Cloud Platform Protocol

G/A Series_V2.7

History

Revision	Date	Author	Description
V2.0	2022-03-25	Tommy	Initial
V2.1	2022-03-28	Tommy	Upgraded layout
V2.2	2022-06-08	Yuki	Upgraded Protocol
V2.3	2022-08-10	Yuki	Upgraded 0x0200
V2.4	2022-12-27	Yuki/Barry	Upgraded 0x0200 and 0900
V2.5	2023-03-09	Barry	Upgraded 0x0200
V2.6	2023-08-06	Barry	Add Example
V2.7	**2023-09-04**	**Barry**	**In the F6 field in the 0200 packet, change RSSI1 to the pressure sensor data,unit:hPa**

Content

Table Index

1. Introduction

(1) The mobile phone number of the message header is a 12-digit unique identification code customized by AOVX.

(2) Message ID includes:

Device general response(0x0001);

Device heartbeat(0x0002);

Device parameters response (0x0104);

Device information report (0x0200);

Platform general response (0x8001);

Set device parameters(0x8103);

Query device parameters(0x8104);

Device control(0x8105).

(3) In addition to the protocol documentation, we provide Java reference code to facilitate user integration.Details can be found in the link below:

OTA Upgrade Guide: FOTA(AOVX) - Powered by MinDoc

Device protocol integration description: Registration and Authentication - Powered by MinDoc

Product Protocol decoder C#(.NET Framework 4.5.2) -AOVX-Powered by MinDoc

2. Protocol Content

2.1. Data Type

Table 1.   Data Type

Data type	Description
BYTE	Unsigned single-byte integer type(8 bits)
WORD	Unsigned double-byte integer type(16 bits)
DWORD	Unsigned four bytes integer type(32 bits)
BYTE[n]	n bytes
BCD[n]	8421 code, n bytes
STRING	GBK code, leave blank if no data

2.2. Transmission Rule

This protocol uses big-endian mode to transfer WORD and DWORD. Agreed as follow:

——BYTE transfer agreement: transfer as the byte streams.

——WORD transfer agreement: transmit high 8 bits, and then transmit low 8 bits.

——DWORD transfer agreement: transmit the highest 8 bits(b31,b24),then higher 8 bits(b23,b16), then the lower 8 bits(b15,b8), then the lowest 8 bits(b7,b0).

2.3. Protocol Message Format

2.3.1. Message Structure

The message is consisted of flag, message header, message body and checksum code. Its structure is shown as the below figure:

Flag	Message header	Message body	Checksum code	Flag

Sending: Message package-- >Calculate and fill the checksum code-- >Transferred meaning-- > Sending;

Receiving: Receiving package-- >Transferred meaning and revert -- >Verify the checksum code-- > Parse message;

Example:

The Device needs to send a hexadecimal packet with the content of

00000000840000 2301E5BB4506FABB57003F0000003623 0731084856,which is encapsulated as follows:

Add flag, message header and checksum code:

7E ------ flag

0200001C8050650805440004 ------ message header

00000000840000 2301E5BB4506FABB57003F0000003623 0731084856 ------ message body

41 ------ checksum code

7E ----- flag

2.3.2. Flag

The start/end flag is 0x7E, if there is 0x7E existing in the checksum code, message header or message body, it must be transferred, the transferred meaning rules is shown as the below:

0x7E<————>0x7D followed with 0x02

0x7D<————>0x7D followed with 0x01

Transferred meaning process is described as following:

Example1:

Data that device needs to send:0x7D 0x00 0x00 0x00 0x01 Transferred 0x7D 0x01 0x00 0x00 0x00 0x01

Server receive the data from the device:0x7D 0x01 0x00 0x00 0x00 0x01 Transferred&Restore 0x7D 0x00 0x00 0x00 0x01

Example 2:

Data that device needs to send:0x7D 0x00 0x00 0x00 0x02 Transferred 0x7D 0x01 0x00 0x00 0x00 0x02

Server receive the data from the device:0x7D 0x01 0x00 0x00 0x00 0x02 Transferred&Restore 0x7D 0x00 0x00 0x00 0x02

Example 3:

Data that device needs to send:0x7E 0x00 0x00 0x00 0x01 Transferred 0x7D 0x02 0x00 0x00 0x00 0x01

Server receive the data from the device:0x7D 0x02 0x00 0x00 0x00 0x01 Transferred&Restore 0x7E 0x00 0x00 0x00 0x01

Example 4:

Data that device needs to send:0x7E 0x00 0x00 0x00 0x02 Transferred 0x7D 0x02 0x00 0x00 0x00 0x02

Server receive the data from the device:0x7D 0x02 0x00 0x00 0x00 0x02 Transferred&Restore 0x7E 0x00 0x00 0x00 0x02

2.3.3. Message Header

Table 2.   Message Header

Start byte	Field	Data type	Description
0	Message ID	WORD	-
2	Properties of Message Body	WORD	The properties format refer to the table 3
4	Device Number	BCD[6]	User defined 12 digits unique identification number. If it is less than 12 digits, fill 0 in front
10	Message Sequence Number	WORD	Cycle accumulation from 0 as the sending sequence

Table 3.   Message Body Properties

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Reserved	Version	Sub-package	Data encryption mode			Length of message body									

Bit15: Reserved.

Bit14: This bit is reserved as 0 by default;

Bit13: Reserved, do not use, default is 0.

Bit12-10: Data encryption mode:

-- When all three bits are 0, it means the message body is not encrypted.

-- When the tenth bit are 1, it means the message body is encrypted by the RSA algorithm.

Bit9-0: Length of message body.

2.3.4. Checksum Code

Checksum code is calculated via XOR from the start of message header to the last byte before

Checksum code. The Checksum code occupies 1 byte.

Example:

8001000541305150710000B2046F020000

The result is 5E.

2.4. Protocol Interaction Process

1. Device reports information to the platform server according to the configured reporting interval (including data and status information, more details refer to 0x0200) in work mode, and the platform responds to the device after receiving and analyzing data packet analysis (more details refer to 0x8001).

2. The platform server can also actively configure and query device parameters as well(more details refer to 0x8103 and 0x8104), and the device will respond to the platform server after receiving the configuration or query commands.

3. The server needs to reply to every message sent by the device

4. After the server sends command 8103/8105 to the device, the serve needs to check whether the device has received the command sent by the server based on the response from the device.

Table 4. Message Interaction Response

Message sent from tracker device to platform server		
Message	**Description**	**Platform response**
0x0001	Device general response	\
0x0002	Device heartbeat	0x8001

| 0x0104 | Device parameters response | \ |
| 0x0200 | Device information | 0x8001 |

Message sent from platform server to tracker device		
Message	**Description**	**Device response**
0x8001	Platform general response	\
0x8103	Set device parameters	0x0104/0x0001
0x8104	Query device parameters	0x0104
0x8105	Device control	0x0001
0x8A00*	Platform RSA public key	0x0001

3. Message Body Data Format

3.1. Device General Response (0x0001)

Message ID: 0x0001

Table 5.   Device General Response Message Body

Start byte	Field	Data type	Description
0	Response sequence number	WORD	The sequence number of the corresponding platform message
2	Response ID	WORD	The ID of the corresponding platform message
4	Result	BYTE	0: Success/confirmation 1: Fail 2: Wrong message 3: Not support

Example: 7E 00 01 00 05 41 30 50 33 98 28 00 01 FFDD810500 01 7E

7E	------Flag
00 01	------Message ID
00 05	------Message Body Properties
41 30 50 33 98 28	------Device ID
00 01	------Message sequence number
FFDD	------Response sequence number
8105	------Response ID
00	------Result
01	------Checksum code
7E	------Flag

3.2. Device Heartbeat(0x0002)

Message ID:0x0002-The device heartbeat data message body is empty.

Example:7E 00 02 00 00 34 40 50 04 93 73 01 04 C7 7E

7E   ------Flag

00 02   ------Message ID

00 00   ------Message Body Properties

34 40 50 04 93 73 ------Device ID

01 04   ------Message sequence number

C7   ------Checksum code

7E   ------Flag

3.3. Device Parameters Response (0x0104)

Message ID:0x0104

Table 6.   **Device Parameters Response Message Body**

Start byte	Field	Data type	Description
0	Response sequence number	WORD	Corresponding to query device parameter message sequence number
2	The number of response parameters	BYTE	
3	Parameters item list		Parameter item format shown as table 15

Example:

7E   01   04   00   1B   41   30   50   33   98   28   00   14

FFDE040000F00F01010000F01001010000F01201050000F014011F   **8E** 7E

7E   -----Flag

01 04   ------ Message ID

00 1B   ------Message Body Properties

41 30 50 33 98 28 ------Device ID

00 14   ------Message sequence number

FFDE   ------Response sequence number

04   ------Total response parameters

0000F00F   ------Parameter ID

01   ------Parameter length

01   ------Parameter value

0000F010   ------Parameter ID

01   ------Parameter length

01   ------Parameter value

0000F012   ------Parameter ID

01   ------Parameter length

05   ------Parameter value

0000F014   ------Parameter ID

01   ------Parameter length

1F   ------Parameter value

8E   ------Checksum Code

7E   ------Flag

3.4. Device Information Report(0x0200)

Message ID:0x0200

Location information report message body is made up with location basic information and location additional information item list. Message structure is shown as follows:

Basic location information	Additional location information item list

Example

7E020000CC413051529609000010000000010000010000000000000000000000000023073101285801040000000000300116310100F01A01CC0000085118AA0000550BA201CC0000085118AE0000550B93F231414F56585F474C3130302D4C415F48322E305F4547393135554C41414252303241300334D30385F56322E302E373A763135F618001F09EB015E01FC00500060042005DC002800000032000AF70600000E480234F81D020865413051529609898604A610218162284347 4C3130302D4C4C410000F912000F000000000000000000000000000000**004E7E**

7E   ------Flag

0200   ------Message ID

00CC   ------Message Body Properties

413051529609   ------Device ID

0001   ------Message sequence number

00000000   ------Alarm sign

10000010   ------Status

00000000   ------Latitude

00000000   ------Longitude

0000   ------Altitude

0000   ------Speed

0000   ------Direction

230731012858   ------Time

01 04 00000000   ------Mileage

30 01 16   ------Wireless network signal strength

31 01 00   ------Number of GNSS positioning satellites

F0 1A 01CC0000085118AA0000550BA201CC0000085118AE0000550B93   ------Base station information

F231414F56585F474C3130302D4C415F48322E305F4547393135554C4141425230324130334D30385F56322E302E373A763135 ------Firmware version

------Bluetooth list

------WiFi list

F6 18 001F09EB015E01FC00500060042005DC0028000000320000A ------Trigger type and sensor information

F7 06 00000E480234   ------Battery information

F8   1D   020865413051529609898604A6102181622843474C3130302D4C410000------Device information

F9 12 000F000000000000000000000000000000000   ------Auxiliary information

4E   ------Checksum Code

7E   ------Flag

Table 7. Basic Location Information Data Format

Start byte	Field	Data type	Description

0	Alarm flag	DWORD	Alarm flag definition is shown as Table 8
4	Status	DWORD	Status definition is shown as Table 9
8	Latitude	DWORD	Latitude value *10^6, accurate to 0.000001 degree.
12	Longitude	DWORD	Longitude value *10^6, accurate to 0.000001 degree
16	Altitude	WORD	Altitude in meters (m)
18	Speed	WORD	1/10km/h
20	Direction	WORD	0～359, north is 0,clockwise
22	Time	BCD[6]	YY-MM-DD-hh-mm-ss (default is GMT+0 time zone

Table 8.   Alarm Flag Definition

Bit	Definition	Description
0	Reserved	
1	Reserved	
2-3	Reserved	
4	Reserved	
5-6	Reserved	
7	Reserved	
8	Reserved	
9-14	Reserved	
15	Reserved	

16	Reserved	
17-27	Reserved	
28	Reserved	
29-30	Reserved	
31	Reserved	

Table 9.   Status Bit Definition

Bit	Status
0	Reserved
1	0: Position unfix; 1: position fix
2	0: North latitude; 1: south latitude
3	0: East longitude; 1: west longitude
4	Reserved
5-26	Reserved
27-29	Network modes: 000-UNREGISTERED；001-GSM；010-LTE；011-CATM；100-NBIOT
30	Reserved
31	0: Real-time data; 1: Buffer data

Table 10.   Extension Device Information List Format

Field	Date type	Description
Extension information ID	BYTE	

Extension information length	BYTE	
Extension information		Extension information shown as Table 11

Table 11.   Extension Information Definition

Extension information ID	Extension information length	Description
0x01	4	DWORD, mileage, 1/10km Additional information can be configured whether to report, data format is shown in Table 12
0x30	1	BYTE: Wireless communication network signal strength, additional information can be configured whether to report, see data format Table 13
0x31	1	Number of GNSS positioning satellites,see Table14
0xF0	m*(2+2+4+4+1)	Base station information, extension information can be configured whether to report, the data format is shown in Table 15, (m represents the number of base station, the maximum is 7)
0xF2	n	STRING, Software Firmware version.Additional information can be configured whether to report. (If no, the system reports once only after the system

		restarts or the configuration is updated. If yes, the system reports every time, see Table 16 for the data formats.
0xF3	1+m*(6+1+[10]+[2]+[2]+[2]+[2]+[6]+[2]+[2])	Bluetooth list. Field mask m group Bluetooth node [Mac,Rssi,Name,FwVer,Voltage,Temperature,Humidity,Accelerometer(X,Y,Z),Res1,Res2] Extension information can be configured report or not. The data format is shown in Table 17 (m indicates the number of Bluetooth nodes. If all Bluetooth information is displayed, the maximum value is 7 (the actual total length should be less than 255 bytes)
0xF4	m*(6+1)	m group WIFI information [Mac,Rssi] Extension information can be configured report or not.Date format see table19.
0xF6	2+1+1+m*([2]+[2]+[2]+[6]+[10]+[2]+[2]+[2]	Date Type：Details See AT+SENSORMASK Instruction Field Mask Bit0-7 Identified Separately [Light,Temperature,Humidity,Accelerometer,Limit,Res1,Res2,R

		es3] Sensor information [Light,Temperature,Humidity,Accelerometer,Limit(Ligh,Tmax,Tmin,Hmax,Hmin),Res1,Res2,Res3] Extension information can be configured report or not. Date format see table20.
0xF7	4+[1+[1]]	Battery voltage: 4 bytes; Charge status(optional): 1 byte; 0: invalid; 1: uncharged; 2: charging; 3: full charging; 4: abnormal; Battery level (optional): 1 byte; Percentage Extension information can be configured report or not. Data Format see table 22.
0xF8	1+[8]+[10]+[10]	Work mode: 1 byte; 0: Periodic mode 1: Trigger mode 2: Tracking mode+Trigger mode 3: Clock mode+Trigger mode 4: Periodic mode+Trigger mode IMEI: 8 bytes (BCD)

| 0xF9 | 2+[4]+[4]+[2]+[6] | ICCID: 10 bytes (BCD) Device type: 10 bytes (STRING), For example: GM100LA-CC Extension information can be configured report or not.Date format see table 23. |
| | | Auxiliary information mask Bit 0-15 identified [GNSS position age, Acc on time,HDOP,Res1,...,Res13] GNSS position age: 4 bytes; Duration of Acc on: 4bytes; HDOP: 2 bytes; GNSS time: 6 bytes Extension information can be configured report or not.Date format see table 24. |

Table 12. Mileage Data Format

Starting byte	Field	Date type	Description
0	Mileage	DWORD	Mileage，1/10km

Table 13. Wireless Communication Network Signal Strength Data Format

Starting byte	Field	Date type	Description
0	Wireless Communication Network Signal Strength	BYTE	Wireless Communication Network Signal Strength （CSQ）

Table 14. Number of GNSS positioning satellites Data Format

Starting byte	Field	Date type	Description
0	Number of GNSS	BYTE	Number of GNSS

	positioning satellites		positioning satellites

Table 15.   Base Station Data Format

Starting byte	Field	Date type	Description
0	MCC	WORD	Mobile Country Code(MCC)
2	MNC	WORD	Mobile Network Code(MNC)
4	CI	DWORD	Cell Tower ID(CI)
8	LAC	WORD	Location Area Code(LAC)
12	RSSI	BYTE	Received Signal Strength Indicator (RSSI)
......			When there are multiple base stations, MCC-RSSI is connected to a group of base station information in sequence

Table 16.   Software Firmware Version Data Format

Starting byte	Field	Date type	Description
0	Software Firmware Version	STRING	String ACSII

Table 17.   Bluetooth Data Format

Starting byte	Field	Date type	Description
0	Field Mask	BYTE	Bit0-7 [Name,FwVer,Voltage,Temperature,Humidity,Sensor,Res1,Res2]
2	Mac	BYTE[6]	Bluetooth Mac address
8	RSSI	BYTE	The strength of the received signal
9	Name	STRING	10 bytes, Bluetooth name
19	FwVer	BCD[2]	Bluetooth version
21	Voltage	WORD	Voltage
23	Temperature	WORD	Temperature

25	Humidity	WORD	Humidity
27	Sensor(X,Y,Z)*	STRING	Different values of the three axes of the Sensor
33	Res1	WORD	Reserved
35	Res2 Reserve 2 byte	WORD	Reserved
......			When there are multiple Bluetooths, the Mac-Res2 connects to a set of Bluetooth information in sequence.

Note: The data length display of the Bluetooth list is mainly based on the actual display information of the mask, and the format in the table above displayed all the mask.

Table 18.　Status Bit Definition

Bit	Definition	Status
Bit 0	Name	0: Display. 1: No Display
Bit 1	FwVer	0: Display. 1: No Display
Bit 2	Voltage	0: Display. 1: No Display
Bit 3	Temperature	0: Display. 1: No Display
Bit 4	Humidity	0: Display. 1: No Display
Bit 5	Sensor	0: Display. 1: No Display
Bit 6	Res1	0: Display. 1: No Display
Bit 7	Res2	0: Display. 1: No Display

Table 19.　Wifi List Data Format

Starting byte	Field	Date type	Description
0	Mac	BYTE[6]	WiFi MAC Address
6	RSSI	BYTE	Strength of the received signal

Table 20.　Trigger Type and Sensor Information Data Format

Starting byte	Field	Date type	Description
0	Data Type	BYTE	0: periodic sampling 1: low power trigger * 2: motion trigger 3: collision trigger * 4: light trigger 5: Temperature and humidity trigger (GL/GM100 only) 6: Temperature trigger (GL/GM100 only)7: Humidity trigger (GL/GM100 only) 8:Alarm trigger * 9: Bluetooth connection trigger
1	Sensor field mask	BYTE	Field masks Bit0-7 are identified respectively[Light,Temperature,Humidity,Accelerometer,Limit,Res1,Res2,Res3] The status bits are defined in Table 21.
2	Light	WORD	mV
4	Temperature	WORD	1/10 ℃
6	Humidity	WORD	1/10 %RH
8	Accelerometer	STRING	STRING Six bytes. Each two bytes indicates a parameter value. The value of the Acc_X, Acc_Y, and Acc_Z three-axis sensor mg.
14	Limit	STRING	10 bytes, each two bytes represents a parameter value, (Ligh,Tmax,Tmin,Hmax,Hmin device parameter threshold)
24	Bar	WORD	2 bytes,Air pressure,hPa
26	Res2	WORD	Reserved
28	Res3	WORD	Reserved

Note: The length of sensor information is mainly displayed based on the actual mask information. and the format in the table above displayed all the mask.

Table 21.   Status Bit Definition

Bit	Definition	Status
Bit 0	Light	0: Display. 1: No Display
Bit 1	Temperature	0: Display. 1: No Display
Bit 2	Humidity	0: Display. 1: No Display
Bit 3	Accelerometer	0: Display. 1: No Display

Bit 4	Limit		0: Display. 1: No Display
Bit 5	Bar		0: Display. 1: No Display
Bit 6	Res2		0: Display. 1: No Display
Bit 7	Res3		0: Display. 1: No Display

Table 22.   Battery Information Data format

Starting byte	Field	Date type	Description
0	Battery voltage	DWORD	mV
4	Charging state	BYTE	0 invalid 1 Uncharged 2 Charging 3 Full 4 Exceptions
5	Energy percentage	BYTE	Percentage

Table 23.   Device Information Data format

Starting byte	Field	Date type	Description
0	Working Mode	BYTE	Working Mode:1Byte 0: Periodic mode* 1: Trigger mode* 2: Tracking mode+Trigger mode 3: Clock mode+Trigger mode* 4: Periodic mode+Trigger mode
1	IMEI	BCD[8]	Device IMEI
9	ICCID	BCD[10]	ICCID
19	Device Type	STRING	10 bytes, device Type

Table 24.   Auxiliary Information Data format

Starting byte	Field	Date type	Description
0	Auxiliary Information Mask	WORD	Mask Bit0-15 identified separately [GNSS age,Acc on time, HDOP, Res1,...,Res13] The bits status are defined in Table 25
2	GNSS age	DWORD	GNSS age
6	ACC on time	DWORD	ACC on time
10	HDOP	WORD	HDOP
12	GNSS Time	BCD[6]	GNSS TIME YY-MM-DD-hh-mm-ss （The default time zone is GMT+0）
……			

Table 25.   Status Bit Definition

Bit	Definition	Status
Bit 0	GNSS age	0: Display. 1: No Display
Bit 1	ACC on time	0: Display. 1: No Display
Bit 2	HDOP	0: Display. 1: No Display
Bit 3	GNSS Time	0: Display. 1: No Display
Bit 4-Bit13	Reserved	0: Display. 1: No Display

3.5. Platform General Response (0x8001)

Message ID:0x8001

Table 26.   Platform General Response Message Body.

Starting byte	Field	Date type	Description
0	Response sequence number	WORD	Sequence number of the corresponding device message
2	Response ID	WORD	ID of the corresponding

			device message
4	Result	BYTE	0: Success/confirmation; 1: Fail; 2: Wrong message; 3: Not support; 4: Alarm processing confirmation ;

Example:

7E 80 01 00 05 59 30 54 49 18 15 00 010001020000 FF 7E

7E   ------Flag

80 01   ------Message ID

00 05   ------Message body Properties

59 30 54 49 18 15 ------ Device ID

00 01   ------Message sequence number

0001   ------Response sequence number

0200   ------Response ID

00   ------Result

FF   ------Checksum Code

7E   ------Flag

3.6. Set Device Parameters(0x8103)

Message ID:0x8103

Table 27.　Set Device Parameters Message Body

Starting byte	Field	Date type	Description
0	Total number of parameters	BYTE	
1	Parameters list		Shown as Table 28

Table 28.　Parameters List Format

Starting byte	Field	Date type

Parameters ID	DWORD	The definition and description of parameters ID shown as Table 29
Parameters length	BYTE	Parameters list shown as Table 29
Parameters value	27	

Table 29.   Parameters List

Parameters ID	Data type	Description
0x0001	DWORD	Device heartbeat interval; The unit is second
0x0010	STRING	Server APN
0x0011	STRING	APN username
0x0012	STRING	APN password
0x0013	STRING	Main server IP or domain name
0x0017	STRING	Backup server IP or domain name
0x0018	DWORD	Main server TCP or UDP port
0xF000	STRING	Device ID; Default maximum 12-bit BCD code
0xF004	STRING	NTP server address, support domain name and IP
0xF005	DWORD	NTP server port
0xF006	BYTE	Timezone [-12, 12]
0xF007	BYTE	Protocol type [0: JTT808; 1: TAIP]
0xF009	BYTE	Protocol encryption [0: NULL; 1: RSA; 2: AES; 3: XTEA]
0xF00A	BYTE	Position Galaxy [0: GPS+BD; 1: GPS+GL0; 2: GPS+GAL]

0xF00B	BYTE	WIFI enable [0: off; 1: on]
0xF00C	BYTE	WIFI work mode [0: AP; 1: STA]*
0xF00D	BYTE	The max AP of WIFI
0xF00E	WORD	WiFi single scan time, the unit is second
0xF00F	BYTE	BT enable [0: off; 1: on]
0xF010	BYTE	BT work mode [0:Host; 1:Slave]
0xF011	BYTE	Maximum number nodes of BT
0xF012	BYTE	The timeout of BT nodes, the unit is minute. BT judges whether the node is offline through automatic scanning
0xF013	WORD	BT single scan time, the unit is second
0xF014	BYTE	BT report mask
0xF017	BYTE	Transmit protocol [0: TCP; 1: UDP; 2: MQTT]
0xF018	DWORD	Report mask
0xF019	BYTE	G-sensor enable [0: off; 1: on]
0xF01A	BYTE	G-sensor sensitivity [0-255]
0xF01B	BYTE	G-sensor range [0: ±2g; 1: ±4g; 2: ±8g; 3:±16g]
0xF01C	WORD	G-sensor times
0xF01D	DWORD	G-sensor time, the unit is second
0xF01E	DWORD	G-sensor trigger interval, the unit is second

0xF01F	BYTE	G-sensor report mask
0xF020	BYTE	Light enable [0: off; 1: on]
0xF021	WORD	Light threshold
0xF022	DWORD	Light trigger interval, the unit is second
0xF023	BYTE	Temp&humi enable [0: off; 1: on]
0xF024	WORD	Upper temperature limit
0xF025	WORD	Lower temperature limit
0xF026	WORD	Upper humidity limit
0xF027	WORD	Lower humidity limit
0xF028	DWORD	Temp&humi trigger interval, the unit is second
0xF029	BYTE	GNSS enable [0: off; 1: on]
0xF02A	BYTE	Device work mode
0xF02B	DWORD	Backup server port, TCP or UDP port
0xF02C	BYTE	Buffer storage switch*
0xF02D	BYTE	Server ACK switch*
0xF02E	DWORD	Reporting interval
0xF02F	DWORD	Sampling interval
0xF030	STRING	AT transparent transmission command.

Example:

7E 81 03 00 2C 59 30 54 48 06 44 FF EB

060000F02301010000F0240200280000F0250200000000F028040000001E0000F0260200320000F02702

00 0A 8A 7E

7E   ------Flag

81 03   -----Message ID

00 2C   ------Message body Properties

59 30 54 48 06 44   ------Device ID

FF EB   ------Message sequence number

06   ------Total Parameter

0000F023   ------Parameter ID

01   ------Parameter Length

01   ------Parameter Value

0000F024   ------Parameter ID

02   ------Parameter Length

0028   ------Parameter Value

0000F025   ------Parameter ID

02   ------Parameter Length

0000   ------Parameter Value

0000F028   ------Parameter ID

04   ------Parameter Length

0000001E   ------Parameter Value

0000F026   ------Parameter ID

02   ------Parameter Length

0032   ------Parameter Value

0000F027   ------Parameter ID

02   ------Parameter Length

000A   ------Parameter Value

8A   ------Checksum Code

7E   ------Flag

3.7. Query Device Parameters(0x8104)

Message ID:0x8104

Query the device parameters message body is empty.

Example：

7E 81 04 00 00 59 30 54 48 06 44 FF F9 B4 7E

7E   ------Flag

81 04   ------Message ID

00 00   ------Message Body Properties

59 30 54 48 06 44 ------Device ID

FF F9   ------Message sequence number

B4   ------Checksum Code

7E   ------Flag

3.8. Device Control(0x8105)

Message ID:0x8105

Table 30. Device Control Message Body

Starting byte	Field	Date type	Description
0	Commands word	BYTE	Device control commands shown as Table31
1	Commands parameters	STRING	Shown as the below table, each field is separated by symbol '.'

Example：

7E 81 05 00 01 59 30 54 49 18 15 FF DD 04 DA 7E

7E   ------Flag

81 05   ------Message ID

00 01   ------Message Body Properties

59 30 54 49 18 15 ------Device ID

FF DD   ------Message sequence number

04   ------Command Word

      ------Command parameter

DA   ------Checksum Code

7E   ------Flag

Table 31. Commands Word Description

Commands word	Command parameters	Description
0x04	None	Device restart
0x05	None	Restore the factory configuration of the device
0x20	TYPE;MODE;VERSION;PROTOCOL;URL;MD5	OTA upgrade TYPE:0: App upgrade,1: Core upgrade MODE:0: Full package; 1:Diff package VERSION: Target firmware version; PROTOCOL:0: FTP protocol; 1: HTTP protocol URL: The full URL path MD5: The MD5 value of firmware
0x24	COMMAND	AT transparent transmission; refer to AT commands.

3.9. Uplink Transparent Transmission (0x0900)

Message ID:0x0900

Temporary reserved

Table 32. Basic Location Information Data Format

Start byte	Field	Data type	Description
0	Transparent Transmission Type	BYTE	0x41: UART1; 0x42: UART2; 0x51:BLE1;(used) 0x52:BLE2;(used)
1	Status	DWORD	Status definition is shown as Table 9
5	Latitude	DWORD	Latitude value *10^6, accurate to 0.000001 degree
9	Longitude	DWORD	Longitude value *10^6, accurate to

			0.000001 degree
13	Altitude	WORD	Altitude in meters (m)
15	Speed	WORD	1/10km/h
17	Direction	WORD	0～359, north is 0,clockwise
19	Time	BCD[6]	YY-MM-DD-hh-mm-ss (default is GMT+0 time zone)
25	Transparent Transmission Data	STRING	ASCII code,length less than 1023-25 bytes;

4. Example of Message Data Interaction

4.1. Report the Packet

GA series devices report location and expansion information to the platform at the configured interval. This packet is also reported when the device detects the trigger event. The interval for reporting data packets can be configured remotely by the platform.

Example for reporting Data packets:

[Device→Platform]:

Example of data packet sent by the device:

7E 02 00 00 42 14 50 60 00 05 26 00 09 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 22 12 29 08 42 35 F0 0C 01 CC 00 00 00 6C 6D 00 00 55 0B 2F F6 0E 04 0F 0A 8F 00 FE 01 18 02 D8 FD A8 00 48 F7 06 00 00 10 0E 02 61 B3 7E

`7E` --Flag

`0200` --Message ID

`0042` --Properties of Message Body

`145060000526` --Device Number

`0009` --Message Sequence Number

`00000000` --Alarm Flag

`00000000` --Status Flag

`00000000` --Latitude

`00000000` --Longitude

`0000` --Altitude

`0000` --Speed

`0000` --Direction

`221229084235` --Time

`F0 0C 01CC0000006C6D0000550B2F` --Base Station Information(MCC:01CC,MNC:00,CI:00006C6D,LAC:0000550B,RSSI:2F)

F6 0E 040F0A8F00FE011802D8FDA80048 --Trigger Type and Sensors Information(04(Data type) OF(Mask) 0A8F(Light) 00FE(Temperature) 0118(Humidity) 02D8FDA80048(Accelerometer))

F7 06 0000100E0261 --Battery Information

B3 --Checksum Code

7E --Flag

[Platform→Device]:

Example of data packet sent by the platform:

7E 80 01 00 05 14 50 60 00 05 26 00 01 00 09 02 00 00 89 7E

7E --Flag

8001 --Message ID

0005 --Properties of Message Body

145060000526 --Device Number

0001 --Message Sequence Number

0009020000 --Response message body89 --Checksum Code

7E --Flag

Example for reporting data packets:

[Device→Platform]:

Example of data packet sent by the device:

7E020000421450600005260004000000000000001000000000000000000000000000000221228135548F00C01CC0000006C6D0000550B2EF60E000F000000F7011A0038FFC80300F7060000100903649D7E

7E --Flag

0200 --Message ID

0042 --Properties of Message Body

145060000526 --Device Number

0004 --Message Sequence Number

00000000 --Alarm Flag

00000010 --Status Flag

00000000 --Latitude

00000000 --Longitude

0000 --Altitude

0000 --Speed

0000 --Direction

221228135548 --Time

F0 0C 01CC0000006C6D0000550B2E --Base Station Information(MCC:01CC,MNC:00,CI:00006C6D,LAC:0000550B,RSSI:2E)

F6 0E 000F000000F7011A0038FFC80300 --Trigger Type and Sensors Information(00(Data type) 0F(Mask) 0000(Light) 00F7(Temperature) 011A(Humidity) 0038FFC80300(Accelerometer))

F7 06 000010090364 --Battery Information

9D --Checksum Code

7E --Flag

[Platform→Device]:

Example of data packet sent by the device:

7E800100051450600000526000100004020000847E

7E --Flag

8001 --Message ID

0005 --Properties of Message Body

145060000526 --Device Number

0001 --Message Sequence Number

0004020000 --Response message body84 --Checksum Code

7E --Flag

4.2. Platform remote configuration and query

The platform can also proactively configure and query GA series device parameters. When the platform uses remote configuration, GA series devices reply all parameter packets (0x0104) by default for platform verification, or devices can be configured to reply general response packets (0x0001). The platform can send a query package (0x8104) to obtain device parameter information.
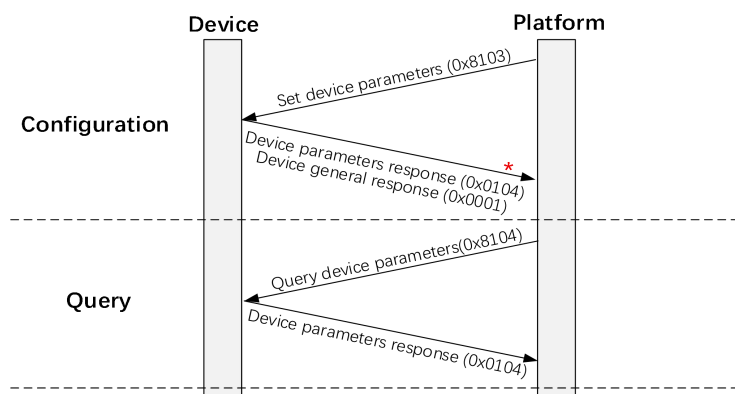
Example for querying device parameters after delivering the device report interval:

[Platform→Device]：

Example of data packet sent by the platform:

7E 81 03 00 16 14 50 60 00 05 26 FF DD 01 00 00 F0 30 10 41 54 2B 54 49 4D 45 47 41 50 3D 30 2C 36 30 30 0A 7E

7E --Flag

8103 --Message ID

0016 --Properties of Message Body

145060000526 --Device Number

FFDD --Message Sequence Number

010000F0301041542B54494D454741503D302C363030 --Response message body0A --Checksum Code

7E --Flag

[Device→Platform]：

Example of data packet sent by the device:

7E 01 04 00 25 14 50 60 00 05 26 00 04 FF DD 01 00 00 F0 30 1D 2B 54 49 4D 45 47 41 50 3A 72 65 70 6F 72 74 2C 36 30 30 0D 0A 0D 0A 4F 4B 0D 0A 0D 0A 9F 7E

7E --Flag

0104 --Message ID

0025 --Properties of Message Body
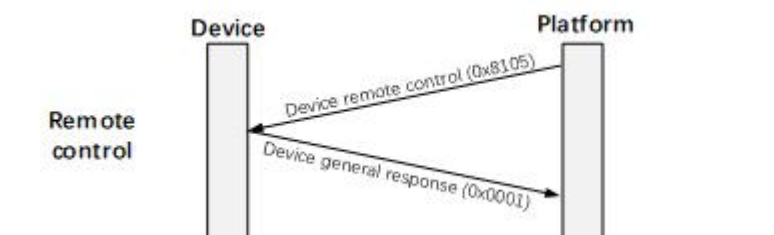
145060000526 --Device Number

0004 --Message Sequence Number

FFDD010000F0301D2B54494D454741503A7265706F72742C3630300D0A0D0A4F4B0D0A0D0A --Response message body9F --Checksum Code

7E --Flag

4.3. Platform Remote Control

The platform can actively control the GA series of devices. The platform uses remote control equipment for reset and OTA upgrade.

OTA upgrade instructions for example:

[Platform→Device]：

Example of data packet sent by the platform:

7E 81 05 00 A6 14 50 60 00 05 26 FF DD 20 30 3B 30 3B 41 4F 56 58 5F 47 58 31 30 30 2D 58 58 5F 48 32 2E 30 5F 56 32 2E 30 2E 32 5F 76 30 37 2E 62 69 6E 3B 31 3B 68 74 74 70 3A 2F 2F 34 37 2E 31 32 32 2E 30 2E 31 39 31 3A 38 30 38 30 2F 66 69 6C 65 2F 46 69 72 6D 77 61 72 65 5F 4A 74 38 30 38 5F 41 4F 56 58 2F 32 30 32 32 31 32 30 36 2F 41 4F 56 5F 47 58 31 30 30 2D 58 58 5F 48 32 2E 30 5F 56 32 2E 30 2E 32 5F 76 30 37 2E 62 69 6E 3B 34 33 39 30 61 32 37 66 33 64 39 34 30 62 33 33 66 65 31 64 31 62 35 66 37 64 62 65 35 37 36 30 1C 7E

7E --Flag

8105 --Message ID

00A6 --Properties of Message Body

145060000526 --Device Number

FFDD --Message Sequence Number

20303B303B414F56585F47583130302D58585F48322E305F56322E302E325F7630372E62696E3B313B687474703A2F2F34372E3132322E302E3139313A383038302F66696C652F4669726D776172655F4A743830385F414F56582F3230323231323036 2F414F56585F47583130302D58585F48322E305F56322E302E325F7630372E62696E3B343339306132376633643934306233336665316431623566376462653537363630 --Response message body**1C** --Checksum Code

7E --Flag

[Device→Platform]:

Example of data packet sent by the device:

7E 00 01 00 05 14 50 60 00 05 26 00 07 FF DD 81 03 00 A4 7E

7E --Flag

0001 --Message ID

0005 --Properties of Message Body

145060000526 --Device Number

0007 --Message Sequence Number

FFDD810300 --Response message body**A4** --Checksum Code

7E –Flag

Example of AT pass-through instruction:

[Device→Platform]:

Example of data packet sent by the device:

7E 09 00 00 40 41 30 50 73 23 78 00 05 52 00 00 00 12 01 E5 BB 63 06 FA BC 40 00 44 00 00 00 00 22 12 29 17 36 45 01 D0 6D 76 0C 21 F7 BA 02 01 06 03 03 AA FE 11 16 AA FE 20 00 0D 68 12 80 00 02 44 F9 00 07 90 8B 00 00 00 00 00 00 DC 7E

7E --Flag

0001 --Message ID

0005 --Properties of Message Body

145060000526 --Device Number

0007 --Message Sequence Number

FFDD810300 --Response message bodyA4 --Checksum Code

7E --Flag