01
3-17	Device ID	Here is IMEI, 15 bytes

3.4.10 Reset All Record(0x10)

Byte No.	Parameter	Description
1	Length	0x01
2	Key	0x10

3.4.13 Find Me(0x13)

Byte No.	Parameter	Description
1	Length	0x01
2	Key	0x13

3.4.14 Power Off(0x14)

Byte No.	Parameter	Description
1	Length	0x01
2	Key	0x14

3.4.6 Scan BLE(0x16)

Byte No.	Parameter	Description
----------	-----------	-------------

1	Length	n
2	Key	0x16
This is the command to activate the Scanning		

Byte No.	Parameter	Description
1	Length	n
2	Key	0x16
3-8	MAC	MAC address of the device connects to the base.
9	RSSI	
	MAC	MAC address of the device connects to the base.
	RSSI	
This is the BLE information scanned		

3.4.17 Firmware Recovery (0x17)

Byte No.	Parameter	Description
1	Length	0x01
2	Key	0x17
Recover firmware settings		

3.4.19 Automatically Set Beacon Location List (0x19)

Byte No.	Parameter	Description
1	Length	0x09+N
2	Key	0x19
3-6	Latitude	Int32
7-10	Longitude	Int32
11-11+N	Beacon description	String (max len=16bytes) end by '\0'
Receiving the command, the device will automatically search for beacons nearby and add them to the beacon location list. All these beacons share the same location information and device description		

3.4.1A Automatically Set Home Wi-Fi Location List (0x1A)

Byte No.	Parameter	Description
1	Length	0x09+N
2	Key	0x1A
3-6	Latitude	Int32
7-10	Longitude	Int32
11-11+N	Wi-Fi description	String (max length=16bytes) end by '\0'

3.4.1B Scan Wi-Fi (0x1B)

Byte No.	Parameter	Description
1	Length	n
2	Key	0x1B
3	RSSI Threshold	Int8 Big than this value will return
4	Scan interval	Interval =0, Scan once Interval >=1, unit: second

This is the command to scan

Byte No.	Parameter	Description
1	Length	n
2	Key	0x1B
3	Flag	Bit7: 1=5G, 0=2.4G Bit0~Bit6: index value
4-9	MAC	MAC address of the device connected to the charging base.
10	RSSI	
11~n	Name	Wi-Fi name (UTF8).

This is the Wi-Fi information scanned

3.4.1C Light (0x1C)

Byte No.	Parameter	Description
1	Length	2
2	Key	0x1C
3	control	Bit 7 :enable 0x00-Off 0x01-brightness (CTM:EC208 Only) 0x02-super bright (CTM: EC208 Only) 0x03-slow flash (CTM: EC208 Only) 0x04-fast flash (CTM: EC208 Only) 0x05-super flash (CTM: EC208 Only) 0x06-SOS flash (CTM: EC208 Only) 0x80-Led Normal On

3.4.1D New Find Me (0x1D)

Byte No.	Parameter	Description
1	Length	2

2	Key	0x1D
3	control	If 0 : disable, else :enable

3.4.1E Motor Control (0x1E) (CTM:EC208)

Byte No.	Parameter	Description
1	Length	2
2	Key	0x1E
3	Control mode	0- Off 0- Alert 1- Accent 2- Heart beat 3- Shake quick 4- Shake rapid 5- Shake staccato

3.5 NO ENCRYPTION COMMAND (0X09) OPTIONAL

3.5.1 BLE/USB Password Handshake

Byte No.	Parameter	Description
1	Length	0x05
2	Key	0x0D
3-6	Password	Bit 30-0: Range: 000000-999999. Default: <u>123456</u> Please convert the bit to Decimal system

3.6 FIRMWARE UPDATE COMMAND(0X7E) KEY LIST **OPTIONAL**

Hex	Description	Remark
10	Start DFU with initial command	
11	Transfer new firmware text	
12	Validate new firmware	
13	Query DFU state	
14	Reset device	
15	Get Pack Max length	
The error code for DFU is 0x7F format. (in order to handle the error stream uniformly) The correct return is 7E format 7E's length is fixed to 0		

3.7 NEGATIVE RESPONSE COMMAND(0X7F) KEY LIST

Hex	Description	Remark
00	Success	If never use this code
	Protocol Error	
11	Version Invalid	Protocol version is not supported
12	Encryption Invalid	Encryption method is not supported
13	Length Error	Incorrect protocol length
14	Checksum Error	Checksum error
15	Command Invalid	Command not supported
16	Key Invalid	Key invalid
17	Key length error	Key length error
	Value Error	
21	Data Format Invalid	
22	Data Size Error	
23	Invalid State	
24	Invalid Parameter	
25	No Memory	Not enough storage
26	Sub Function not supported	
27	GPS is not ready	No GPS positioning
28	Address resp	
30	Out of service	

31	Device unregistered	
40	BLE password not exchanged	
F0	Battery Power Low	
Meets the length key value format.		

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4. ENCRYPTION **OPTIONAL**

For the sake of TCP data security, it's necessary to encrypt the Message body.

The Message body of the data should be sent after encrypted by AES algorithm. The receptor decrypt the Message body with the Key found according to the Key ID.

Each encrypted Message body is headed in a particular way(0xA5), described as below:

1B	1B	2B	2B	2B	4B	2B	2B	NB
header (0xA5)	properties	length	Check sum	sequence ID	Key ID	Control Code	Head CRC	Message body

Data security highly relies on the Key, that should be carefully managed in such a way:

1. Each Key of 16 bytes generated by the server corresponds to one ID.
2. The password saved by the server in the database, can be checked and exported by the administrator.
3. The Key information is imported by factory tool to the device, that consists of Key ID, Key body and Time of importation. If the Key body has been refreshed or replaced, the device must be reset to factory settings to be able to work fine again.
4. Length refers to that after encryption.

Head CRC: Header + Properties + Length + Check sum + Sequence ID + Key ID + Control code

4.1 MESSAGE PROPERTIES

Properties 1byte							
Bit 7	6	5	4	3	2	1	0
Encryption		ERR flag	ACK flag	Version			

Encryption: **Reserved**

ERR flag: **Reserved**

ACK flag: **Reserved**

4.2 KEY ID

Bit31-24	23 ~ 0
Type	Key ID in Keyring

Encryption type of Message Body transmission, and Key ID:

Type	Description
------	-------------

0	Invalid encryption, invalid Key ID in keyring.
1	AES Dynamic key Reserved
2	AES static key
3	RSA public key Reserved
4	RSA private key Reserved

4.3 SEQUENCE ID

To be in accordance with the body sequence ID.

4.4 CONTROL CODE (CC)

Definition of request

Type	Description
1	Data transmission
2	Key management Reserved

Definition of response

Type	Description
200	OK
500	Decryption fails
501	Data verification error after decryption
403	Invalid Key
404	Key fails Reserved

APPENDIX 1

CRC16 CHECKSUM CALCULATION ALGORITHM:

1. Shifted Algorithm

```
uint16_t crc16_compute(uint8_t const * p_data, uint32_t size, uint16_t const * p_crc)
{
    uint16_t crc = (p_crc == NULL) ? 0x0000 : *p_crc;

    for (uint32_t i = 0; i < size; i++)
    {
        crc = (uint8_t)(crc >> 8) | (crc << 8);
        crc ^= p_data[i];
        crc ^= (uint8_t)(crc & 0xFF) >> 4;
        crc ^= (crc << 8) << 4;
        crc ^= ((crc & 0xFF) << 4) << 1;
    }
    return crc;
}
```

2. Look-up table

```
static const uint16_t CRC_Table[ ] = {
0x0000, 0x1021, 0x2042, 0x3063, 0x4084, 0x50a5, 0x60c6, 0x70e7,
    0x8108, 0x9129, 0xa14a, 0xb16b, 0xc18c, 0xd1ad, 0xe1ce, 0xf1ef,
    0x1231, 0x0210, 0x3273, 0x2252, 0x52b5, 0x4294, 0x72f7, 0x62d6,
    0x9339, 0x8318, 0xb37b, 0xa35a, 0xd3bd, 0xc39c, 0xf3ff, 0xe3de,
    0x2462, 0x3443, 0x0420, 0x1401, 0x64e6, 0x74c7, 0x44a4, 0x5485,
    0xa56a, 0xb54b, 0x8528, 0x9509, 0xe5ee, 0xf5cf, 0xc5ac, 0xd58d,
    0x3653, 0x2672, 0x1611, 0x0630, 0x76d7, 0x66f6, 0x5695, 0x46b4,
    0xb75b, 0xa77a, 0x9719, 0x8738, 0xf7df, 0xe7fe, 0xd79d, 0xc7bc,
    0x48c4, 0x58e5, 0x6886, 0x78a7, 0x0840, 0x1861, 0x2802, 0x3823,
    0xc9cc, 0xd9ed, 0xe98e, 0xf9af, 0x8948, 0x9969, 0xa90a, 0xb92b,
    0x5af5, 0x4ad4, 0x7ab7, 0x6a96, 0x1a71, 0x0a50, 0x3a33, 0x2a12,
    0xdbfd, 0xcbdc, 0xfbbf, 0xeb9e, 0x9b79, 0x8b58, 0xbb3b, 0xab1a,
    0x6ca6, 0x7c87, 0x4ce4, 0x5cc5, 0x2c22, 0x3c03, 0x0c60, 0x1c41,
    0xedae, 0xfd8f, 0xcdec, 0xddcd, 0xad2a, 0xbd0b, 0x8d68, 0x9d49,
    0x7e97, 0x6eb6, 0x5ed5, 0x4ef4, 0x3e13, 0x2e32, 0x1e51, 0x0e70,
    0xff9f, 0xefbe, 0xdfdd, 0xcffc, 0xbf1b, 0xaf3a, 0x9f59, 0x8f78,
```

```
0x9188, 0x81a9, 0xb1ca, 0xa1eb, 0xd10c, 0xc12d, 0xf14e, 0xe16f,  
0x1080, 0x00a1, 0x30c2, 0x20e3, 0x5004, 0x4025, 0x7046, 0x6067,  
0x83b9, 0x9398, 0xa3fb, 0xb3da, 0xc33d, 0xd31c, 0xe37f, 0xf35e,  
0x02b1, 0x1290, 0x22f3, 0x32d2, 0x4235, 0x5214, 0x6277, 0x7256,  
0xb5ea, 0xa5cb, 0x95a8, 0x8589, 0xf56e, 0xe54f, 0xd52c, 0xc50d,  
0x34e2, 0x24c3, 0x14a0, 0x0481, 0x7466, 0x6447, 0x5424, 0x4405,  
0xa7db, 0xb7fa, 0x8799, 0x97b8, 0xe75f, 0xf77e, 0xc71d, 0xd73c,  
0x26d3, 0x36f2, 0x0691, 0x16b0, 0x6657, 0x7676, 0x4615, 0x5634,  
0xd94c, 0xc96d, 0xf90e, 0xe92f, 0x99c8, 0x89e9, 0xb98a, 0xa9ab,  
0x5844, 0x4865, 0x7806, 0x6827, 0x18c0, 0x08e1, 0x3882, 0x28a3,  
0xcb7d, 0xdb5c, 0xeb3f, 0xfb1e, 0x8bf9, 0x9bd8, 0xabbb, 0xbb9a,  
0x4a75, 0x5a54, 0x6a37, 0x7a16, 0x0af1, 0x1ad0, 0x2ab3, 0x3a92,  
0xfd2e, 0xed0f, 0xdd6c, 0xcd4d, 0xbdaa, 0xad8b, 0x9de8, 0x8dc9,  
0x7c26, 0x6c07, 0x5c64, 0x4c45, 0x3ca2, 0x2c83, 0x1ce0, 0x0cc1,  
0xef1f, 0xff3e, 0xcf5d, 0xdf7c, 0xaf9b, 0xbfba, 0x8fd9, 0x9ff8,  
0x6e17, 0x7e36, 0x4e55, 0x5e74, 0x2e93, 0x3eb2, 0x0ed1, 0x1ef0
```

```
};
```

```
uint16_t crc16_compute(const uint8_t *data, uint32_t len, uint32_t init)
```

```
{
```

```
    uint16_t crc16 = init;
```

```
    for( uint32_t i = 0; i < len; i++){
```

```
        crc16 = CRC_Table[ ((crc16 >> 8) & 0xff) ^ data[i] ] ^ ( crc16 << 8);
```

```
    }
```

```
    return crc16;
```

```
}
```


ANNEX

Shenzhen Eview GPS Technology



Shenzhen Eview GPS Technology is a professional Personal Mobile Alarm provider in Shenzhen, China. We design, develop, and manufacture high quality alarm products for persons and trackers for pets since 2009. With over 10 years of experience in the industry, we have become a market leader in over 30 countries worldwide. The intense investment in R&D fuels the innovation in our products that continuously renews the standards of our industry. “Protect & Connect” is our mission.

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