

2023

AOVX



Cloud Platform Protocol

V Series_V2.9



www.aovx.com

History

Revision	Date	Author	Description
V1.0	2021-09-11	Tommy	Initial
V1.1	2021-09-28	Tommy	Upgrade
V1.2	2022-02-16	Tommy	Added BT/WIFI/GPIO status
V1.3	2022-03-16	Tommy	Upgraded 0x0200
V2.0	2022-03-25	Tommy	Upgraded 0x8103/0x8105
V2.1	2022-03-28	Tommy	Upgraded layout
V2.2	2022-05-07	Yuki	Added 0x8900 and 0x0900
V2.3	2022-05-14	Yuki	Upgraded 0x8900 and 0x0900
V2.4	2022-06-06	Yuki	Upgraded Protocol
V2.5	2022-07-29	Yuki	Upgraded 0x0200 Auxiliary information
V2.6	2022-12-27	Yuki/Barry	Added network status in 0x0200, upgraded 0900 message format
V2.7	2023-7-22	Barry	Added examples; added alarm types in 0200 113: Exit jamming 114: immediately report 115: TOW distance trigger 116: idle trigger 117: exit idle 118: parking trigger 119: low speed trigger
V2.8	2023-8-6	Barry	Added examples
V2.9	2023-10-10	Barry	Update F7 name changed from "Battery Information" to "Internal Battery Information",Delete the status flag bit

**bit4 from VG300 and use bit31 to
represent the data status of VG300.**

Contents

History	2
Contents	2
Table Index	1
1. Introduction	3
2. Protocol Content	4
2.1. Data Type	4
2.2. Transmission Rule	4
2.3. Protocol Message Format	4
2.3.1. Message Structure	4
2.3.2. Flag	6
2.3.3. Message Header	7
2.3.4. Checksum	7
2.4. Protocol Interaction Process	8
3. Message Body Data Format	10
3.1. Device General Response (0x0001)	10
3.2. Platform General Response (0x8001)	11
3.3. Device Heartbeat(0x0002)	12
3.4. Device Registration (0x0100)	13
3.5. Device Register Response (0x8100)	15
3.6. Device Authentication (0x0102)	16
3.7. Set Device Parameters (0x8103)	17
3.8. Query Device Parameters (0x8104)	21
3.9. Query Device Parameter Response (0x0104)	22
3.10. Device Control (0x8105)	24
3.11. Location Information Report (0x0200)	26
3.12. Uplink Transparent Transmission (0x0900)	42

3.13. Downlink Transparent Transmission (0x8900)	44
3.14. Platform RSA Public Key*(0x8A00)	44
4. Examples of Message Data Interaction	45
4.1. Registration and Authentication	45
4.2. Report Data Package and Heartbeat Package	47
4.3. Platform Remote Configuration and Query	51
4.4. Platform Remote Control	53

Table Index

Table 1. Data Type	4
Table 2. Message Header	7
Table 3. Message Body Properties	7
Table 4. Message Interaction Response	8
Table 5. Device General Response Message Body	10
Table 6. Platform General Response	11
Table 7. Device Registration Message Body	13
Table 8. Device Registration Response Message Body	15
Table 9. Device Authentication Message Body	16
Table 10. Set Device Parameters Message Body	17
Table 11. Device Parameters Item Data Format	17
Table 12. Parameter List	17
Table 13. Query Device Parameter Response Message Body	22
Table 14. Device Control Message Body	24
Table 15. Commands Word Description	24
Table 16. Basic Location Information Data Format	27
Table 17. Alarm Flag Definition	28
Table 18. Status Definition	28
Table 19. Location Extension Format	29
Table 20. Extension Information Definition	29
Table 21. Mileage Information Data Format	32
Table 22. Mobile Network Signal Strength Data Format	32
Table 23. Number of GNSS Positioning Satellites Data Format	32
Table 24. Base Station Information Data Format	32
Table 25. External Supply Voltage Data Format	33
Table 26. Firmware Version Data Format	33

Table 27. Bluetooth List Data Format	33
Table 28. Status Definition	34
Table 29. WiFi List Data Format	35
Table 30. GPIO Status Data Format	35
Table 31. Trigger Type and Sensor Information Data Format	36
Table 32. Status Definition	39
Table 33. Internal Battery Information Data Format	39
Table 34. Auxiliary Information Data Format	40
Table 35. Status Definition	40
Table 36. Basic Location Information Data Format	42
Table 37. Status Bit Definition	42
Table 38. Downlink Transparent Transmission Message Body	44

1. Introduction

(1) This communication protocol is based on the Ministry of Transportation's standard JT/T 808 **"Road Transport Vehicle Satellite Positioning System Beidou Compatible Vehicle Mounted Terminal Communication Protocol Technical Specification"**.

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

(3) Message ID includes:

Device general response (0x0001); Platform general response (0x8001);

Device heartbeat(0x0002); Device registration (0x0100);

Device registration response (0x8100); Device authentication (0x0102);

Set device parameters (0x8103); Query device parameters (0x8104);

Uplink transparent transmission(0x0900);Downlink transparent transmission(0x8900);

Query device parameters response(0x0104); Device control(0x8105);

Location information report (0x0200); Platform RSA public key(0x8A00)*.

(4) In addition to the protocol documentation, we also provide Java code for easy integration.

For details please check the below link:

OTA upgrade guide: *FOTA(AOVX) - Powered by MinDoc*

Device protocol integration guide: *Registration and Authentication - Powered by MinDoc*

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, and message body and checksum code. The structure is shown as the below figure:



Sending: Message Package——>calculate and fill the checksum——>transferred meaning——>sending;

Receiving: Receiving package——>transferred meaning and revert——>verify checksum code——>parse message

Example:

The device needs to send a hexadecimal packet with the content **000000008400002301E5BB4506FABB57003F00000036230731084856**, which is encapsulated as follows:

Add flag, message header and checksum code:

7E-----flag

0200001C8050650805440004-----message header

000000008400002301E5BB4506FABB57003F00000036230731084856-----message body

41-----checksum code

7E-----flag

2.3.2. Flag

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

0x7E<————>0x7D followed with 0x02

0x7D<————>0x7D followed with 0x01

Example 1:

Data sent by the device: 0x7D 0x00 0x00 0x00 0x01 transfer to 0x7D 0x01 0x00 0x00 0x00 0x01

The server receives the data sent from the device: 0x7D 0x01 0x00 0x00 0x00 0x01 transfer to 0x7D 0x00 0x00 0x00 0x01

Example 2:

Data sent by the device: 0x7D 0x00 0x00 0x00 0x02 transfer to 0x7D 0x01 0x00 0x00 0x00 0x02

The server receives the data sent from the device: 0x7D 0x01 0x00 0x00 0x00 0x02 transfer to 0x7D 0x00 0x00 0x00 0x02

Example 3:

Data sent by the device: 0x7E 0x00 0x00 0x00 0x01 transfer to 0x7D 0x02 0x00 0x00 0x00 0x01

The server receives the data sent from the device: 0x7D 0x02 0x00 0x00 0x00 0x01 transfer to 0x7E 0x00 0x00 0x00 0x01

Example 4:

Data sent by the device: 0x7E 0x00 0x00 0x00 0x02 transfer to 0x7D 0x02 0x00 0x00 0x00 0x02

The server receives the data sent from the device: 0x7D 0x02 0x00 0x00 0x00 0x02 transfer to 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.Message Body Properties
4	Device ID	BCD[6]	Last 12 digits of IMEI
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		Sub-package	Data encryption mode			Length of message body									

Bit15: Reserved.

Bit14: Version. This bit is reserved as 0 by default;

Bit13: Sub package, 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 is 1, it means the message body is encrypted by the RSA algorithm.

Bit9-0: Length of message body.

2.3.4. Checksum

Checksum is calculated via XOR from the start of message header to the last byte before checksum. The Checksum occupies 1 byte.

Example: 8001000541305150710000B2046F020000

The final result is 5E

2.4. Protocol Interaction Process

1. The tracker device shall register to platform server firstly and then device will get the authentication code from server. The authentication code will be used when tracker device login to the server.
2. The registered device only needs to log in with the saved authentication code.
3. The tracker device would report the message (including status and alarm information refer to message 0x0200 for details) to platform server after login and authentication are completed.
4. The platform server can actively configure and query tracker device parameters as well.

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
0x0100	Device registration	0x8100
0x0102	Device authentication	0x8001
0x0104	Query device parameters response	\
0x0200	Device information report	0x8001
0x0900	Uplink transparent transmission	\
Message sent from platform server to tracker device		
Message	Description	Device response
0x8001	Platform general response	\
0x8100	Device registration response	\

0x8103	Set device parameters	0x0104/0x0001
0x8104	Query device parameters	0x0104
0x8105	Device control	0x0001
0x8900	Downlink transparent transmission	0x0900
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. Platform General Response (0x8001)

Message ID: 0x8001

Table 6. Platform General Response

Start byte	Field	Data type	Description
0	Response Sequence Number	WORD	The sequence number of the corresponding device message.
2	Response ID	WORD	The ID of the corresponding device message.
4	Result	BYTE	0: Success/confirmation 1: Fail 2: Wrong message 3: Not support 4: Confirmed that the alarm has been handled

Example:

7E 80 01 00 05 59 30 54 49 18 15 00 01 00 01 02 00 00 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

3.3. 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

564D3330302D474C000000000000000000000000-----Device model

0000000000000000-----Device ID

00-----License color

00-----Vehicle identification

7F-----Checksum code

7E-----Flag

3.5. Device Register Response (0x8100)

Message ID: 0x8100

Table 8. Device Registration Response Message Body

Start byte	Field	Data type	Description
0	Response sequence number	WORD	Corresponding device register message sequence number
2	Result	BYTE	0: Success; 1: The vehicle has been registered; 2: The vehicle does not exist in the database; 3: The device has been registered; 4: The device does not exist in the database;
3	Authentication code	STRING	This field is only available after success. The maximum is 32 bytes

Example:

7E 81 00 00 09 41 30 50 33 98 28 00 01 000100010203040506 2D 7E

7E-----Flag

81 00-----Message ID

00 09-----Message Body Properties

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

00 01-----Message Sequence Number

0001-----Response Sequence Number

00-----Result

010203040506 -----Authentication code

2D-----Checksum code

7E-----Flag

3.6. Device Authentication (0x0102)

Message ID:0x0102

Table 9. Device Authentication Message Body

Start byte	Field	Data type	Description
0	Authentication code	STRING	Report the authentication code after reconnection. The maximum is 32 bytes

Example:

7E0102000C4130503748090002343133303530333734383039587E

7E-----Flag

0102-----Message ID

000C-----Message Body Properties

413050374809-----Device ID

0002-----Message Sequence Number

343133303530333734383039-----Authentication code

58-----Checksum code

7E-----Flag

3.7. Set Device Parameters (0x8103)

Message ID: 0x8103

Table 10. Set Device Parameters Message Body

Start byte	Field	Data type	Description
0	Total number of parameters	BYTE	
1	Parameters list		Shown as Table 11.Device Parameters Item Data Format

Table 11. Device Parameters Item Data Format

Field	Data type	Description
Parameter ID	DWORD	The parameter ID definition & description, shown as Table 12.Parameter List
Parameter length	BYTE	Parameters list format shown as Table 12.Parameter List
Parameter value		

Table 12. Parameter List

Parameter 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
0x0027	DWORD	Sleep report interval in sleep mode, unit in second
0x0029	DWORD	Run report interval in run mode,unit in second

0x0030	DWORD	Turn angle,range:0<180°, unit in degree
0x0055	DWORD	Maximum speed in km/h
0x0056	DWORD	Over-speed duration in seconds
0x0080	DWORD	The data of odometer,the unit is 1/10km For example:103=10.3km
0xF000	STRING	Device ID Default maximum 12-bit BCD code
0xF001	DWORD	Run voltage in mV
0xF002	DWORD	Stop voltage in mV
0xF003	WORD	Sleep voltage in mV
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 method:[0: NULL; 1: RSA; 2: AES; 3: XTEA]
0xF00A	BYTE	Positioning Galaxy: [0: GPS+BD; 1: GPS+GLO; 2: GPS+GAL].
0xF00B	BYTE	WIFI enable [0: off; 1: on]
0xF00C	BYTE	WIFI working mode: [0: AP; 1: STA]*
0xF00D	BYTE	The max AP number of WIFI
0xF00F	BYTE	BT enable [0: off; 1: on]
0xF010	BYTE	BT working mode [0: host; 1: slave]
0xF011	BYTE	Maximum number nodes of BT

0xF012	BYTE	BT node timeout time, in minutes BT automatic scan, used to judge the node offline
0xF014	BYTE	BT report mask
0xF015	WORD	Input GPIO mode High byte [channel number]; Low byte [0:digital 1:analog]
0xF016	BYTE	GPIO direction*
0xF017	BYTE	Transmit protocol: [0:TCP; 1:UDP; 2:MQTT*]
0xF018	DWORD	Report mask
0xF01A	BYTE	G-sensor sensitivity [0-255]
0xF01B	BYTE	G-sensor range [0: 2g; 1: 4g; 2: 8g; 3: 16g]
0xF01D	DWORD	G-sensor vibration valid time in seconds
0xF01F	BYTE	G-sensor report mask
0xF02B	DWORD	Backup server port, TCP or UDP port
0xF02C	BYTE	Data buffer enable/disable*
0xF02D	BYTE	ACK enable/disable*
0xF030	STRING	AT transparent transmission command

Example:

7E810300194130503083699CA5030000002704000000190000002904000000190000F01B0100BE7E

7E-----Flag

81 03-----Message ID

00 19-----Message Body Properties

41 30 50 30 83 69 -----Device ID

9C A5-----Message Sequence Number

03-----Total parameters

00000027-----Parameter ID

04-----Parameter length

00000019-----Parameter value

00000029-----Parameter ID

04-----Parameter length

00000019-----Parameter value

0000F01B-----Parameter ID

01-----Parameter length

00-----Parameter value

BE-----Checksum code

7E-----Flag

3.8. Query Device Parameters (0x8104)

Message ID: 0x8104

Query 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

3.9. Query Device Parameter Response (0x0104)

Message ID: 0x0104

Query device parameter response message data format.

Table 13. Query Device Parameter Response Message Body

Start byte	Field	Data type	Description
0	Response sequence number	WORD	Response sequence number corresponding to query device parameter message
2	The number of response parameters	BYTE	
3	Parameters item list		Parameter item format shown as Table 11. Device Parameters Item Data Format

Example:

7E 01 04 00 1B 41 30 50 33 98 28 00 14 FFDE 04 00 00 F0 0F 01 01 00 00 F0 10 01 01 00 00 F0 12 01 05
00 00 F0 14 01 1F 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

3.10. Device Control (0x8105)

Message ID:0x8105

Table 14. Device Control Message Body

Start byte	Field	Data	Description
0	Commands word	BYTE	Device control commands word description ,shown as Table 15.Commands Word Description
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 0-----Message ID

00 01-----Message Body Properties

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

FF DD-----Message Sequence Number

04-----Command

-----Command parameter

DA-----Checksum code

7E-----Flag

Table 15. Commands Word Description

Commands word	Command parameters	Description
4	/	Device restart
5	/	Restore the factory configuration of the device
32	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
33	MODE	Fuel Control, MODE: 0: connect; 1: disconnect
34	MODE	Power Output, MODE: 0: off; 1: on
35	CHANNEL;MODE	GPIO Output, CHANNEL: 0-15, MODE: 0: off; 1: on
36	COMMAND	AT transparent transmission; refer to AT commands

3.11. Location 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:

7E020000F4413050339828001000000000000000301E5BB6206FABC2E003E0000000022090611031701040000078300115310116F00C01CC00085118AE0000550B17F1040000330FF22D414F56585F564C3330302D4C415F48322E305F4547393135554C4141425230324130334D30385F56322E302E30F33F3FC0F58B46EDDACC000000000000000000000000D7C011002360000000000001FB5DA257BD9C900000000000000000000000B9C01090243000000000000F41C94772B6BB9E0C46C1632D1C320BDC210E475EB93BB42BC2D1DDF93B8F5080000000000000001F60840080000000803A8F70600000000200F90C000700000001157F5EA00008 5C 7E

7E-----Flag

0200-----Message ID

00F4-----Message Body Properties

413050339828-----Device ID

0010-----Message Sequence Number

00000000-----Alarm flag

00000003-----Status

01E5BB62-----Latitude

06FABC2E-----Longitudes

003E-----Altitude

0000-----Speed

0000-----Direction

220906110317-----Time

010400000078-----Mileage

300115-----Network Signal Strength

310116-----Number of GNSS positioning satellites

F00C01CC00085118AE0000550B17-----LBS information

F1040000330F-----External power supply voltage

F22D414F56585F564C3330302D4C415F48322E305F4547393135554C4141425230324130334D30385F56322E302E30-----Firmware version

F33F3FC0F58B46EDDACC00000000000000000000000000D7C0110023600000000000001FB5DA257BD9C9000000 00000000000000000000B9C01090243000000000000-----Bluetooth list

F41C94772B6BB9E0C46C1632D1C320BDC210E475EB93BB42BC2D1DDF93B8-----WiFi list

F50800000000000000001-----GPIO status

F608400800000000803A8-----Trigger types and sensor information

F706000000000200-----Battery information

F90C000700000001157F5EA00008-----Auxiliary information

5C-----Checksum code

7E-----Flag

Table 16. Basic Location Information Data Format

Start byte	Field	Data type	Description
0	Alarm flag	DWORD	Alarm flag definition is shown as Table 17.Alarm Flag Definition
4	Status	DWORD	Status definition is shown as Table 18.Status Definition
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 17. Alarm Flag Definition

Bit	Definition	Description
0	Reserved	
1	Overspeed alarm	Flag maintained until alarm condition is released
2-3	Reserved	
4	GNSS fault	Flag maintained until alarm condition is released
5-6	Reserved	
7	Device main power under voltage	Flag maintained until alarm condition is released
8	Device main power off	Flag maintained until alarm condition is released
9-14	Reserved	
15	Remove alarm	Cleared after receiving the response
16	Vibration alarm	Cleared after receiving the response
17-27	Reserved	
28	Illegal displacement of the vehicle	Cleared after receiving the response
29-30	Reserved	
31	Reserved	

Table 18. Status Definition

Bit	Status
0	0: ACC off; 1: ACC on
1	0: GNSS position unfix; 1: GNSS position fix
2	0: North latitude; 1: south latitude
3	0: East longitude; 1: west longitude
4	Reserved

5	0: Idle; 1: anti-idle
6-9	Reserved
10	0: Fuel connect; 1: Fuel disconnect
11-26	Reserved
27-29	Network modes; 000-UNREGISTERED; 001-GSM; 010-LTE; 011-CATM; 100-NBIOT
30	0: Normal data; 1: TOW data
31	0: Real-time data; 1: Buffer data

Table 19. Location Extension Format

Field	Data type	Description
Extension information ID	BYTE	
Extension information length	BYTE	
Extension information		Extension information shown as Table 20.Extension Information Definition

Table 20. Extension Information Definition

Extension information ID	Extension information length(Byte)	Description
0x01	4	Mileage, 1/10km;extension information can be configured to be reported or not, shown Table 21.Mileage Information Data Format
0x30	1	Mobile network signal strength; extension information can be configured to be reported or not, shown as Table 22.Mobile Network Signal Strength Data Format
0x31	1	Number of GNSS positioning satellites, shown as Table 23.Number of GNSS Positioning Satellites Data Format
0xF0	m*13	m: Number of base station;, maximum is 7; Base station information

0xF1	4	<p>DWORD, External supply voltage in mV.</p> <p>Extension information can be configured to be reported or not, shown as Table 25.External Supply Voltage Data Format</p>
0xF2	n	<p>STRING, firmware version;</p> <p>Extension information can be configured to be reported or not:</p> <p>Enbale:it will be reported everytime;</p> <p>Disable: it will be reported only once after reboot or configuration update;</p> <p>Shown as Table 26.Firmware Version Data Format</p>
0xF3	$1+m*(6+1+[10]+[2]+[2]+[2]+[2]+[6]+[2]+[2])$	<p>Bluetooth list。</p> <p>String mask</p> <p>m BLE nodes;</p> <p>[Mac,Rssi,Name,FwVer,Voltage,Temperature,Humidity,Accelerometer(X,Y,Z),Res1,Res2]</p> <p>Extension information can be configured to be reported or not:</p> <p>Shown as Table 27.Bluetooth List Data Format (m:numbers of BLE nodes, maximum is 7)</p>
0xF4	$m*(6+1)$	<p>m: Number of WIFI nodes;</p> <p>WIFI information[Mac,Rssi]</p> <p>Extension information can be configured to be reported or not:</p> <p>Shown as Table 25.External Supply Voltage Data Format</p>
0xF5	$4+m*4$	<p>m: Number of GPIO channel;</p> <p>Output GPIO channel status:</p> <p>Extension information can be configured to be reported or not:</p> <p>Shown as Table 30.GPIO Status Data Format</p>

0xF6	$1+1+m*([2]+[2]+[2]+[6]+[10]+[2]+[2]+[2])$	<p>Data type:</p> <p>The field mask bit 0-7 identifies:</p> <p>[Light,Temperature,Humidity,Accelerometer,Limit,Res1,Res2,Res3]</p> <p>Sensors information</p> <p>[Light,Temperature,Humidity,Accelerometer,Limit(Ligh,Tmax,Tmin,Hmax,Hmin),Res1,Res2,Res3]</p> <p>Extension information can be configured to be reported or not:</p> <p>Shown as Table 31.Trigger Type and Sensor Information Data Format</p>
0xF7	$4+[1+[1]]$	<p>Internal Battery Information</p> <p>Battery voltage: 4 Bytes;</p> <p>Charging status(optional): 1 Byte;</p> <p>0: Invalid;</p> <p>1: Uncharged;</p> <p>2: Charging;</p> <p>3: Full charging;</p> <p>4: Abnormal;</p> <p>Battery level(optional): 1 Byte;</p> <p>Percentage;</p> <p>Extension information can be configured to be reported or not:</p> <p>Shown as Table 33.Internal Battery Information Data</p>

		Format
0xF9	2+[4]+[4]+[2]+[6]	<p>Auxiliary information</p> <p>mask Bit 0-15 identified [GNSS age, Acc on time,HDOP,Res1,...,Res13]</p> <p>GNSS age</p> <p>Acc ontime</p> <p>HDOP</p> <p>Extension information can be configured to be reported or not:</p> <p>Shown as Table 34.Auxiliary Information Data Format</p>

Table 21. Mileage Information Data Format

Start byte	Field	Data type	Description
0	Mileage	DWORD	Mileage, 1/10km

Table 22. Mobile Network Signal Strength Data Format

Start byte	Field	Data type	Description
0	Mobile network signal strength	BYTE	Mobile network signal strength(CSQ)

Table 23. Number of GNSS Positioning Satellites Data Format

Start byte	Field	Data type	Description
0	Number of GNSS positioning satellites	BYTE	Number of GNSS positioning satellites

Table 24. Base Station Information Data Format

Start byte	Field	Data type	Description
0	MCC	WORD	MCC

2	MNC	WORD	MNC
4	CI	DWORD	CI
8	LAC	WORD	LAC
12	RSSI	BYTE	RSSI
.....			When there are multiple base stations, the information from MCC to RSSI is a group of base station information, and each base station information is connected successively

Table 25. External Supply Voltage Data Format

Start byte	Field	Data type	Description
0	External power supply voltage	DWORD	External power supply voltage in mV

Table 26. Firmware Version Data Format

Start byte	Field	Data type	Description
0	Firmware version	STRING	String ACSII

Table 27. Bluetooth List Data Format

Start byte	Field	Data type	Description
0	STRING mask	BYTE	<p>The field mask bit0-7 respectively identifies [Name, FwVer, Voltage, Temperature, Humidity, Sensor, Res1, Res2;</p> <p>Show as Table 28. Status Definition</p>

2	Mac	BYTE[6]	Mac address of Bluetooth
8	RSSI	BYTE	Strength of 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	Three-axis values of g sensor
33	Res1 reserved 2 bytes	WORD	Reserved
35	Res2 reserved 2 bytes	WORD	Reserved
.....			When there is more than one Bluetooth, from Mac-Res2 for a set of Bluetooth information in sequence.

Remark:The data length display of the Bluetooth list is based on the actual display information of the masks, and the format of the above table shows all the masks.

Table 28. Status Definition

Byte	Definition	Status
Bit 0	Name	0: Enable; 1:Disable
Bit 1	FwVer	0: Enable; 1:Disable

Bit 2	Voltage	0: Enable; 1:Disable
Bit 3	Temperature	0: Enable; 1:Disable
Bit 4	Humidity	0: Enable; 1:Disable
Bit 5	Sensor	0: Enable; 1:Disable
Bit 6	Res1	0: Enable; 1:Disable
Bit 7	Res2	0: Enable; 1:Disable

Table 29. WiFi List Data Format

Start byte	Field	Data type	Description
0	Mac	BYTE[6]	WiFi Mac Address
6	RSSI	BYTE	Strength of received signal

Table 30. GPIO Status Data Format

Start byte	Field	Data type	Description
0	Output GPIO Status •	DWORD	Bit 0-15: Identify GPIO channels 0-15; Bit 16-31: Reserved; Predefined: Bit 0: RELAY; Bit 1: DO1; (0 for low level, 1 for high level)
4	Imput GPIO Status	DWORD	Input GPIO channel status: GPIO channel 16-31;

			Digital input: 0/1; (0 for low level, 1 for high level) Analog input: voltage value in mV; Predefined: Bit 16:DI1/AI1
--	--	--	-----------------------------------------------------------------------------------------------------------------------------------

Table 31. Trigger Type and Sensor Information Data Format

Start byte	Field	Data type	Description
0	Data type	BYTE	64: Periodic trigger; 65: Power on trigger; 66: ACC ignition; 67: ACC flameout; 68: VCC connect; 69: VCC remove; 70: Virtual ignition(Gsensor); 71: Virtual ignition (GNSSAST); 72: Virtual flameout(Gsensor); 73: Corner trigger; 74: Overspeed trigger; 75: OTA start; 76: OTA succeed; 77: OTA failed; 78: GNSS first fixed; 79: Low voltage trigger; 80: Low voltage release

			81: Jamming trigger; 82: Distance trigger; 83: Crash trigger; 84: DI1 trigger; 85: DI2 trigger*; 86: DI3 trigger*; 87: DI4 trigger*; 88: DI5 trigger*; 89: DI6 trigger*; 90: DI7 trigger*; 91: DI8 trigger*; 92: DI9 trigger*; 93: DI10 trigger*; 94: AI upper limit trigger*; 95: AI lower limit trigger*; 96: Battery low voltage trigger*; 97: Battery low voltage release*; 98: Battery start charging; 99: Battery full charged; 100: Soft reset trigger; 101: Virtual ignition(voltage only VG300 support); 102: Virtual flameout(voltage only VG300 support); 103: TOW start; 104: TOW stop; 105: Enter GEO-Fence; 106: Exit GEO-Fence;
--	--	--	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

			107: Wake from deep sleep cycle (Only VL/VM300 support) 108: DI1 release 109: Acceleration 110: Deceleration 111: Curve acceleration 112: Acceleration ignition 113: Exit Jamming 114: Report immediately 115: TOW distance trigger 116: Idle trigger 117: Exit idle 118: Parking trigger 119: Low speed trigger 120: ACC Ignition driving (motion triggered) 121: Module FOTA successful 122:MediumTurn
1	Sensor Mask	BYTE	Bit0-7: Identify [Light,Temperature,Humidity, AccelerometerLimit,Res1,Res2,Res3] Status definition show as Table 32.Status Definition
2	Light	WORD	Reserved
4	Temperature	WORD	Reserved
6	Humidity	WORD	Reserved
8	Accelerometer	STRING	6 bytes;

			Every two bytes represent a parameter value, ACC_X, ACC_Y, ACC_Z three-axis sensor values, in mg
14	Limit	STRING	Reserved
24	Res1	WORD	Reserved
26	Res2	WORD	Reserved
28	Res3	WORD	Reserved

Remark:The data length display of the sensor information length is based on the actual display information of the masks, and the format of the above table shows all the masks.

Table 32. Status Definition

Start byte	Field	Data type
Bit 0	Light	0: Enable; 1:Disable
Bit 1	Temperature	0: Enable; 1:Disable
Bit 2	Humidity	0: Enable; 1:Disable
Bit 3	Accelerometer	0: Enable; 1:Disable
Bit 4	Limit	0: Enable; 1:Disable
Bit 5	Res1	0: Enable; 1:Disable
Bit 6	Res2	0: Enable; 1:Disable
Bit 7	Res3	0: Enable; 1:Disable

Table 33. Internal Battery Information Data Format

Start byte	Field	Data type	Start byte
0	Battery voltage	DWORD	Reserved
4	Charge status	BYTE	0: Invalid;

			1: Uncharged; 2: Charging; 3: Full charging; 4: Abnormal;
5	Battery percentage	BYTE	Reserved

Table 34. Auxiliary Information Data Format

Start byte	Field	Data type	Start byte
0	Auxiliary information mask	WORD	Bit0-15 Identify [GNSS age,Acc on time, HDOP, Res1,...,Res13] Status definition show as Table 35.Status Definition
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 (GMT+0 as default)
.....			

Table 35. Status Definition

Byte	Definition	Status
Bit 0	GNSS age	0: Enable; 1:Disable
Bit 1	ACC on time	0: Enable; 1:Disable
Bit 2	HDOP	0: Enable; 1:Disable
Bit 3	GNSS Time	0: Enable; 1:Disable

Bit 4-Bit13	Reserved	0: Enable; 1:Disable
-------------	----------	----------------------

3.12. Uplink Transparent Transmission (0x0900)

Message ID:0x0900

Table 36. 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 37.Status Bit Definition
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	Mileage	WORD	Mileage in meters (m)
31	Transparent Transmission Data	STRING	n bytes length less than 1023-31 bytes;refer to the AT commands

Table 37. Status Bit Definition

Bit	Status
0	0: ACC off; 1: ACC on
1	0: GNSS position unfix; 1: GNSS position fix

2	0: North latitude; 1: south latitude
3	0: East longitude; 1: west longitude
4-9	Reserved
10	0: Fuel connect; 1: Fuel disconnect
11-29	Reserved
30	0: Normal data; 1: TOW data
31	0: Real-time data; 1: Buffer data

3.13. Downlink Transparent Transmission (0x8900)

Message ID: 0x8900

Table 38. Downlink Transparent Transmission Message Body

Start byte	Field	Data type	Description
0	Transparent transmission type	BYTE	0x41: UART1; 0x42: UART2;
1	Transparent transmission data	STRING	n bytes ASCII code,length less than 1023 bytes;refer to the AT commands

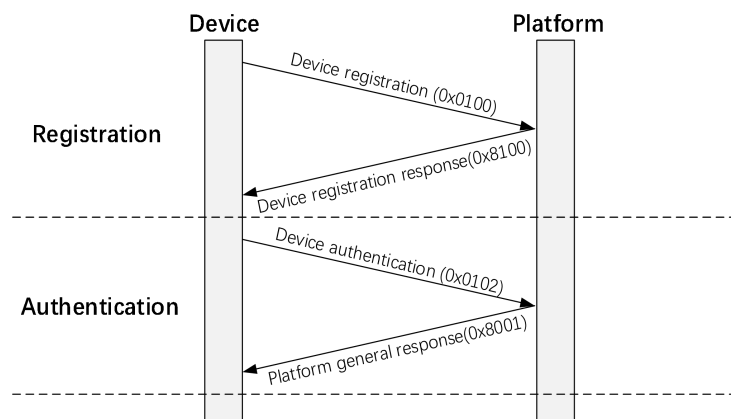
3.14. Platform RSA Public Key*(0x8A00)

Message ID: 0x8A00 platform RSA public key * message body is TBD.

4. Examples of Message Data Interaction

4.1. Registration and Authentication

In the unregistered status, V series devices will register firstly. The device will obtain the authentication code and save it after the successful registration. The authentication code will be used when the device logged in. The registered device only needs to login with the saved authentication code.



Examples of registration interaction:

[Device→Platform]:

Example of data packet sent by the device

7E 01 00 00 26 34 40 50 04 95 30 00 02 00 00 00 00 41 4F 56 58 00 56 4D 33 30 30 2D 47 4C 00 00 00 00 00 00 00 00 AE 7E

Explain

<u>0x7E</u>	<u>0x01 0x00</u>	<u>0x00 0x26</u>	<u>0x34 0x40 0x50 0x04 0x95 0x30</u>	<u>0x00 0x02</u>	<u>0x00 0x00</u>	<u>0x00 0x00</u>
flag	message ID	properties of message body	device number	message sequence number	province area ID	district ID

0x41 0x4F 0x56 0x58 0x00
manufacturer ID

0x56 0x4D 0x33 0x30 0x30 0x2D 0x47 0x4C 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
device type

<u>0x00 0x00 0x00 0x00 0x00 0x00 0x00</u>	<u>0x00</u>	<u>0x00</u>	<u>0xAE</u>	<u>0x7E</u>
device ID	license plate color	vehicle logo	checksum code	flag

[Platform→Device]:

Example of data packet sent by the platform

7E 81 00 00 0F 34 40 50 04 95 30 00 01 00 02 00 33 34 34 30 35 30 30 34 39 35 33 30 05 7E

Explain

<u>0x7E</u>	<u>0x81 0x00</u>	<u>0x00 0x0F</u>	<u>0x34 0x40 0x50 0x04 0x95 0x30</u>	<u>0x00 0x01</u>	<u>0x000x02</u>
flag	message ID	properties of message body	device number	message sequence number	reply sequence number

<u>0x00</u>	<u>0x33 0x34 0x34 0x30 0x35 0x30 0x30 0x34 0x39 0x35 0x33 0x30</u>	<u>0x05</u>	<u>0x7E</u>
result	authentication code	checksum code	flag

Examples of authentication interaction:

[Device→Platform]:

Example of data packet sent by the device

7E 01 02 00 0C 34 40 50 04 95 30 00 04 33 34 34 30 35 30 30 34 39 35 33 30 83 7E

Explain

<u>0x7E</u>	<u>0x01 0x02</u>	<u>0x00 0x0C</u>	<u>0x34 0x40 0x50 0x04 0x95 0x30</u>	<u>0x00 0x04</u>
flag	message ID	properties of message body	device number	message sequence number

<u>0x33 0x34 0x34 0x30 0x35 0x30 0x30 0x34 0x39 0x35 0x33 0x30</u>	<u>0x83</u>	<u>0x7E</u>
authentication code	checksum code	flag

[Platform→Device]:

Example of data packet sent by the platform

7E 80 01 00 05 34 40 50 04 95 30 00 02 00 04 01 02 00 04 7E

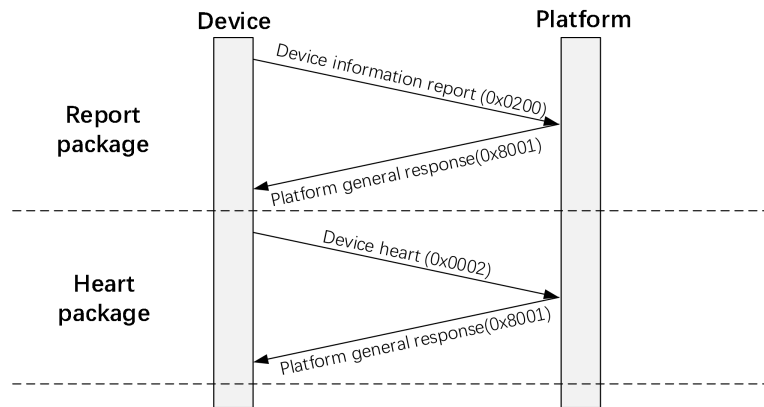
Explain

<u>0x7E</u>	<u>0x80 0x01</u>	<u>0x00 0x05</u>	<u>0x34 0x40 0x50 0x04 0x95 0x30</u>	<u>0x00 0x02</u>	<u>0x00 0x04</u>
flag	message ID	properties of message body	device number	message sequence number	reply sequence number

<u>0x01 0x02</u>	<u>0x00</u>	<u>0x04</u>	<u>0x7E</u>
reply ID	result	checksum code	flag

4.2. Report Data Package and Heartbeat Package

The device will report location information and extension information to platform after authentication completed according to configured report interval. And the device will report the package information when detects trigger events. When the devices enter the sleep mode, it will report the heartbeat package to the platform according to the configured time interval. The time intervals of reporting data package and heartbeat package can be set remotely by the platform.



Note: After registration and authentication, the first data package contains the information of software version, and the subsequent data packages do not contain the information of software version by default. This information can be included in each data package through platform setting.

Example of the first reported data package interaction:

[Device→Platform]:

Example of data packet sent by the device

7E 02 00 00 88 34 40 50 04 95 30 00 02 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 22 04 28 11 28 05 01 04 00
 00 00 00 30 01 0C 31 01 00 F0 0C 01 CC 00 08 51 18 AE 00 00 55 0B 05 F1 04 00 00 34 E8 F2 2D 41 4F 56 58 5F 56 4C 33 30 30 2D
 45 4D 5F 48 31 2E 31 5F 45 47 39 31 35 55 45 55 41 42 52 30 32 41 30 34 4D 30 38 5F 56 31 2E 32 2E 32 F3 01 1F F5 08 00 00 00 00
 00 00 00 01 F6 08 40 08 00 40 FC 80 FE 08 F9 04 00 00 00 00 F1 7E

Explain

<u>0x7E</u>	<u>0x02 0x00</u>	<u>0x00 0x88</u>	<u>0x34 0x40 0x50 0x04 0x95 0x30</u>	<u>0x00 0x02</u>	<u>0x00 0x00 0x00 0x00</u>
flag	message ID	properties of message body	device number	message sequence number	alarm flag
<u>0x00 0x00 0x00 0x01</u>	<u>0x00 0x00 0x00 0x00</u>	<u>0x00 0x00 0x00 0x00</u>	<u>0x00 0x00 0x00 0x00</u>	<u>0x00 0x00</u>	<u>0x00 0x00</u>
status	latitude	longitude	altitude	speed	direction
<u>0x22 0x04 0x28 0x11 0x28 0x05</u>	<u>0x01 0x04 0x00 0x00 0x00 0x00</u>	<u>0x30 0x01 0x0C</u>	<u>0x31 0x01 0x00</u>		
time	mileage	mobile network signal strength	GNSS number of positioning satellites		
<u>0xF0 0x0C 0x01 0xCC 0x00 0x08 0x51 0x18 0xAE 0x00 0x00 0x55 0x0B 0x05</u>	<u>0xF1 0x04 0x00 0x00 0x34 0xE8</u>				
base station information	power supply (external) voltage				

0xF2 0x2D 0x41 0x4F 0x56 0x58 0x5F 0x56 0x4C 0x33 0x30 0x30 0x2D 0x45 0x4D 0x5F 0x48 0x31 0x2E 0x31 0x5F 0x45 0x47 0x39
0x31 0x35 0x55 0x45 0x55 0x41 0x42 0x52 0x30 0x32 0x41 0x30 0x34 0x4D 0x30 0x38 0x5F 0x56 0x31 0x2E 0x32 0x2E 0x32
 software version

<u>0xF3 0x01 0x1F</u>	<u>0xF5 0x08 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x01</u>	<u>0xF6 0x08 0x40 0x08 0x00 0x40 0xFC 0x80 0xFE 0x08</u>
bluetooth List	GPIO status	trigger type and sensors information
<u>0xF9 0x04 0x00 0x00 0x00 0x00</u>	<u>0xF1</u>	<u>0x7E</u>
auxiliary information	checksum code	flag

[Platform→Device]:**Example of data packet sent by the platform**

7E 80 01 00 05 34 40 50 04 95 30 00 02 00 02 02 00 00 03 7E

Expla

<u>0x7E</u>	<u>0x80 0x01</u>	<u>0x00 0x05</u>	<u>0x34 0x40 0x50 0x04 0x95 0x30</u>	<u>0x00 0x02</u>	<u>0x00 0x02</u>	<u>0x02 0x00</u>	<u>0x00</u>	<u>0x03</u>	<u>0x7E</u>
flag	message ID	properties of message body	device number	message sequence number	reply sequence number	reply ID	result	checksum code	flag

Examples of report package interaction(ACC=ON):

[Device→Platform]:

Example of data packet sent by the device

7E 02 00 00 59 34 40 50 04 95 30 00 03 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 22 04 28 11 28 30 01 04 00
 00 00 00 30 01 0B 31 01 00 F0 0C 01 CC 00 08 51 18 AE 00 00 55 0B 04 F1 04 00 00 34 D1 F3 01 1F F5 08 00 00 00 00 00 00 00 01 F6
 08 40 08 00 38 FC 80 FE 18 F9 04 00 00 00 00 B8 7E

Explain

<u>0x7E</u>	<u>0x02 0x00</u>	<u>0x00 0x59</u>	<u>0x34 0x40 0x50 0x04 0x95 0x30</u>	<u>0x00 0x03</u>	<u>0x00 0x00 0x00 0x00</u>
flag	message ID	properties of message body	device number	message sequence number	alarm flag
<u>0x00 0x00 0x00 0x01</u>	<u>0x00 0x00 0x00 0x00</u>	<u>0x00 0x00 0x00 0x00</u>	<u>0x00 0x00 0x00 0x00</u>	<u>0x00 0x00</u>	<u>0x00 0x00</u>
status	latitude	longitude	altitude	speed	direction
<u>0x22 0x04 0x28 0x11 0x28 0x30</u>	<u>0x01 0x04 0x00 0x00 0x00 0x00</u>	<u>0x30 0x01 0x0B</u>	<u>0x31 0x01 0x00</u>		
time	mileage	mobile network signal strength	GNSS number of positioning satellites		
<u>0xF0 0x0C 0x01 0xCC 0x00 0x08 0x51 0x18 0xAE 0x00 0x00 0x55 0x0B 0x04</u>	<u>0xF1 0x04 0x00 0x00 0x34 0xD1</u>				
base station information		power supply (external) voltage			
<u>0xF3 0x01 0x1F</u>	<u>0xF5 0x08 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x01</u>	<u>0xF6 0x08 0x40 0x08 0x00 0x38 0xFC 0x80 0xFE 0x18</u>			
bluetooth list	GPIO status	trigger type and sensors information			
<u>0xF9 0x04 0x00 0x00 0x00 0x00</u>	<u>0xB8</u>	<u>0x7E</u>			
auxiliary infoemation	checksum code	flag			

[Platform→Device]:**Example of data packet sent by the platform**

7E 80 01 00 05 34 40 50 04 95 30 00 03 00 03 02 00 00 03 7E

Explain

<u>0x7E</u>	<u>0x80 0x01</u>	<u>0x00 0x05</u>	<u>0x34 0x40 0x50 0x04 0x95 0x30</u>	<u>0x00 0x03</u>	<u>0x00 0x03</u>	<u>0x02 0x00</u>	<u>0x00</u>	<u>0x03</u>	<u>0x7E</u>
flag	message ID	properties of message body	device number	message sequence number	reply sequence number	reply ID	result	checksum code	flag

Examples of report package interaction(ACC=OFF):**[Device→Platform]:**

Example of data packet sent by the device

7E 02 00 00 59 34 40 50 04 95 30 00 0B 00 00 00 00 00 02 01 E5 BC 07 06 FA BD 3D 00 05 00 00 01 44 22 04 28 14 02 33 01 04 00 00 00 02 30 01 0C 31 01 05 F0 0C 01 CC 00 08 51 18 AE 00 00 55 0B 08 F1 04 00 00 34 D1 F3 01 1F F5 08 00 00 00 00 00 00 00 01 F6 08 43 08 00 30 FC 90 FE 00 F9 04 00 00 00 01 F2 7E

Explain

<u>0x7E</u>	<u>0x02 0x00</u>	<u>0x00 0x59</u>	<u>0x34 0x40 0x50 0x04 0x95 0x30</u>	<u>0x00 0x0B</u>	<u>0x00 0x00 0x00 0x00</u>	
flag	message ID	properties of message body	device number	message sequence number	alarm flag	
<u>0x00 0x00 0x00 0x02</u>	<u>0x01 0xE5 0xBC 0x07</u>	<u>0x06 0xFA 0xBD 0x3D</u>	<u>0x00 0x05</u>	<u>0x00 0x00</u>	<u>0x01 0x44</u>	
status	latitude	longitude	altitude	speed	direction	
<u>0x22 0x04 0x28 0x14 0x02 0x33</u>	<u>0x01 0x04 0x00 0x00 0x00 0x02</u>	<u>0x30 0x01 0x0C</u>	<u>0x31 0x01 0x05</u>			
time	mileage	mobile network signal strength	GNSS number of positioning satellites			
<u>0xF0 0x0C 0x01 0xCC 0x00 0x08 0x51 0x18 0xAE 0x00 0x00 0x55 0x0B 0x0B</u>	<u>0xF1 0x04 0x00 0x00 0x34 0xD1</u>					
base station information			power supply (external) voltage			
<u>0xF3 0x01 0x1F</u>	<u>0xF5 0x08 0x00 0x00 0x00 0x00 0x00 0x00 0x01</u>	<u>0xF6 0x08 0x43 0x08 0x00 0x30 0xFC 0x90 0xFE 0x00</u>				
bluetooth list	GPIO status	trigger type and sensors information				
<u>0xF9 0x04 0x00 0x00 0x00 0x01</u>	<u>0xF2</u>	<u>0x7E</u>				
auxiliary information	checksum code	flag				

[Platform→Device]:

Example of data packet sent by the platform

7E 80 01 00 05 34 40 50 04 95 30 00 0B 00 0B 02 00 00 03 7E

Explain

<u>0x7E</u>	<u>0x80 0x01</u>	<u>0x00 0x05</u>	<u>0x34 0x40 0x50 0x04 0x95 0x30</u>	<u>0x00 0x0B</u>	<u>0x00 0x0B</u>	<u>0x02 0x00</u>	<u>0x00</u>	<u>0x03</u>	<u>0x7E</u>
flag	message ID	properties of message body	device number	message sequence number	reply sequence number	reply ID	result	checksum	flag code

Examples of heartbeat package interaction:

[Device→Platform]:

Example of data packet sent by the device

7E 00 02 00 00 34 40 50 04 95 30 00 2F A8 7E

Explain

<u>0x7E</u>	<u>0x00 0x02</u>	<u>0x00 0x00</u>	<u>0x34 0x40 0x50 0x04 0x95 0x30</u>	<u>0x00 0x2F</u>	<u>0xA8</u>	<u>0x7E</u>
flag	messageID	properties of message body	device number	message sequence number	checksum code	flag

[Platform→Device]:

Example of data packet sent by the platform

7E 80 01 00 05 34 40 50 04 95 30 00 2F 00 2F 00 02 00 03 7E

Explain

<u>0x7E</u>	<u>0x80 0x01</u>	<u>0x00 0x05</u>	<u>0x34 0x40 0x50 0x04 0x95 0x30</u>	<u>0x00 0x2F</u>	<u>0x00 0x2F</u>	<u>0x00 0x02</u>	<u>0x00</u>	<u>0x03</u>	<u>0x7E</u>
flag	message ID	properties of message body	device number	message sequence number	reply sequence number	reply ID	result	checksum code	flag

Examples of DI1 interface low level trigger interaction :

[Device→Platform]:

Example of data packet sent by the device

7E 02 00 00 26 34 40 50 04 95 30 00 0A 00 00 00 00 00 00 03 01 E5 BA C0 06 FA BB E1 00 49 00 00 00 00 22 04 29 15 57 10 F5 08 00 00 00 00 00 00 00 79 7E

Explain

<u>0x7E</u>	<u>0x02 0x00</u>	<u>0x00 0x26</u>	<u>0x34 0x40 0x50 0x04 0x95 0x30</u>	<u>0x00 0x0A</u>	<u>0x00 0x00 0x00 0x00</u>	<u>0x00 0x00 0x00 0x03</u>
flag	message ID	properties of message body	device number	message sequence number	alarm flag	status

<u>0x01 0xE5 0xBA 0xC0</u>	<u>0x06 0xFA 0xBB 0xE1</u>	<u>0x00 0x49</u>	<u>0x00 0x00</u>	<u>0x00 0x00</u>	<u>0x22 0x04 0x29 0x15 0x57 0x10</u>
latitude	longitude	altitude	speed	direction	time

<u>0xF5 0x08 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00</u>	<u>0x00</u>	<u>0x79</u>	<u>0x7E</u>
GPIO status		checksum code	flag

[Platform→Device]:

Example of data packet sent by the platform

7E 80 01 00 05 34 40 50 04 95 30 00 0A 00 0A 02 00 00 03 7E

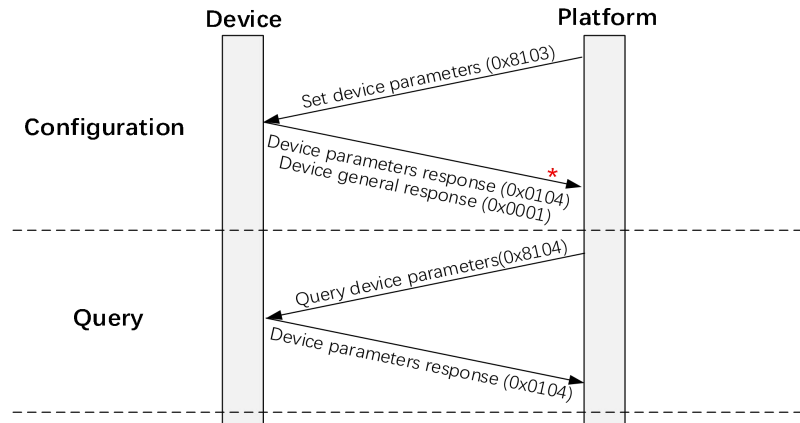
Explain

<u>0x7E</u>	<u>0x80 0x01</u>	<u>0x00 0x05</u>	<u>0x34 0x40 0x50 0x04 0x95 0x30</u>	<u>0x00 0x0A</u>	<u>0x00 0x0A</u>	<u>0x02 0x00</u>
flag	message ID	properties of message body	device number	message sequence number	reply sequence number	reply ID

<u>0x00</u>	<u>0x03</u>	<u>0x7E</u>
result	checksum code	flag

4.3. Platform Remote Configuration and Query

The platform can also actively configure and query V series device parameters. When the platform uses remote configuration, the V series device defaults to reply all parameters package (0x0104) for the platform to verify, and the device can also be configured as reply to a general response package (0x0001). The platform can send a query package (0x8104) to obtain the parameter information of the device.



Examples of setting the reporting interval and query device parameters:

[Platform→Device]:

Example of data packet sent by the platform

7E 81 03 00 1C 34 40 50 04 95 30 00 00 03 00 00 01 04 00 00 00 B4 00 00 00 27 04 00 00 00 B4 00 00 00 29 04 00 00 00 3C 2F 7E

Explain

<u>0x7E</u>	<u>0x81 0x03</u>	<u>0x00 0x1C</u>	<u>0x34 0x40 0x50 0x04 0x95 0x30</u>	<u>0x00 0x00</u>	<u>0x03</u>	<u>0x00 0x00 0x00 0x01</u>	<u>0x04</u>
flag	message ID	properties of message body	device number	message sequence number	total number of parameters	parameter ID (device heartbeat interval)	the length of parameter
	<u>0x00 0x00 0x00 0xB4</u>	<u>0x00 0x00 0x00 0x27</u>	<u>0x04</u>	<u>0x00 0x00 0x00 0xB4</u>	<u>0x00 0x00 0x00 0x29</u>	<u>0x04</u>	<u>0x00 0x00 0x00 0x3C</u>
	parameter value	parameter ID (report interval in sleep mode)	the length of parameter	parameter value (report interval in run mode)	parameter ID	the length of parameter	parameter value
<u>0x2F</u>	<u>0x7E</u>						
checksum code	flag						

[Device→Platform]:

Example of data packet sent by the device

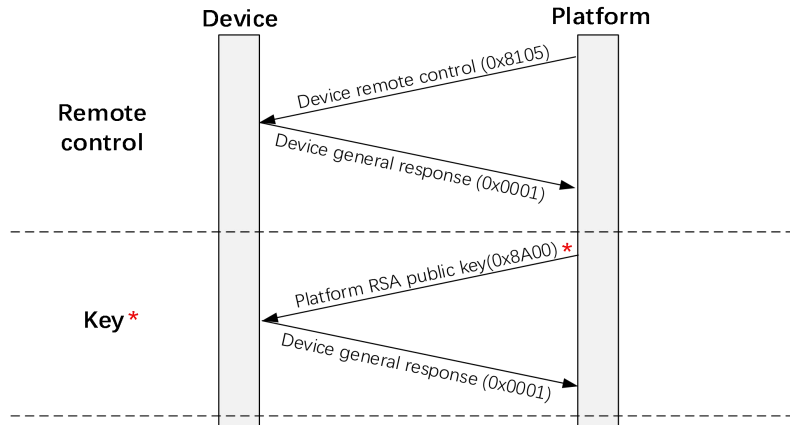
7E 01 04 00 1E 34 40 50 04 95 30 00 57 00 00 03 00 00 00 01 04 00 00 00 B4 00 00 00 27 04 00 00 00 B4 00 00 00 29 04 00 00 00 3C FD 7E

Explain

<u>0x7E</u>	<u>0x01 0x04</u>	<u>0x00 0x1E</u>	<u>0x34 0x40 0x50 0x04 0x95 0x30</u>	<u>0x00 0x57</u>	<u>0x00 0x00</u>	<u>0x03</u>
flag	message ID	properties of message body	device number	message sequence number	reply sequence number	total number of response parameter
	<u>0x00 0x00 0x00 0x01</u>	<u>0x04</u>	<u>0x00 0x00 0x00 0xB4</u>	<u>0x00 0x00 0x00 0x27</u>	<u>0x04</u>	<u>0x00 0x00 0x00 0xB4</u>
	parameter ID (device heartbeat interval)	the length of parameter	parameter value (report interval in sleep mode)	parameter ID	the length of parameter	parameter value
	<u>0x00 0x00 0x00 0x29</u>	<u>0x04</u>	<u>0x00 0x00 0x00 0x3C</u>	<u>0xFD</u>	<u>0x7E</u>	
	parameter ID (report interval in run mode)	the length of parameter	parameter value	checksum code	flag	

4.4. Platform Remote Control

The platform can actively control V series devices. Such as reset, OTA upgrade, output status of GPIO and etc.



Fuel control: connect

[Platform→Device]:

Example of data packet sent by the platform

7E 81 05 00 04 34 40 50 04 95 30 00 00 23 30 3B 31 1C 7E

Explain

<u>0x7E</u>	<u>0x81 0x05</u>	<u>0x00 0x04</u>	<u>0x34 0x40 0x50 0x04 0x95 0x30</u>	<u>0x00 0x00</u>	<u>0x23</u>	<u>0x30 0x3B 0x31</u>
flag	message ID	properties of message body	device number	message sequence number	command word	command parameters
<u>0x1C</u>	<u>0x7E</u>					
checksum code	flag					

[Device→Platform]:

Example of data packet sent by the device

7E 00 01 00 05 34 40 50 04 95 30 00 0A 00 00 81 03 00 09 7E

Explaindevice

<u>0x7E</u>	<u>0x00 0x01</u>	<u>0x00 0x05</u>	<u>0x34 0x40 0x50 0x04 0x95 0x30</u>	<u>0x00 0x0A</u>	<u>0x00 0x00</u>	<u>0x81 0x03</u>	<u>0x00</u>	<u>0x09</u>	<u>0x7E</u>
flag	message ID	properties of message body	device number	message sequence number	reply sequence number	reply ID	result	checksum code	flag

Query status:

[Platform→Device]:

<u>0x7E</u>	<u>0x81 0x03</u>	<u>0x00 0x13</u>	<u>0x34 0x40 0x50 0x04 0x95 0x30</u>	<u>0x00 0x00</u>	<u>0x01</u>	<u>0x00 0x00 0xF0 0x30</u>
flag	message ID	properties of message body	device number	message sequence number	total number of parameters	parameter ID
<u>0x0D</u>	<u>0x41 0x54 0x2B 0x47 0x50 0x49 0x4F 0x56 0x41 0x4C 0x55 0x45 0x3F</u>				<u>0x83</u>	<u>0x7E</u>
the length of parameter	parameter value (AT+GPIOVALUE?)				checksum code	flag

[Device→Platform]:

<u>0x7E</u>	<u>0x01 0x04</u>	<u>0x00 0x29</u>	<u>0x34 0x40 0x50 0x04 0x95 0x30</u>	<u>0x00 0x35</u>	<u>0x00 0x00</u>	<u>0x01</u>	<u>0x00 0x00 0xF0 0x30</u>	<u>0x21</u>
flag	message ID	properties of message body	device number	message sequence number	reply sequence number	total number of reply parameters	parameter ID	the length of parameter
<u>0x2B 0x47 0x50 0x49 0x4F 0x56 0x41 0x4C 0x55 0x45 0x3A 0x30 0x3A 0x31 0x20 0x31 0x3A 0x30 0x20 0x31 0x36 0x3A 0x31 0x0D 0x0A 0x0D 0x0A 0x4F 0x4B 0x0D 0x0A 0x0D 0x0A</u>								
parameter value								
(+GPIOVALUE:0:1 1:0 16:1								

OK)

NOTE: "+GPIOVALUE:0:1 1:0 16:1" means: RELAY:→1 , DO1→0 , DI1→1

<u>0x3F</u>	<u>0x7E</u>
checksum	flag
code	

Fuel control: disconnect

[Platform→Device]:

Explains									
<u>0x7E</u>	<u>0x81 0x05</u>	<u>0x00 0x04</u>	<u>0x34 0x40 0x50 0x04 0x95 0x30</u>	<u>0x00 0x00</u>	<u>0x23</u>	<u>0x30 0x3B 0x30</u>	<u>0x1D</u>	<u>0x7E</u>	
flag	message ID	properties of message body	device number	message sequence number	command word	command parameters	checksum	flag	
							code		

[Device→Platform]:

<u>0x7E</u>	<u>0x00 0x01</u>	<u>0x00 0x05</u>	<u>0x34 0x40 0x50 0x04 0x95 0x30</u>	<u>0x00 0x08</u>	<u>0x00 0x00</u>	<u>0x81 0x03</u>	<u>0x00</u>	<u>0x0B</u>	<u>0x7E</u>
flag	message ID	properties of message body	device number	message sequence number	reply sequence number	reply ID	result	checksum code	flag

Query status:

[Platform→Device]:

<u>0x7E</u>	<u>0x81 0x03</u>	<u>0x00 0x13</u>	<u>0x34 0x40 0x50 0x04 0x95 0x30</u>	<u>0x00 0x00</u>	<u>0x01</u>	<u>0x00 0x00 0xF0 0x30</u>
flag	message ID	properties of message body	device number	message sequence number	total number of parameters	parameter ID
<u>0x0D</u>	<u>0x41 0x54 0x2B 0x47 0x50 0x49 0x4F 0x56 0x41 0x4C 0x55 0x45 0x3F</u>			<u>0x83</u>	<u>0x7E</u>	
the length of parameter	parameter value (AT+GPIOVALUE?)			checksum code	flag	

[Device→Platform]:

<u>0x7E</u>	<u>0x01 0x04</u>	<u>0x00 0x29</u>	<u>0x34 0x40 0x50 0x04 0x95 0x30</u>	<u>0x00 0x1B</u>	<u>0x00 0x00</u>	<u>0x01</u>	<u>0x00 0x00 0xF0 0x30</u>	<u>0x21</u>
flag	message ID	properties of message body	device number	message sequence number	reply sequence number	total number of reply parameters	parameter ID	the length of parameter
<u>0x2B 0x47 0x50 0x49 0x4F 0x56 0x41 0x4C 0x55 0x45 0x3A 0x30 0x30 0x30 0x20 0x31 0x3A 0x30 0x20 0x31 0x36 0x3A 0x31 0x0D 0x0A 0x0D 0x0A 0x4F 0x4B 0x0D 0x0A 0x0D 0x0A</u>								
parameter value								
(+GPIOVALUE:0:0 1:0 16:1								
OK)								

NOTE: "+GPIOVALUE:0:0 1:0 16:1" means: RELAY→0 , DO1→0 , DI1→1

```

0x10  0x7E
checksum flag
code

```

Examples of AT transparent transmission command

[Platform→Device]:

<u>0x7E</u>	<u>0x81 0x03</u>	<u>0x00 0x15</u>	<u>0x34 0x40 0x50 0x04 0x95 0x30</u>	<u>0x00 0x00</u>	<u>0x01</u>	<u>0x00 0x00 0xF0 0x30</u>
flag	message ID	properties of message body	device number	message sequence number	total number of parameters	parameter ID
<u>0x0F</u>	<u>0x41 0x54 0x2B 0x54 0x49 0x4D 0x45 0x47 0x41 0x50 0x3D 0x30 0x2C 0x33 0x30</u>					<u>0x83</u>
the length of parameter	parameter value (AT+TIMEGAP=0.30)					checksum code
						<u>0x7E</u>
						flag

[Device→Platform]:

Example of data packet sent by the device

7E 01 04 00 21 34 40 50 04 95 30 00 0B 00 00 01 00 00 F0 30 19 2B 54 49 4D 45 47 41 50 3A 72 75 6E 2C 33 30 0D 0A 0D 0A 4F 4B 0D 0A 0D 0A 62 7E

Explain

<u>0x7E</u>	<u>0x01 0x04</u>	<u>0x00 0x21</u>	<u>0x34 0x40 0x50 0x04 0x95 0x30</u>	<u>0x00 0x0B</u>	<u>0x00 0x00</u>	<u>0x01</u>	<u>0x00 0x00 0xF0 0x30</u>	<u>0x19</u>
flag	message ID	properties of message body	device number	message sequence number	reply sequence number	total number of reply parameters	parameter ID of parameter	the length of parameters

0x2B 0x54 0x49 0x4D 0x45 0x47 0x41 0x50 0x3A 0x72 0x75 0x6E 0x2C 0x33 0x30 0x0D 0x0A 0x0D 0x0A 0x4F 0x4B 0x0D 0x0A 0x0D 0x0A

parameter value
(+TIMEGAP:run,30
OK)

<u>0x62</u>	<u>0x7E</u>
checksum	flag
code	