Communication Protocol of Intelligent Connected Vehicle Terminals

Version No.: V1.0.7

Revision Records

Revision Date	Version	Revisor	Description
28 April, 2022	V1.0.7	Xu Wenshu	Initial release

Contents

1 Scope

This specification is a tailoring and expansion of JT/T 808-2013 GNSS System for Operating Vehicles—General Specifications for the Communication Protocol and Data Format of BD Compatible Vehicle Terminal, which not only takes into account the general functions of the standard protocol, but also includes the personalized functions suitable for terminals for connected vehicles.

This specification applies to the communication between the terminals for connected vehicles and the platform server.

2 Normative References

This document refers to the following documents.

GB/T 2260 Code for Administration Division of the People's Republic of China

JT/T 794 GNSS System for Operating Vehicles: Technical Requirements for Vehicle Terminals

JT/T 808-2013 GNSS System for Operating Vehicles: General Specifications for the Communication Protocol and Data Format of Vehicle Terminal Issued by the Ministry of Transport

3 Terms, Definitions and Abbreviations

3.1 Terms and Definitions

The following terms and definitions shall apply hereto.

3.1.1 Abnormal Data Communication Link

Wireless communication links are disconnected, or temporarily suspended or held (e.g., during calling).

3.1.2 Register

The terminal sends a message to notify the platform that it has been installed on a vehicle.

3.1.3 Unregister

The terminal sends a message to notify the platform that it has been removed from the installed vehicle.

3.1.4 Authentication

The terminal sends a message to the platform upon connection thereto for verification of its identity by the platform.

3.2 Abbreviations

The follow abbreviations apply to this document.

TEA—— The TEA algorithm was invented in 1994 by David Wheeler and Roger Needham at the University of Cambridge Computer Laboratory

TCP—— Transmission Control Protocol

UDP—— User Datagram Protocol

4 Business Process

4.1 Terminal Registration

The flow chart of terminal registration is as follows (Fig. 1):

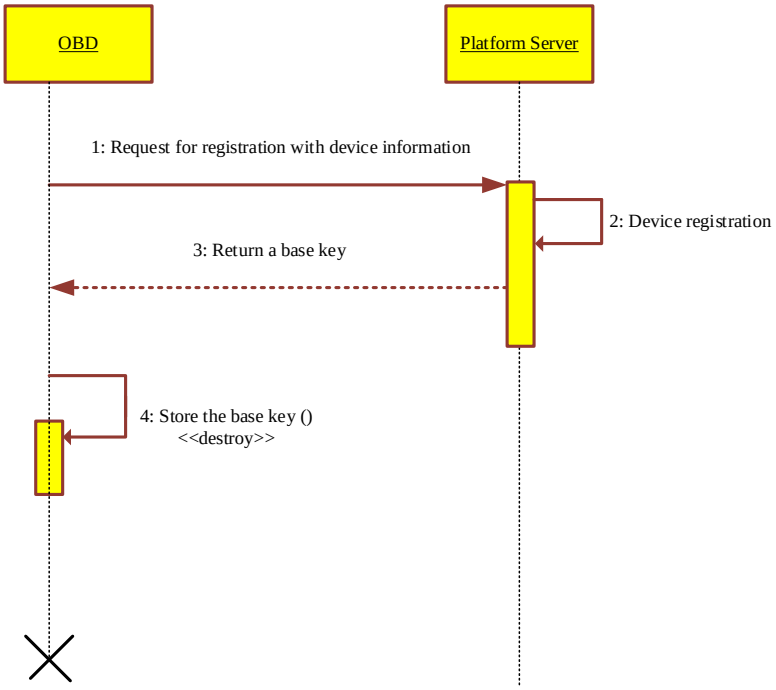

Fig. 1 Business Flowchart of Terminal Registration

Steps:

1) The terminal carries the device information and requests for device registration.

2) After registration, the platform will generate a base key.

3) The base key is permanently stored in the terminal.

4.2 Firmware Upgrade

The platform initiates the firmware upgrade. When receiving the upgrade notification, the terminal switches to the FTP server and checks the latest firmware version. If the current firmware version is the same as that recorded in the server, no upgrade is necessary. If the firmware version is inconsistent, the latest version of firmware will be downloaded automatically.

Vehicle information acquired by the terminal will be stored in FLASH during the upgrade process and uploaded to the server when the upgrade is complete.

4.3 Data Reporting

1) The terminal carries the base key (authentication key) upon logging in.

2) The data reported by the terminal is encrypted, and the platform will decide whether to use the information reported for further development as required. (reserved)

5 Protocol Details

5.1 Communication Method

The communication protocol adopts TCP or UDP, with the platform serving as the server side and the terminal as the client side.

5.2 Data Type

See Table 1 for the data types used in the messages of the protocol.

Note: When the data value is negative or decimal, adjust it according to the parameterized algorithm. When data is packed, the data value should be added with the offset or multiplied by the magnification; when unpacked, the data value should be subtracted by the offset or divided by the magnification.

Table 1 Date Type

Data Type	Description and Requirements
BYTE	Unsigned single-byte integer (single byte, 8 bits) Value range: Decimal 0 ~ 256; Hexadecimal 0x00 ~ 0xFF
WORD	Unsigned double-byte integer (double byte, 16 bits) Value range: Decimal 0 ~ 65535; Hexadecimal 0x0000 ~ 0xFFFF
DWORD	Unsigned four-byte integer (4-byte double word, 32 bits) Value range: Decimal 0 ~ 4294967295; Hexadecimal 0x00000000 ~ 0xFFFFFFFF
BYTE[n]	n-byte
BCD[n]	8421 code, n bytes
STRING	GBK coding, leave it blank if there is no data.

5.3 Transmission Rules

The protocol uses big-endian network byte order to pass bytes and double words.

Transmission rules are as follow:

—— Transmission rules of BYTE: Transmit using byte stream;

—— Transmission rules of WORD: Pass the upper eight bits first, then the lower eight bits;

—— Transmission rules of DWORD: Pass the upper 24 bits first, then the upper 16 bits, the upper 8 bits, and finally the lower 8 bits.

5.4 Message Composition

5.4.1 Message Structure

Each message is comprised by identifier, header, message body and check code. See Fig. 2 for the message structure diagram:

Identifier	Message Head	Message Body	Check Code	Identifier

Fig. 2 Message Structure

5.4.2 Identifier

This document uses 0x7e as the identifier. If 0x7e is shown in the check character, message header and message body, it shall be escaped in accordance with the following rules:

0x7e ←→ 0x7d followed by a 0x02;

0x7d ←→ 0x7d followed by a 0x01.

The escape process is as follows:

Sending message: Message packing → calculate and fill the check character → escape;

Receiving message: Escaping reduction → verify the check character → parse the message.

Example:

Send a data packet with the content of 0x30 0x7e 0x08 0x7d 0x55, and it will be encapsulated as follows: 0x7e 0x30 0x7d 0x02 0x08 0x7d 0x01 0x55 0x7e.

5.4.3 Message Header

The content of message header is shown in Table 2.

Table 2 Message Header

Start Byte	Field	Data Type	Description and Requirements
0	Message ID	WORD	
2	The message body properties	WORD	See Fig. 3 for the format structure of the message body properties.
4	Terminal SN	BCD[6]	Get the Terminal SN by converting the first 14-digits of the terminal IMEI to a 6-byte Hex. For example, if the terminal IMEI is 123456789012347, then the Terminal SN is 0x0B3A73CE2FF2.
10	Message Sequence Number	WORD	Cyclic accumulation from 0 shall be done based on the sending sequence. The message originator starts loop accumulation automatically, and the message responder shall keep the response message consistent with the original message.
12	Message Packet Encapsulation Item		This field is available only when the identifier in the message body attributes indicates that the packet will be segmented to send.

See Fig. 3 for the structure chart of message body attributes format.

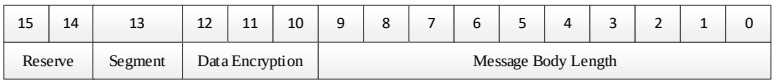

Fig. 3 Structure Chart of Message Body Attributes Format

Data Encryption:

——bit10~bit12 are identifiers for data encryption;

——When all the three are 0, it means that the message body is not encrypted;

——When bit10 is 1, it means that the message body is encrypted by RSA algorithm;

——When bit10~bit12 are 1, it means that the message body is super encrypted. For the message body format, please refer to the appendix "Super Encryption Format".

——Others are reserved.

(Suggestion) Special Note:

Considering the processing of messages by the server and device, if this method is used to divide messages into multiple packet segments and a single packet, which deviates greatly from the packet assembly and formatting specified in the protocol, it may cause significant inconvenience to packet assembly and formatting. Therefore, bit13 in the message body attributes can only be 0, that is, process as a single packet. For multiple packets of data, see the specific subcommands for details.

Segmentation: When bit13 in the message body attributes is 1, it means that the message body is a long message, which will be segmented before sending. The segmentation information is determined by the message packet encapsulation item; If bit13 is 0, it means there is no message packet encapsulation item field in the header.

The content of the message packet encapsulation item is shown in Table 3.

Table 3 Content of Message Packet Encapsulation Item

Start Byte	Field	Data Type	Description and Requirements
0	Total Number of Packets	WORD	The total number of packets after segmentation
2	Packet Number	WORD	Start from 1

5.4.4 Check Character

The check character is get by applying the XOR operation to the first byte in the message header to the very last byte prior to the check character. The operation runs as follows: the first byte is XORed with the second byte to get a first value, which is then XORed with the third byte to get a second value, which is then XORed with the fourth byte to get a third value, …, the operation continues until the very last byte prior to the check character is XORed and generate a final value. The final value is the check character, which occupies 1 bytes.

6 Communication Links

6.1 Establishment

TCP or UDP shall be used for data links between the terminal and the platform. The terminal should connect to the platform as soon as the reset is complete, after which the terminal sends a login message to the platform for authentication.

6.2 Maintenance

After the establishment of the links and upon the terminal authentication, the terminal should send heartbeat messages periodically to the platform, which shall reply with general response messages after receiving the message with a frequency specified by the terminal parameters.

6.3 Disconnection

Either the platform or the terminal can disconnect the links based on TCP protocol and both sides should take the initiative to determine whether a TCP connection is disconnected.

The platform can use the following ways to judge if a TCP connection is broken:

——Identifies disconnection initiated by the terminal based on TCP protocol;

——A new connection is established for the same terminal, which indicates that the original connection has been disconnected;

——Receives no messages from the terminal for a certain period, such as heartbeat messages.

The terminal can use the following ways to judge if a TCP connection is broken:

——Identifies disconnection initiated by the platform based on TCP protocol;

——Data communications links disconnected;

——Data communication links are normal, but no reply is received even after reaching the required retransmission times.

7 Message Processing

7.1 Messages Sent by the Platform

All messages sent by the platform shall be replied by the terminal and the responses can be divided into general response and specific response, determined by each proprietary protocols. The sender shall resend the message after a timeout for a response. Response timeout interval and retransmission times shall be determined by parameters specified by the platform.

7.2 Messages Sent by the Terminal

7.2.1 Data communication links are normal

When data communication links are normal, all messages sent by the terminal shall be replied by the platform and the responses can be divided into general response and specific response, determined by each proprietary protocols. The terminal shall resend the message after a timeout for a response. Response timeout interval and retransmission times shall be determined by parameters specified by the terminal. For any key alarm message sent by the terminal, if no response is received after reaching the specified retransmission times, it shall be saved and sent before sending any other messages in the future.

7.2.2 Data communication links are abnormal

When data communication links are abnormal, the terminal shall save all key alarm messages to send and shall send the saved messages immediately after the data communication links resume to normal.

8 Message Classification

8.1 Introduction

The following describes specifications of interfaces by their functions. Unless otherwise specified, the default communication mode shall be TCP.

8.2 Terminal Management

8.2.1 Terminal Registration/Unregistration

The terminal, if not registered, shall register first, then save the authentication key received for the login by the terminal in the future. When the terminal on the vehicle need to be removed or replaced, the terminal shall perform unregister operation to unbind itself from the vehicle.

8.2.2 Authentication for Terminal Login

Upon registration, the terminal shall immediately conduct authentication with the authentication key obtained during registration whenever connected to the platform. The terminal shall not send other messages before the authentication is completed.

8.2.3 Set/Query Terminal Parameters

The platform will send terminal parameters set messages to the terminal, which will reply with the general response. The platform will send terminal parameters query messages to inquire about the parameters of the terminal, which will reply with a special response carrying the required information. The terminals under different network systems shall support the specific parameters used in their networks.

8.2.4 Terminal Control

The platform will send terminal control messages to control the terminal, which will reply with the general response.

8.2.5 Message Transmission

For data interaction between the platform and the device, uplink passthrough and downlink passthrough will be used.

9 Detailed Explanation of Messages

According to the definition and description of terminal parameter ID specified in section 8.9 of the JT/T808-2013 protocol, 0x0001-0xEFFF are the original parameter ID in the JT/T 808-2013 protocol, and 0xF000-0xFFFF are the user-defined extended parameter ID provided by the JT/T 808-2013 protocol. In principle, the original parameter ID can be used if it applies to this protocol, and it will not be entered if not applicable. For user-defined extended parameters newly added to the system, they must be added in sequence starting from 0xF000. Please refer to Table 4 "User-Defined Parameter IDs of Connected Vehicle Terminals", which will be updated later. Contents in grey boxes are included in the previous JT/T 808-2013 protocol, which are not apply to this protocol, and shall be reserved for future development as required without occupation. Other contents in color boxes are user-defined contents that can be updated and extended. (To better distinguish different parameter IDs, the original parameter IDs that need to be reserved are classified by attributes, as shown in Table 4, and the data type and description requirements remain unchanged.) The parameters are classified as follows:

0xF000-0xF1FF are terminal attributes and network management parameters; 0xF200-0xF3FF are related parameters such as alarm threshold and alarm enable.

Table 4 User-Defined Parameter IDs of Connected Vehicle Terminals (Extensible)

Parameter ID	Data Type	Description and Requirements	Default Value
0xF000-0xFFFF		**Defined by users (defined by Jimi IoT, update and add later.)**	
0xF000-0xF1FF		**Terminal attributes and network management parameters**	
0x0001 (original parameter ID)	DWORD	Terminal heartbeats sending interval. Unit: seconds (s)	30
0x0002 (original parameter ID)	DWORD	TCP message response timeout interval. Unit: seconds (s)	5
0x0003 (original parameter ID)	DWORD	TCP message retransmission times	3
0x0010 (original parameter ID)	STRING	Master server APN, wireless communication dial-up access point. If the network system is CDMA, then the PPP dial-up number applies.	
0x0011 (original parameter ID)	STRING	The user name of master server APN.	
0x0012 (original parameter ID)	STRING	The dial-up passwords of master server wireless communication.	
0x0013 (original parameter ID)	STRING	The master server's address, IP or domain name.	
0x0018 (original parameter ID)	DWORD	Server TCP port	
0x0081 (original parameter ID)	DWORD	Province ID where the vehicle located	
0x0082 (original parameter ID)	DWORD	City or county ID where the vehicle located	

0x0083 (original parameter ID)	STRING	Motor vehicle plate issued by the traffic management department	
0x0084 (original parameter ID)	BYTE	License plate color shall be determined as specified in the 5.4.12 of the JT/T 415-2006 Please note that it must be a specific color code (1, 2, 3, 4, 5, or 9), not the color name. For unlicensed vehicles, the value is 0. Examples are as follow: 0x00: 'Unlicensed'; 0x01: 'Blue'; 0x02: 'Yellow'; 0x03: 'Black'; 0x04: 'White'; 0x05: 'Green'; 0x09: 'Other'.	
0xF000	WORD	Device manufacturer	Read only
0xF001	WORD	Authentication level	
0xF002	BCD[6]	Terminal SN	Read only
0xF003	BYTE[5]	Terminal type	Read only
0xF004	BYTE[7]	Terminal ID	Read only
0xF005	STRING	Terminal hardware version number	Read only
0xF006	STRING	Terminal system software version number	Read only
0xF007	STRING	IMEI, IMSI, and ICCIDof the SIM card. Leave blank for items that cannot be read. The field starts with a half-width ":" and end with a half-width ";". For example: “IMEI:xxx;IMSI:xxx;ICCID:xxx;”	Read only
0xF008	STRING	Parameters of the FTP upgrade server, such as IP address, port number, username, and password. The field starts with a half-width ":" and end with a half-width ";". For example: “FTPIP:123.123.123.12;PORT:12345; USER: admin;PASS:golo12345;”	
0xF009	DWORD	Oil correction factor	
0xF00A	DWORD	Mileage correction factor	
0xF00B	DWORD	Initial value of accumulated oil volume (obtained by calculation), unit: L	
0xF00C	DWORD	Initial value of accumulated mileage (obtained by calculation), unit: KM	
0xF00D	DWORD	Vehicle type code as shown in Table 5. **(follow-up maintenance is required)** High 16 bits for commercial vehicle, and the low 16 bits remain as 0x0000; Low 16 bits for passenger vehicles, and the high 16 bits remain as 0x0000;	
0xF00E	DWORD	Time interval for OBD data uplink transparent transmission.	

		Unit: seconds (s)	
0xF00F	BYTE	Sub-categories of Uplink Transparent Transmission Messages The sub-categories of messages shown in Table are as follows: 0x01: OBD data stream reporting; (report by the terminal) 0x02: Trouble code data reporting; (report by the terminal) 0x03: Report of alarm data and driving behavior data; (report by the terminal) 0x04: Travel data reporting; (report by the terminal) 0x05: OBD MCU log data reporting; (report after the platform sends a query) 0x06: Upload the data collected by CAN learning; (report by the terminal) 0x07: Support the reporting of data stream ID list; (report by the terminal) 0x08: Support the reporting of vehicle control ID list; (report by the terminal) 0x09: Support the reporting of alarm and driving behavior data ID list (report by the terminal) Add one by one... **(Extensible)**	
0xF010	BYTE	Terminal registration ID 0: not registered; 1: registered;	
0xF011	DWORD	Value for the critical terminal hardware fault. If the fault values are all 0, it is normal. Each bit represents a critical hardware fault, which is specifically defined by each terminal.	Read only
0xF012	BYTE	Geofence: 0x00: Circular 0x01: Rectangular …	
0xF013	BYTE	Clear trouble code (If it is set to 0x01 on the platform, it is valid; otherwise, it is invalid; the terminal always returns 0x00 when being required.)	Platform settings Meaningless queries
0xF014	BCD[6]	UTC date time (YY-MM-DD-HH-MM-SS) Note: When the server side queries, the terminal returns the current UTC time; Correct the terminal UTC time through the server-side settings to achieve time synchronization.	
0xF015	BYTE	Vehicle check (If it is set to 0x01 on the platform, it is a conditional check, and to 0x02 a quick check. If the terminal responds, the checkup	Platform settings Meaningless

		data stream will be uploaded automatically; otherwise, no data will be uploaded. The terminal always returns 0x00 when being required.)	queries
0xF016	BYTE	OBD communication control (OBD communication and diagnosis are turned on and off at the same time) 0x00: Disable communication 0x01: Enable communication (default)	
0xF017	BYTE	Diagnostic communication control (OBD communication and diagnosis are turned on and off at the same time) 0x00: Disable communication 0x01: Enable communication (default)	
0xF018	BYTE	The sign of the east-west longitude and north-south latitude of the Geofence. First lower bit of the byte: 0: East longitude, 1: West longitude Second lower bit of the byte: 0: North latitude, 1: South latitude	
0xF019	BYTE	Remote GPS switch 0x00: Off 0x01: On (default)	
0xF01A	BYTE	WiFi switch 0x00: Off 0x01: On (default)	
0xF01B	BYTE	Reset WiFi password and user name 0x01	
0xF01C	STRING	Command to set the WiFi user name and password. The field starts with a half-width ":" and end with a half-width ";". For example: “USER:admin; PASS:12345;”	
0xF01D	STRING	APN channel address	
0xF01E	STRING	Upload path (URL) of the terminal system software log	
0xF01F	BYTE	Anti-theft switch 0x00: Off (default); 0x01: On; 0xFF: not supported	
0xF020	BYTE	Encrypted and non-encrypted toggle switch: 0x00: Non-encrypted; 0x01: Encrypted	
0xF021	STRING	Parameter setting of external device	
0xF022	STRING	Parameter query messages of the external device	Read only
0xF023	BYTE[3]	Parameter setting for abnormal oil level alarm of the external device (oil level sensor) Byte 0: 0x01: Not active; 0x02: Active Byte 1: Changeable threshold (not active, active) Byte 2: Specified time period (not active, active)	
0xF024	BYTE	0x00: Not shared 0x01: Shared (NB-IOT)	
0xF025	STRING	Vehicle VIN	

Add one by one...			
0xF200-0xF3FF		**Parameters for Alarm Threshold and Alarm Enable**	
0x0020 (original parameter ID)	DWORD	Location reporting strategy, 0: regular reporting; 1: distance reporting; 2: regular and distance reporting	0
0x0021 (original ID)	DWORD	Location reporting method: 0: Depend on ACC status; 1: Depend on login and ACC status. Judge login status first. If the terminal is already logged in, then check the ACC status.	1
0x0027 (original parameter ID)	DWORD	Reporting interval when sleeping, unit: seconds (s), >0	60*60
0x0028 (original parameter ID)	DWORD	Reporting interval when emergency alarm is triggered, unit: seconds (s), >0	5
0x0029 (original parameter ID)	DWORD	Default regular reporting interval, unit: seconds (s), >0	10
0x002C (original parameter ID)	DWORD	Default distance interval for reporting, unit: meter (m), >0	50
0x002E (original parameter ID)	DWORD	Distance interval for reporting when sleeping, unit: meter (m), >0	50
0x002F (original parameter ID)	DWORD	Distance interval for reporting when emergency alarm is triggered, unit: meter (m), >0	20
0x0030 (original parameter ID)	DWORD	Turning angle for additional points report while turning: <180	30
0x0031 (original parameter ID)	WORD	Geofence radius (illegal displacement threshold), unit: meter	500
0x0050 (original parameter ID)	DWORD	Alarm mask word, which is corresponding to the alarm sign in the reported location information. If the corresponding bit is 1, the corresponding alarm will be masked.	
0x0055 (original parameter ID)	DWORD	Highest speed. Unit: km/h **(Speed threshold)**	100/120
0x0056 (original parameter ID)	DWORD	Speeding duration. Unit: second (s) **(Alarm will be triggered when the vehicle moves at a speed that is above the set speed threshold for longer than the set speeding duration.)**	30
0x0057 (original parameter ID)	DWORD	Time threshold for continuous driving. Unit: seconds (s) **(One type of fatigue driving)**	4*3600
0x0058 (original parameter ID)	DWORD	Cumulative driving time threshold for the day. Unit: seconds (s) **(Another type of fatigue driving)**	6*3600
0x0059 (original parameter ID)	DWORD	Minimum rest time. Unit: seconds (s) **(One factor for judging the continuous driving time)**	15*60
0x005A (original parameter ID)	DWORD	The longest parking time. Unit: seconds (s) **(Another factor for judging the continuous driving time)**	1*3600
0x005B (original parameter ID)	WORD	Differential value of warning for speed alert, unit: 1/10km/h	10
0x005C (original parameter ID)	WORD	Differential value of warning for fatigue driving, unit: seconds (s), >0	30*60

0x005D (original parameter ID)	WORD	Parameter setting of collision alert: b7-b0: Collision time, unit: 4ms; b15-b8: Collision acceleration, unit: 0.1g. Range: 0~79, default value is 10.	0x190A
0x005E (original parameter ID)	WORD	Parameter settings of rollover alert: Rollover angle, unit: 1 degree, default value is 30 degrees.	30
0xF200	BYTE[32]	User-defined alarm mask word, which corresponds to the data ID reported in alarm data and driving behavior data. If the corresponding bit is 1, the corresponding alarm will be masked. See Table 28 Definition and Description of Alarm and Driving Behavior Data ID (Extensible) for detailed definition. Calculation method of each threshold value is consistent with Table 25 Definition and Description of Data Stream IDs (Extensible).	
0xF201	DWORD	Alarm threshold for high voltage. Unit: mV	15000/28000
0xF202	DWORD	Alarm threshold for low voltage. Unit: mV	10800/20000
0xF203	WORD	Alarm threshold for high water temperature, unit: degree Celsius (℃)	120
0xF204	WORD	Alarm threshold for low water temperature, unit: degree Celsius (℃)	60
0xF205	WORD	Alarm threshold for high oil temperature. Unit: degree Celsius (℃)	
0xF206	WORD	Alarm threshold for high fuel temperature. Unit: degree Celsius (℃)	
0xF207	WORD	Alarm threshold for high oil pressure. Unit: KPa	
0xF208	WORD	Alarm threshold for preheating duration. Unit: minute	10
0xF209	WORD	Alarm threshold for overrun idling time. Unit: minute	20
0xF20A	BYTE	Alarm threshold for quick fuel up (depends on how hard the driver steps on the accelerator)	40%
0xF20B	WORD	Alarm threshold for sudden acceleration, unit: km/h	40
0xF20C	WORD	Alarm threshold for hard braking, unit: km/h	60
0xF20D	WORD	Alarm threshold for sharp turn. Unit: degree	60
0xF20E	WORD	Alarm threshold for high rotational speed. Unit: RPM	2500/3500
0xF20F	DWORD	Latitude of the center point of the circular geofence. The latitude value in degrees multiplied by 10 to the 6th power. Accurate to one millionth of a degree.	
0xF210	DWORD	Longitude of the center point of the circular geofence. The longitude value in degrees multiplied by 10 to the 6th power. Accurate to one millionth of a degree.	
0xF211	DWORD	Latitude of point 1 of the rectangular geofence. The latitude value in degrees multiplied by 10 to the 6th power. Accurate to one millionth of a degree.	
0xF212	DWORD	Longitude of point 1 of the rectangular geofence. The longitude value in degrees multiplied by 10 to the 6th power. Accurate to	

		one millionth of a degree.	
0xF213	DWORD	Latitude of point 2 of the rectangular geofence. The latitude value in degrees multiplied by 10 to the 6th power. Accurate to one millionth of a degree.	
0xF214	DWORD	Longitude of point 2 of the rectangular geofence. The longitude value in degrees multiplied by 10 to the 6th power. Accurate to one millionth of a degree.	
0xF215	BYTE	Trigger threshold for sensor-enabled vibrating alarm, unit: 0.1g	1-10
0xF216	WORD	Alarm threshold for hard braking, unit: km/h	
0xF217	WORD	Initial threshold for hard braking, unit: km/h	
0xF218	WORD	Alarm threshold for sharp turn, unit: km/h	
0xF219	WORD	Judge duration threshold for sharp turn. unit: second (s)	2
Add one by one...			

Table 5 List of Vehicle Type ID

Description of Commercial Vehicle Engine Types	**ID (DWORD)**			**Description**
	Engine Type (8 bits in high order)	**Electronic Control System (The second 8 bits in high order)**	**Fixed value (16 bits in low order)**	
Standard Truck OBD	0x00	0x00	0x0000	SAE J1939 Protocol
		0x01	0x0000	SAE J1979 Protocol, SOFIM8140.43E4
		0x02	0x0000	SAE J1708 Protocol
Weichai Power	0x01	0x00	0x0000	SAE J1939 by default
		0x01	0x0000	Other combinations
		0x02	0x0000	Private diagnostics (automatic scan and match)
		0x03	0x0000	P949-V720
		0x04	0x0000	P949-V732
		0x05	0x0000	P949-V740
		0x06	0x0000	P949-V750
		0x07	0x0000	P949-V760
		0x08	0x0000	P949-V770
		0x09	0x0000	P949-V780 v791
		0x0A	0x0000	P949-V792
		0x0B	0x0000	P1949-V100
		0x0C	0x0000	P1949-V200
		0x0D	0x0000	P1949-V210
		0x0E	0x0000	P1949-V300
		0x0F	0x0000	P1949-V301

		0x10	0x0000	P1949-V302
		0x11	0x0000	DNOx2.2-V720
		0x12	0x0000	DNOx2.2-V740
		0x13	0x0000	DNOx2.2-V750
		0x14	0x0000	DNOx2.2-V760
		0x15	0x0000	DNOx2.2-V770
		0x16	0x0000	NOx2
		0x17	0x0000	DCU
YC Diesel	0x02	0x00	0x0000	DNOx2.2-6.5-V720
		0x01	0x0000	DNOx2.2-6.5-V730
		0x02	0x0000	DNOx2.2-6.5-V740
		0x03	0x0000	DNOx2.2-6.5-V741
		0x04	0x0000	DNOx2.2-6.5-V742
		0x05	0x0000	DNOx2.2-6.5-V750
		0x06	0x0000	DNOx2.2-V720
		0x07	0x0000	DNOx2.2-V730
		0x08	0x0000	DNOx2.2-V740
		0x09	0x0000	DNOx2.2-V741
		0x0A	0x0000	DNOx2.2-V742
		0x0B	0x0000	NOx2
		0x0C	0x0000	Guangxi Sunlight
		0x0D	0x0000	Zhejiang Yinlun Machinery
Wuxi Diesel Engine	0x03	0x00	0x0000	
		0x01	0x0000	The engines (manufactured by Wuxi Diesel Engine) support Bosch DCUs.
Quanchai Engine	0x04	0x00	0x0000	
Cummins	0x05	0x00	0x0000	Aftertreatment
Shanghai Diesel Engine (SDEC)	0x06	0x00	0x0000	SC25R136.1Q4
		0x01	0x0000	DNOX2.2 6.5 Version 1
		0x02	0x0000	DNOX2.2 6.5 Version 2
		0x03	0x0000	DNOX2.2 6.5 Version 3
		0x04	0x0000	DNOX2.2 6.5-V731
		0x05	0x0000	DNOX2.2 6.5-V732
		0x06	0x0000	DNOX2.2 6.5-V733
		0x07	0x0000	DNOX2.2 6.5-V740
		0x08	0x0000	DNOX2.2 6.5-V751
		0x09	0x0000	DNOX2.2 6.5-V760
		0x0A	0x0000	DNOX2.2 6.5-V761
Changchai	0x07	0x00	0x0000	
Yunnei Power	0x08	0x00	0x0000	
Chaoyang Diesel	0x09	0x00	0x0000	

Dalian Diesel	0x0A	0x00	0x0000	
DEUTZ	0x0B	0x00	0x0000	
Steyr	0x0C	0x00	0x0000	
Iveco	0x0D	0x00	0x0000	SOFIM8140.43S3 SOFIM8140.47S4 SOFIM8140.47Z4
Benz	0x0E	0x00	0x0000	
MAN	0x0F	0x00	0x0000	
Mitsubishi Power	0x10	0x00	0x0000	
Qingling ISUZU	0x11	0x00	0x0000	
Hino Motors	0x12	0x00	0x0000	
Liuzhou Wuling Liuji Power	0x13	0x00	0x0000	
JMC	0x14	0x00	0x0000	JX493ZLQ3, JX493Q4 SOFIM8140.46
Dongfeng Motor	0x15	0x00s	0x0000	10-meter electric bus
		0x01	0x0000	6.2-meter electric bus
		0x02	0x0000	Yufeng Electric vehicle
		0x03	0x0000	Jufeng Electric vehicle
		0x04	0x0000	8.1-meter electric bus, 4.4-meter Zebra model
		0x05	0x0000	ER30 Electric vehicle
		0x06	0x0000	12-meter hybrid vehicle
		0x07	0x0000	Hiconics Power
Bosch	0x16	0x01	0x0000	Bosch DCU
Actblue	0x17	0x00	0x0000	SCR (JINBEI)
		0x01	0x0000	SCR-OBD non-post-processed data
		0x02	0x0000	SCR-CAN
Dongfeng diesel vehicle	0x18	0x00	0x0000	Dongfeng DINEX ACU
		0x01	0x0000	Dongfeng CV ACM
		0x02	0x0000	Dongfeng Chaoyang DNOx2.26.5
		0x03	0x0000	Dongfeng ACM
		0x04	0x0000	Dongfeng CES-ACM
Sinotruk	0x19	0x00	0x0000	Sinotruk self-developed SCR operating system
		0x01	0x0000	First-generation motor urea pump developed by Sinotruk
		0x02	0x0000	Second-generation motor urea pump developed by Sinotruk
		0x03	0x0000	Third-generation air-assisted SCR system developed by Sinotruck

		0x04	0x0000	Sinotruck DNOx2.2-6.5-V750
		0x05	0x0000	Sinotruck DNOx2.2-6.5-V751
		0x06	0x0000	Sinotruck DNOx2.2-6.5-V760
		0x07	0x0000	Sinotruck DNOx2.2-6.5-V770
		0x08	0x0000	Sinotruck DNOx2.2-V750
		0x09	0x0000	Sinotruck DNOx2.2-V751
		0x0A	0x0000	Sinotruck DNOx2.2-V760
		0x0B	0x0000	Sinotruck DNOx2.2-V770
		0x0C	0x0000	Sinotruck SCR system, pin 11/12
Tenneco	0x1A	0x00	0x0000	Tenneco aftertreatment system (Sinotruck) (old)
		0x01	0x0000	Tenneco DCU1.2
		0x02	0x0000	Tenneco DCU (JAC)
		0x03	0x0000	Tenneco DCU
		0x04	0x0000	Tenneco DCU (Hualing Automobile)
		0x05	0x0000	Tenneco DCU (FAW Jiefang)
		0x06	0x0000	Tenneco DCU system (Weichai)
		0x07	0x0000	Tenneco aftertreatment system (Sinotruck) (new)
Hualing Automobile	0x1B	0x00	0x0000	DNX2.2 6.5-1 Start verification
		0x01	0x0000	DNX2.2 6.5-2
		0x02	0x0000	DNX2.2 6.5-3
		0x03	0x0000	DNX2.2 6.5-4
		0x04	0x0000	DNX2.2 6.5-V732
		0x05	0x0000	DNX2.2 6.5-V740
		0x06	0x0000	DNX2.2 6.5-V741
		0x07	0x0000	DNX2.2 6.5-V750
		0x08	0x0000	DNX2.2 6.5-V760
		0x09	0x0000	DNX2.2 6.5-V770
		0x0A	0x0000	DNX2.2 6.5-V140
		0x0B	0x0000	DNX2.2 6.5-V150
		0x0C	0x0000	DNX2.2 6.5-V160
		0x0D	0x0000	DNX2.2 6.5-V161
		0x0E	0x0000	DNX2.2 6.5-V170
		0x0F	0x0000	DNOx2.2–V740
		0x10	0x0000	DNOx2.2–V732
		0x11	0x0000	DNOx2.2–V750
		0x12	0x0000	DNOx——6.5 –V160
		0x13	0x0000	DNOx——6.5 –V140
		0x14	0x0000	DNOx——6.5 –V150
Doosan	0x1C	0x00	0x0000	DNOX2 aftertreatment system
Foton Lovol	0x1D	0x00	0x0000	Lovol DNOX2.2 6.5-V730
		0x01	0x0000	Lovol DNOX2.2 6.5-V741

		0x02	0x0000	Lovol DNOX2.2 6.5-V750
		0x03	0x0000	Lovol DNOX2.2 6.5-V751
Henghe	0x1E	0x00	0x0000	Henghe aftertreatment system
Kaidesi	0x1F	0x00	0x0000	Kaidesi aftertreatment system
Kailong	0x20	0x00	0x0000	Kailong aftertreatment (UDS)
CVS	0x21	0x00	0x0000	CVS aftertreatment system
Weifu Lida	0x22	0x00	0x0000	Weifu Lida SCR (Air-Assisted) System J1939
Qintai Auto	0x23	0x00	0x0000	Qintai pump aftertreatment
Nissan	0x24	0x00	0x0000	Nissan UD DNOX1 aftertreatment system
Jiefang	0x25	0x00	0x0000	Jiefang DNOX2.2, entire data stream
		0x01	0x0000	Jiefang DNOX2.2 SCR V762
		0x02	0x0000	Jiefang DNOX2.2 -SCR V761
		0x03	0x0000	Jiefang DNOX2.2-SCR V750
		0x04	0x0000	Jiefang DNOX2.2-SCR V730
		0x05	0x0000	Jiefang DNOX2.2-SCR V720
		0x06	0x0000	FAW Jiefang DNOX2.2 6.5-V720
		0x07	0x0000	FAW Jiefang DNOX2.2 6.5-V730
		0x08	0x0000	FAW Jiefang DNOX2.2 6.5-V750
		0x09	0x0000	FAW Jiefang DNOX2.2 6.5-V761
		0x0A	0x0000	FAW Jiefang DNOX2.2 6.5-V771
		0x0B	0x0000	FAW Jiefang DNOX2.2 6.5-V762
		0x0C	0x0000	FAW Jiefang DNOX2.2 6.5-V210
		0x0D	0x0000	FAW Jiefang DNOX2.2 6.5-V300
		0x0E	0x0000	FAW Jiefang DNOX2.2 6.5-V301
		0x0F	0x0000	FAW Jiefang DNOX2.2 6.5-V400
		0x10	0x0000	FAW Jiefang DNOX2.2 6.5-V501
		0x11	0x0000	-- FAW Electronic control system that meet National-VI standards
Ecocat	0x26	0x00	0x0000	Ecocat aftertreatment system
Yili Lanjie Auto Parts	0x27	0x00	0x0000	Yili Lanjie Auto Parts aftertreatment system
CVS	0x28	0x00	0x0000	Aftertreatment system J1939
Weifu Lida	0x29	0x00	0x0000	Aftertreatment system J1939
Add one by one...			0x0000	

Passenger Vehicle Brand Types	**ID(DWORD)**					**Description Classified vehicle brands by bits**
	Fixed value (16 bits in high order)	**Passenger Vehicle Brand (Gasoline Vehicle)**	**Passenger Vehicle Brand (PEV) (16 bits in low order)**	**Passenger Vehicle Brand (Hybrid) (16 bits in**	**Passenger Vehicle Brand (Diesel Vehicle) (16 bits in**	

		(16 bits in low order)		**low order)**	**low order)**	
Standard	0x0000	0x0000	0x8000	0x4000	0x2000	Read OBD data only
Volkswagen	0x0000	0x0001	0x8001	0x4001	0x2001	Read OBD data only
GM	0x0000	0x0002	0x8002	0x4002	0x2002	
Ford	0x0000	0x0003	0x8003	0x4003	0x2003	
Toyota	0x0000	0x0004	0x8004	0x4004	0x2004	
Honda	0x0000	0x0005	0x8005	0x4005	0x2005	
Nissan	0x0000	0x0006	0x8006	0x4006	0x2006	
Subaru	0x0000	0x0007	0x8007	0x4007	0x2007	
KIA	0x0000	0x0008	0x8008	0x4008	0x2008	
Hyundai	0x0000	0x0009	0x8009	0x4009	0x2009	
Peugeot	0x0000	0x000A	0x800A	0x400A	0x200A	
Citroen	0x0000	0x000B	0x800B	0x400B	0x200B	
Volvo	0x0000	0x000C	0x800C	0x400C	0x200C	
Renault	0x0000	0x000D	0x800D	0x400D	0x200D	
Mitsubishi	0x0000	0x000E	0x800E	0x400E	0x200E	
Land Rover	0x0000	0x000F	0x800F	0x400F	0x200F	
B.M.W.	0x0000	0x0010	0x8010	0x4010	0x2010	
Benz	0x0000	0x0011	0x8011	0x4011	0x2011	
Bestune	0x0000	0x0012	0x8012	0x4012	0x2012	
CMC	0x0000	0x0013	0x8013	0x4013	0x2013	
Dongfeng Fengxing (Forthing)	0x0000	0x0014	0x8014	0x4014	0x2014	
Dongfeng Fengshen (Aeolus)	0x0000	0x0015	0x8015	0x4015	0x2015	
Jaguar	0x0000	0x0016	0x8016	0x4016	0x2016	
JAC	0x0000	0x0017	0x8017	0x4017	0x2017	
Landwind	0x0000	0x0018	0x8018	0x4018	0x2018	
Daihatsu	0x0000	0x0019	0x8019	0x4019	0x2019	
Chery	0x0000	0x001A	0x801A	0x401A	0x201A	
Luxgen	0x0000	0x001B	0x801B	0x401B	0x201B	
ZX AUTO	0x0000	0x001C	0x801C	0x401C	0x201C	
Zotye Auto	0x0000	0x001D	0x801D	0x401D	0x201D	
Fiat	0x0000	0x001E	0x801E	0x401E	0x201E	
MG	0x0000	0x001F	0x801F	0x401F	0x201F	
Haval	0x0000	0x0020	0x8020	0x4020	0x2020	
Changan	0x0000	0x0021	0x8021	0x4021	0x2021	
Suzuki	0x0000	0x0022	0x8022	0x4022	0x2022	

Isuzu	0x0000	0x0023	0x8023	0x4023	0x2023	
BYD	0x0000	0x0024	0x8024	0x4024	0x2024	
Geely Auto	0x0000	0x0025	0x8025	0x4025	0x2025	
EMGRAND	0x0000	0x0026	0x8026	0x4026	0x2026	
SMART	0x0000	0x0027	0x8027	0x4027	0x2027	
Brillance Auto	0x0000	0x0028	0x8028	0x4028	0x2028	
Trumpchi	0x0000	0x0029	0x8029	0x4029	0x2029	
Daewoo	0x0000	0x002A	0x802A	0x402A	0x202A	
SsangYong	0x0000	0x002B	0x802B	0x402B	0x202B	
Hawtai Motor	0x0000	0x002C	0x802C	0x402C	0x202C	
GWM	0x0000	0x002D	0x802D	0x402D	0x202D	
ROEWE	0x0000	0x002E	0x802E	0x402E	0x202E	
Joylong	0x0000	0x002F	0x802F	0x402F	0x202F	
Opel	0x0000	0x0030	0x8030	0x4030	0x2030	
SAAB	0x0000	0x0031	0x8031	0x4031	0x2031	
MAZDA	0x0000	0x0032	0x8032	0x4032	0x2032	
Haima	0x0000	0x0033	0x8033	0x4033	0x2033	
Rover	0x0000	0x0034	0x8034	0x4034	0x2034	
Lexus	0x0000	0x0035	0x8035	0x4035	0x2035	
BAIC	0x0000	0x0036	0x8036	0x4036	0x2036	
Baojun	0x0000	0x0037	0x8037	0x4037	0x2037	
MAXUS	0x0000	0x0038	0x8038	0x4038	0x2038	
Volkswagen	0x0000	0x0039	0x8039	0x4039	0x2039	
Add one by one...	0x0000					
All Models	0x0000	0x7FFF	0x7FFF	0x7FFF	0x7FFF	Match bus protocol for all models (powered on by default)

Terminal General Response-0x0001

Message ID: 0x0001.

For data format of the message body of the terminal general response, see Table 6.

Table 6 Data Format of the Message Body of the Terminal General Response

Start Byte	Field	Data Type	Description and Requirements
0	Response sequence number	WORD	Sequence number of the corresponding platform message
2	Response ID	WORD	ID of the corresponding platform message
4	Result	BYTE	0: Succeeded/confirm; 1: Failed; 2: Message error; 3: Not support

			4: SE key exchange succeeded **5: SE key exchange failed**

9.1 Platform general response--0x8001

Message ID: 0x8001.

For the data format of the message body of the platform general response, see Table 7.

Table 7 Data Format of the Message Body for the Platform General Response

Start Byte	Field	Data Type	Description and Requirements
0	Response sequence number	WORD	Sequence number of the corresponding terminal message
2	Response ID	WORD	ID of the corresponding terminal message
4	Result	BYTE	0x00: Succeeded/confirm; 0x01: Failed; 0x02: Message error; 0x03: Not support; 0x0**4: Alarm processing confirm** 0x0**5: Not logged in** 0x0**6: Logged in** 0x0**7: Unregistered** 0x0**8: Registered** 0x0**9: SE key exchange succeeded** 0x0**A: SE key exchange failed** **0x0B: Encrypted device**

9.2 Terminal heartbeat--0x0002

Message ID: 0x0002.

The message body of the terminal heartbeat is empty.

The platform replies with the general response.

9.3 Terminal registration--0x0100

Message ID: 0x0100.

For data format of the terminal registration message body, see Table 8.

Table 8 Data Format of the Terminal Registration Message Body n

Start Byte	Field	Data Type	Description and Requirements
0	Device manufacturer	WORD	Default: 0x595A; others are reserved.
2	Authentication level	WORD	0X0001: Authenticate the terminal SN only; default 0x0002: Authenticate the terminal SN and SIM card's ICCID; 0x0003: Authenticate the terminal SN, SIM card's ICCID, and vehicle information only;
4	Device Type	BYTE[5]	The first 5-digit string of the terminal SN represents the device

			type. For example: If the terminal SN is 975990000007, then the device type is 0x39 0x37 0x35 0x39 0x39. Based on this parameter, the platform can differentiate the types of passenger and commercial vehicles.
9	SIM Card's ICCID	BYTE[20]	SIM card's CCID (Add "0X00" when it cannot be read).
29	Terminal SN	BYTE[7]	The last 7-digit string of the terminal SN represents the terminal SN of the same device type. For example: Terminal SN is 975990000007, then 0x30 0x30 0x30 0x30 0x30 0x30 0x37
36	License Plate Color	BYTE	The color code setting of motor vehicle license plates conforms to section 5.4.12 of JT/T 415-2006. Please note that it must be a specific color code (1, 2, 3, 4, 5, or 9), not the color name. For vehicles without registration plates, the value is 0. Examples are as follow: 0x00: 'No license plate'; 0x01: 'Blue'; 0x02: 'Yellow'; 0x03: 'Black'; 0x04: 'White'; **0x05:** '**Green**'; 0x09: 'Others'.
37	Vehicle Identification	STRING	It represents vehicle VIN when the color code of the license plate is 0. Otherwise, it represents the motor vehicle license plate issued by the public security traffic management department.

The terminal registration steps are as follows:

1) First, the platform records the information of the vehicle to be registered, and enters the terminal SN, as well as the terminal SIM card's ICCID.
2) Then, complete the binding of the above information.
3) The platform judges the consistency of the registration information reported by the terminal, and makes a response.

9.4 Terminal registration response--0x8100

Message ID: 0x8100.

For the data format of the terminal registration message body, see Table 9.

Table 9 Data Format of the Terminal Registration Message Body

Start Byte	Field	Data Type	Description and Requirements
0	Response sequence	WORD	Sequence number of the corresponding terminal registration message

	number		
2	Result	BYTE	0: Succeeded; 1: Failed: 2: No such vehicle in database; 3: Terminal already exists; 4: No such terminal in database
3	Base key	STRING	This field is only available after the device is registered successfully. The terminal should save the key in FLASH and reset the registration identifier. The key will be used for authentication for each login.

9.5 Terminal logout--0x0003

Message ID: 0x0003.

The logout message body is empty. This command can be initiated to the platform by the terminal, or it can be issued by the platform forcibly. The receiver confirms with a general response. When unregistered successfully, the platform will unbind the terminal and SIM information with the vehicle, and the terminal will clear the registration identifier and authentication code accordingly.

Terminal or the platform replies with a general response.

9.6 Terminal Login Authentication—0x0102

Message ID: **0x0102**

For the data format of the terminal login authentication message body, see Table 10**.**

Table 10 Data Format of the Terminal Login Authentication Message Body

Start Byte	Field	Data Type	Description and Requirements
0	Authentication code (base key)	STRING	Registered terminal shall send an authentication message immediately after it is successfully connected to and logged into the platform.

The platform replies with a general response.

Special note: After the platform responds, you can write a command to set parameters for a specified terminal based on the device type and its personalized design requirement. Then, send it to the terminal to complete the configuration. Such as setting "0xF00D vehicle type configuration code", and "0xF014 UTC date and time", which are used to configure the vehicle model and synchronize time.

9.7 Set parameter for specific terminal--0x8103

Message ID: 0x8103.

For the data format of the terminal parameter setting message body, see Table 11.

Table 11 Data Format of the Terminal Parameter Setting Message Body

Start Byte	Field	Data Type	Description and Requirements
0	Total number of parameters	BYTE	
1	List of		Please refer to for the list of parameters.

	parameters		

Table 12 Data Format for Specific Terminal Parameters Setting Message from the Platform and for Terminal Response to the Specific Parameter List Query

Field	Data Type	Description and Requirements
Parameter ID	WORD	For definition and instruction of parameter ID, see Table 4.
Parameter Length	BYTE	
Parameter Value		If it is a multivalued parameter, the parameter IDs should be the same during message transmission.

The device shall reply with a general response.

9.8 Query parameter of specific terminal--0x8106

Message ID: 0x8106.

For the data format of the specific terminal parameters query message body, see Table 13. The terminal responses with 0x0101 command.

Table 13 Data Format of the Terminal Parameter Setting Message Body

Start Byte	Field	Data Type	Description and Requirements
0	Total number of parameters	BYTE	The total number of parameters is n.
1	List of parameter ID	BYTE[2*n]	The parameter IDs are arranged in order, such as “Parameter ID1, Parameter ID2...Parameter IDn”

9.9 Response to specific terminal parameter query --0x0104

Message ID: 0x0104.

For the data format of the message body of the response to the specific terminal parameter query, see Table 14.

Table 14 Data Format of the Message Body of the Response to the Specific Terminal Parameter Query

Start Byte	Field	Data Type	Description and Requirements
0	Response sequence number	WORD	Sequence number of corresponding terminal parameter query message
2	Number of response parameters	BYTE	
3	List of parameters		Please refer to **错误!未找到引用源。** for the list of parameters.

9.10 Terminal control--0x8105

Message ID: 0x8105.

For the data format of the terminal control message body, see Table 15.

Table 15 Data Format of the Terminal Control Message Body

Start Byte	Field	Data Type	Description and Requirements
0	Command	BYTE	For instruction of terminal control command character, see Table

	Character		16.

Table 16 Instruction of Terminal Control Command Character

Command Character	Command Parameter	Description and Requirements
1	None	**Reserved**
2	None	**Reserved**
3	None	Terminal Off
4	None	Terminal Rest
5	None	Reset the terminal to factory settings (IP address and port connected remain unchanged)
6	None	Disconnect data communication
7	None	Turn off all wireless communications
……		
0xA1	**None**	**OBD MCU firmware upgrade via WiFi**
0xA2	**None**	**Terminal system software upgrade via WiFi**
……		
0xB1	**None**	**Read OBD MCU log (please refer to Terminal Data Uplink Transparent Transmission for data upload format)**
0xB2	**None**	**Read terminal system software log (upload in file format)**
……		

The terminal replies with a general response

9.11 Notification of terminal upgrade result--0x0108

Message ID: 0x0108.

The terminal uses this command to notify the monitoring center after the upgrade is completed and itself reconnected to the platform. For the data format of the message body of the terminal upgrade result notification, see Table 17.

Table 17 Data Format of the Message Body of the Terminal Upgrade Result Notification

Start Byte	Field	Data Type	Description and Requirements
0	Upgrade type	BYTE	0: OBD MCU; **1: Terminal system software** 12: Road transport license card reader, 52: BD satellite positioning module
1	Upgrade result	BYTE	0: Succeeded; 1: Failed; 2: Canceled. **3: Failed_Verification error;** **4: Failed_Upgrade timeout;** **5: Failed_Upgrade file name error;** **6: Failed_Upgrade file version number error;** ……

The platform replies with a general response.

9.12 Location information reporting—0x0200

Message ID: 0X0200

For the format of the terminal location information reporting message, see Table 18.

Table 18 Format of the Terminal Location Information Reporting Message

Start Byte	Field	Data Type	Description and Requirements
0	Alarm flag	DWORD	See Table 19 for the definition of alarm flag bit (reserved)
4	Status	DWORD	See Table 20 for status bit definitions.
8	Latitude	DWORD	The latitude value in degrees multiplied by 10 to the 6th power. Accurate to one millionth of a degree.
12	Longitude	DWORD	The longitude value in degrees multiplied by 10 to the 6th power. Accurate to one millionth of a degree.
16	Elevation	WORD	Altitude. Unit: meter (m)
18	Speed	WORD	1/10km/h
20	Direction	WORD	0~359, 0 for due north, clockwise
22	Time	BCD[6]	YY-MM-DD-HH-MM-SS
28	**Additional location information items (Not included in this protocol. Please refer to related content in the standard JT/T 808 protocol as required.)**		

Table 19 Definition of Location Information Alarm Flag Bit

Note: Contents in grey boxes are not defined in this protocol temporarily.

Bit	Definition	Description
0	1: Emergency alert, triggered after the alarm switch is on.	Clear after receiving a response
1	1: Speed alert	The indication is always ON until the alarm is relieved.
2	1: Fatigue driving alert	The indication is always ON until the alarm is relieved.
3	1: Danger alert	Clear after receiving a response
4	1: GNSS module failed	The indication is always ON until the alarm is relieved.
5	1: GNSS antenna open-circuited	The indication is always ON until the alarm is relieved.
6	1: GNSS antenna short-circuited	The indication is always ON until the alarm is relieved.
7	1: Undervoltage of the terminal's main supply	The indication is always ON until the alarm is relieved.
8	1: Main supply for the terminal failed	The indication is always ON until the alarm is relieved.
9	1: Terminal LCD or display failure	The indication is always ON until the alarm is relieved.
10	1: TTS module failure	The indication is always ON until the alarm is relieved.
11	1: Camera Failure	The indication is always ON until the alarm is

		relieved.
12	1: Road transport IC card license reading module failure	The indication is always ON until the alarm is relieved.
13	1: Speed warning	The indication is always ON until the alarm is relieved.
14	1: Fatigue driving alert	The indication is always ON until the alarm is relieved.
15	Reserved	
16	Reserved	
17	Reserved	
18	1: Cumulative driving time over the threshold for the day	The indication is always ON until the alarm is relieved.
19	1: Parking time over the threshold	The indication is always ON until the alarm is relieved.
20	1: Entered or left geofence	Clear after receiving a response
21	1: Entry or leaving route	Clear after receiving a response
22	1: Short/long driving mileage	Cleared after receiving response
23	1: Route departure alarm	The indication is always ON until the alarm is relieved.
24	1: Vehicle VSS failure	The indication is always ON until the alarm is relieved.
25	1: Abnormal vehicle fuel level	The indication is always ON until the alarm is relieved.
26	1: Vehicle theft alarm (indicated by vehicle immobilizer)	The indication is always ON until the alarm is relieved.
27	1: Illegal ignition	Clear after receiving a response
28	1: Illegal displacement	Clear after receiving a response
29	1: Collision alert	The indication is always ON until the alarm is relieved.
30	1: Rollover alert	The indication is always ON until the alarm is relieved.
31	1: Illegal door opening alarm (if no area is set, the terminal it will not judge illegal door opening actions)	Clear after receiving a response

Note: The location information must be reported immediately when an alarm or warning occurs.

Table 20 Definition of the Status Bit for Location Information

Bit	**Status**
0	0: ACC Off 1: ACC On
1	0: Not located 1: Located
2	0: North latitude 1: South latitude
3	0: East longitude 1: West longitude
4	0: In operation; 1: Out of operation

5	0: Latitude and longitude are not encrypted by the secret plugin; 1: Latitude and longitude have been encrypted by the secret plugin
6~7	Reserved
8-9	00: Empty; 01: Half-loaded; 10: Reserved; 11: Full-load (Input manually or acquired by the sensor, used for indicating the loaded status of passenger vehicles, heavy-duty vehicles, and trucks.)
10	0: The vehicle oil circuit is normal; 1: The vehicle oil circuit is disconnected
11	0: The vehicle circuit is normal; 1: The vehicle circuit is disconnected
12	0: Door unlocked; 1: Door locked
13	0: Door 1 closed; 1: Door 1 open (front door)
14	0: Door 2 closed; 1: Door 2 open (middle door)
15	0: Door 3 closed; 1: Door 3 open (rear door)
16	0: Door 4 closed; 1: Door 4 open (driver-side door)
17	0: Door 5 closed; 1: Door 5 open (user-defined)
18	0: Positioning without GPS satellites; 1: Positioning with GPS satellites
19	0: Positioning without BD satellites; 1: Positioning with BD satellites
20	0: Positioning without GLONASS satellites; 1: Positioning with GLONASS satellites
21	0: Positioning without Galileo satellites; 1: Positioning with Galileo satellites
22~28	Reserved
29~30	Positioning Type 00: GNSS; 01: LBS; 10: INS; 11: Reserved
31	0: Real-time location data; 1: Buffered data

Note: The location information must be reported immediately when the status changes.

The platform replies with a general response.

9.13 Data downlink transparent transmission—0x8900

Message ID: 0x8900

For the data format of the body of the downlink transparently-transmitted message, see Table 25.

Table 21 Data Format of the Body of the Downlink Transparently-Transmitted Message

Start Byte	**Field**	**Data Type**	**Description and Requirements**
0	Transparent Message Type	BYTE	For definition of transparent message type, see Table 22.
1	Transparent Message		N

The terminal replies with a general response

Table 22 Transparent Message Definition

Transparent Message Type	**Definition**	**Description and Requirements**
Detailed GNSS Module Positioning Data	0x00	Detailed GNSS Module Positioning Data
Information of Road Transport IC Card License	0x0B	For the information of the IC card license for road transportation, the uplink transparent message is 64 bytes, and the downlink transparent message is 24 bytes. Transparent transmission timeout for the IC

		card license for road transportation is 30s. The message will not be resent after timeout.
Over-serial port 1 transparent transmission	0x41	Transmit messages transparently over serial port 1
Over-serial port 2 transparent transmission	0x42	Transmit messages transparently over serial port 2
User-defined transparent transmission	0xF0-0xFF	User-defined transparent messages **0xF0: For uplink transparent transmission of vehicle data, see 9.14.1** **0xF1: For downlink transparent transmission of the platform data, see 9.13.1** **0xF2-0xFE: For future expansion** **0xFF: Transparent transmission of entire protocol data packets, thus to achieve transparent transmission of protocol packets between terminals and platforms, that is, protocol for protocol transparent transmission.**

9.13.1 Data downlink transparent transmission--0x8900F1

Type of transparent data: 0xF1

For the data format of the body of the downlink transparently-transmitted message, see Table 23.

Table 23 Data Format of the Body of the Downlink Transparently-Transmitted Message

Start Byte		Field	Data Type	Description and Requirements
0		Transparent Message Type	BYTE	0xF1, see definition of Custom Extension for Transparent Data Transmission in Table 22.
Transparent Message	1	Event Time	BCD[6]	YY-MM-DD-HH-MM-SS
	7	Reserved	BYTE	Fill in 0x00 for reserved usage.
	8	Vehicle Type	BYTE	0x01: Commercial vehicle; 0x02: Passenger vehicle;
	9	Message Subcategory	BYTE	0x01: Vehicle control 0x02: Distribute CAN learning result Add one by one... **(Extensible)**
	10	Message Data		Please refer to the description on subcategories of downlink transparent platform data transmission messages.

The terminal replies with a general response

9.13.1.1 Sending Vehicle Control Command

Please refer to Table 24 for the data format of the message body of the platform-sent vehicle control command, which is consistent with that specified in ARM Interface Protocol.

Data Format of the Message Body of Vehicle Control Command

Start Byte	Field	Data Type	Description and Requirements

10	Control Function	BYTE	Refer to supplements of "Automotive Control Protocol Technology" 0x01 Locked 0x02 Unlock 0x03 Window roll-up 0x04 Window roll-down 0x05 Horn 0x06 Hazard lights on 0x07 Enable remote window roll-up 0x08 Disable remote window roll-up 0x09 Enable remote window roll-down 0x0a Disable remote window roll-down 0x0b Enable auto lock 0x0c Disable auto lock 0x0d Find vehicle 0x0e Open the trunk 0x0f Open the sunroof 0x10 Close sunroof 0x11 Turn on the lights 0x12 Turn off the lights 0X13 Ignition on 0x14 Ignition off 0x15 Enable anti-theft alert 0x16 Disable anti-theft alert Add one by one... (Extensible)

9.13.2 Delivering CAN Learning Results

For the data format of the body of the CAN learning results message delivered by the platform, see Table 24.

Table 24 Data Format of the Body of the CAN Learning Results Message Delivered by the Platform

Start Byte	Field	Data Type	Description and Requirements
10	Total number of data packets	BYTE	
11	Current packet number	BYTE	Start from 1
12	Data length	WORD	Each data packet is up to 512 bytes long. For data packet less than 512 bytes, sent at actual length; For data packet more than 512 bytes, send by segmenting the data.
14	Data content	BYTE[n]	

9.14 Data uplink transparent transmission—0x0900

Message ID: 0x0900

For the data format of the message body of the uplink transparently-transmitted data, see Table 30.

Table 30 Data Format of the Message Body of the Uplink Transparently-transmitted Data

Start Byte	Field	Data Type	Description and Requirements
0	Transparent Message Type	BYTE	For definition of transparent message type, see Table 22.
1	Transparent Message		N
1+N	Data Transmission Time	BCD[6]	YY-MM-DD-HH-MM-SS **Special note:** **This field is only available when the data type is non-real-time data.**

The platform replies with a general response.

9.14.1 Terminal data uplink transparent transmission--0x0900F0

Type of transparent message: 0xF0

For the data format of message body of the uplink transparently-transmitted terminal data, see Table 31.

Table 31 Data Format of Message Body of the Uplink Transparently-Transmitted Terminal Data

Start Byte		Field	Data Type	Description and Requirements
0		Transparent Message Type	BYTE	0xF0, see definition of Custom Extension for Transparent Data Transmission in Table 22
	1	Event Time	BCD[6]	YY-MM-DD-HH-MM-SS
	7	Data Type	BYTE	0x00: Real-time data 0x01: Buffered data
	8	Vehicle Type	BYTE	0x01: Commercial vehicle; 0x02: Passenger car; Add one by one... **(Extensible)**
	9	Message Subcategory	BYTE	0x01: Upload OBD data stream; 0x02: Upload trouble code data 0X03: Upload data related with alarm messages and driving behavior 0x04: Mileage data reporting 0x05: OBD MCU log reporting 0x06: Upload data acquired by CAN learning; 0X07: Support uploading the list of data stream ID; 0x08: Support uploading the list of vehicle control ID; 0x09: Support uploading the ID list of alarm and driving behavior data 0x0A: Upload critical vehicle data 0x0B: VIN reporting 0x0C: Report vehicle check data 0x0D: Report device check data

				0x0E: Report APN data 0x0F: Report device functionality list 0x10: G-Sensor data upload 0x11: Upload Weichai engine data using SEA J1939 0x12: Upload Weichai engine configuration data 0x13: External device data upload 0x15: Data packet for emergency scenarios Add one by one... **(Extensible)**
	10	Specific Message Data		Please refer to the description on subcategories of uplink transparent vehicle data transmission messages.

The platform replies with a general response.

9.14.1.1 OBD Data Stream Reporting 0x01

For the data format of the message body of the uplink transparently-transmitted OBD data stream, see Table 32.

Table 32 Data Format of the Message Body of the Uplink Transparently-transmitted OBD Data Stream

Start Byte	Field	Data Type	Description and Requirements
10	Total number of data	BYTE	Total number of data streams = n
	Data ID1	WORD	See Table 33 for the definition and description of data stream ID.
	Length of Data 1	BYTE	
	Value of Data 1		
	…		
	Data IDn	WORD	
	Length of Data n	BYTE	
	Value of Data n		
	Status	DWORD	See Table 20 for status bit definitions.
	Latitude	DWORD	The latitude value in degrees multiplied by 10 to the 6th power. Accurate to one millionth of a degree.
	Longitude	DWORD	The longitude value in degrees multiplied by 10 to the 6th power. Accurate to one millionth of a degree.

Table 25 Definition and Description of Data Stream IDs (Extensible)

Data ID	Data Length (byte)	Data Type	Data Name	Unit	Description of Calculation Method
0x0000-0x00FF	**Alternate data stream ID segment**				
0x0100-0x02FF	**Data stream ID segment for commercial vehicles**				
0x0528	4	DWORD	Total Vehicle Mileage	KM	y=x/10; Accuracy: 0.1 km

0x052C	4	DWORD	Total Vehicle Fuel	L	y=x/100; Accuracy: 0.01 L
0x0102	4	DWORD	Vehicle Mileage	KM	y=x/10; Accuracy: 0.1 km
0x0103	4	DWORD	Vehicle Fuel	L	y=x/100; Accuracy: 0.01 L
0x0546	4	DWORD	Accumulated Mileage	KM	y=x/10; Accuracy: 0.1 km
0x0105	4	DWORD	Cumulative Fuel Consumption	L	y=x/100; Accuracy: 0.01 L
0x0539	2	WORD	Instant Fuel Consumption	L/H	y=x/100; Accuracy: 0.01 L/H
0x0537	2	WORD	Fuel Consumption per 100 km	L/100KM	y=x/100; Accuracy: 0.01
0x0536	2	WORD	Rotating Speed (RPM)	r/min	y=x; Accuracy: 1 r/min
0x0535	2	WORD	Speed	KM/H	y=x/10; Accuracy: 0.1 km/h
0x0530	2	WORD	Voltage	mV	y=x; Accuracy: 1 mV
0x052D	1	BYTE	Water Temperature	℃	y=x-40; Accuracy: 1℃; Range: –40℃ to 210℃
0x053D	2	WORD	Inlet Pressure	KPa	y=x/10; Accuracy: 0.1 KPa
0x053C	2	WORD	Inlet Flow	g/s	y=x/10; Accuracy: 0.1 g/s
0x010E	2	WORD	Fuel Injection Quantity	ml/s	y=x/10; Accuracy: 0.1 ml/s
0x010F	2	WORD	Oil Temperature	℃	y=x-273; Accuracy: 1℃; Range: –273~1734
0x053B	2	WORD	Oil Pressure	KPa	y=x/10; Accuracy: 0.1 KPa
0x0111	1	BYTE	Fuel Temperature	℃	y=x-40; Accuracy: 1℃; Range: –40~210
0x052E	1	BYTE	Engine Inlet Air Temperature	℃	y=x-40; Accuracy: 1℃; Range: –40~210
0x0113	2	WORD	Torque	Nm	y=x; Accuracy: 1
0x0114	1	BYTE	Engine Load	%	y=x; Accuracy: 1%; Range: 0%-100%
0x0544	1	BYTE	Tank's Liquid Level	%	y=x; Accuracy: 1%; Range: 0%-100%
0x053F	1	BYTE	Accelerator Pedal Position	%	y=x; Accuracy: 1%; Range: 0%-100%
0x0117	1	BYTE	Clutch load	%	y=x; Accuracy: 1%; Range: 0%-100%
0x0118	1	BYTE	Torque percentage	%	y=x-125; Accuracy: 1%; Range: –125% ~ 125%
0x0526	1	BYTE	Air conditioner status	None	y=x; 0: stop; 1: start; Other: unreasonable
0x0527	1	BYTE	Shift Position	None	y=x; 0: N; 1--16: D; 17--20: R; 21: P; Other: unreasonable
0x0520	1	BYTE	Seat belt status	None	y=x; 0: normal; 1: alarm; Other: unreasonable
0x011B	1	BYTE	Clutch status	0/1	y=x; 0: released; 1: depressed; Other: unreasonable

0x051F	1	BYTE	Brake pedal status	0/1	y=x; 0: released; 1: depressed; Other: unreasonable
0x051E	1	BYTE	Handbrake status	0/1	y=x; 0: not pulled up; 1: pulled up; Others: unreasonable
0x011E	1	BYTE	SCR status	None	y=x; 0: stop; 1: start; Other: unreasonable
0x011F	2	WORD	NOx concentration of SCR inlet air (input value of NOx sensor in the upstream of SCR)	ppm	y=x-200; Accuracy: 1ppm; Range: –200~3012ppm
0x0120	2	WORD	SCR exhaust gas temperature (SCR outlet temperature)	℃	y= x-273; Accuracy: 1 ℃; Range: –273 ~ 1734℃
0x0121	2	WORD	Front oxygen sensor indication	mV	y=x; voltage value of oxygen concentration; Accuracy: 1 mV; Range: 0~999mV
0x0122	2	WORD	Rear oxygen sensor indication	mV	y=x; voltage value of oxygen concentration; Accuracy: 1 mV; Range: 0~999mV
0x0123	1	BYTE	Three-way catalytic converter temperature (urea tank temperature)	℃	y=x-40; Accuracy: 1℃; Range: –40℃~210℃
0x0124	1	BYTE	Urea level (reagent balance, catalyst tank level)	%	y=x; Accuracy: 1%; Range: 0%~100%
0x0125	2	WORD	NOx concentration value range (downstream)	ppm	y=x; Accuracy: 1 ppm; Range: 0~3012ppm
0x0126	1	BYTE	OBD status (MIL)	None	y=x; 0: normal; 1: alarm; Other: unreasonable
0x0127	4	DWORD	Engine running time	s	y=x; Accuracy: 1 s;
0x0128	4	DWORD	Gross vehicle weight	Kg	y=x; Accuracy: 1 Kg;
0x0129	2	WORD	SCR inlet temperature	℃	y= x-273; Accuracy: 1℃; Range: –273 ~ 1734℃
0x012A	1	BYTE	Friction torque	%	y=x-125; Accuracy: 1%; Range: –125% ~ 125%
0x012B	2	WORD	DPF differential pressure	kPa	y=x/10; Accuracy: 0.1 kPa; Range: 0~ 6425.5 kPa
0x012C	1	BYTE	Inlet manifold temperature	℃	y=x-40; Accuracy: 1℃; Range: –40~210℃
0x012D	1	BYTE	Engine torque mode	0~3	0~3,0: Overspeed disabled, 1: Speed control, 2: Torque control 3: Speed/Torque Control

0x012E	2	WORD	oil level	mm	y=x/10; Accuracy: 0.1mm; Range: 0~65535 mm
0x012F	2	WORD	Injection amount of the SCR Adblue dosing pump	ml/h	y=x; Accuracy: 1 ml/h;
0x0130	2	WORD	SCR Adblue dosing pump pressure	kpa	y=x; Accuracy: 1 kpa;
0x0131	2	WORD	SCR system pump speed	rpm	y=x; Accuracy: 1 rpm;
0x0132	2	WORD	SCR catalyst downstream temperature	℃	℃, y=x-273; Accuracy: 1℃; Range: –273~1735℃
0x0133	1	BYTE	SCR pump working status	0~5	0~5, 0: Unused, 1: Stop, 2: Pre-injection, 3: Injecting, 4: Purging, 5: Diagnose
0x0134	1	BYTE	NOx inlet power failure	0~3	0~3, 0: abnormal power supply, 1: normal, 2: error, 3: Unavailable
0x0135	1	BYTE	NOx inlet heating control	0~3	0~3, 0: The sensor is not at working temperature, 1: The sensor is at working temperature, 2: Error, 3: Unavailable
0x0136	1	BYTE	Stable and effective NOx inlet signal	0~3	0~3, 0: Signal invalid, 1: Signal valid, 2: Error, 3: Unavailable
0x0137	1	BYTE	NOx inlet heating failure	3/5/31	3/5/31, 3: short-circuited, 5: open-circuited, 31: no fault
0x0138	1	BYTE	NOx outlet power supply failure	0~3	0~3, 0: abnormal power supply, 1: normal, 2: error, 3: Unavailable
0x0139	1	BYTE	NOx outlet heating control	0~3	0~3, 0: The sensor is not at working temperature, 1: The sensor is at working temperature, 2: Error, 3: Unavailable
0x013A	1	BYTE	Stable and effective NOx outlet signal	0~3	0~3, 0: Signal invalid, 1: Signal valid, 2: Error, 3: Unavailable
0x013B	1	BYTE	NOx outlet heating failure	3/5/31	3/5/31, 3: short-circuited, 5: open-circuited, 31: no fault
0x013C	1	BYTE	NOx inlet sensor heating enable	0~3	0~3, 0: Dew point not reached, 1: Dew point reached, heating started , 2: Error, 3: Invalid
0x013D	1	BYTE	NOx outlet sensor heating enable	0~3	0~3, 0: Dew point not reached, 1: Dew point

					reached, heating started , 2: Error, 3: Invalid
0x013E	2	WORD	Upstream temperature of catalyst	℃	℃, y=x-273; Accuracy: 1℃; Range: –273~1735℃
0x013F	2	WORD	Rotating speed threshold	RPM	rpm, y=x, Accuracy: 1 rpm; Range: 0~8031 rpm
0x0140	1	BYTE	Torque percentage threshold	%	%, y=x-125; Accuracy: 1%; Range: –125~125%
0x0141	1	BYTE	Air solenoid valve failure	0~3	0~3, 0: normal, 1: short-circuited to positive power supply, 2: short-circuited to ground, 3: open circuit
0x0142	1	BYTE	Return pipe is blocked	0/1	0/1, 0: normal, 1: blocked
0x0143	1	BYTE	Pump heating failure	0/1	0/1, 0: normal, 1: heating failed
0x0144	1	BYTE	Low Air or Low Flow Fault	0/1	0/1, 0: normal, 1: low air or low flow
0x0145	1	BYTE	SCR motor failure	0/1	0/1, 0: normal, 1: motor drive failure
0x0146	1	BYTE	Metering pump heating status	0~3	0~3, 0: Frozen and unheated, 1: Frozen and heated, 2: Unfrozen and unheated, 3: Unfrozen and heated
0x0147	1	BYTE	Purge complete flag bit	0/1	0/1, 0: Purge done, 1: Purge undone
0x0148	1	BYTE	SCR pump temperature	℃	℃,y=x-40; Accuracy: 1℃; Range: –40~215℃;
0x0149	2	WORD	AD value of pressure switch	-	-, y=x; Accuracy: 1; Range: 0~4080
0x014A	2	WORD	Instant fuel consumption (km/l)	km/l	y=x/100; Accuracy: 0.01 km/l
0x014B	2	WORD	Ambient temperature	℃	℃, y=x-273; Accuracy: 1℃; Range: –273℃ to 1735℃
0x014C	2	WORD	Particulate matter (PM) concentration	mg/m3	y=x/1000; Accuracy: 0.001 mg/m3;
0x014D	2	WORD	Opacity	%	y=x/10; Accuracy: 0.1 %; Range: 0~99.9
0x014E	2	WORD	PM K value		y=x/1000; Accuracy: 0.001℃; Range: 0~9.99
0x014F	4	DWORD	Cumulative urea consumption (total urea consumption)	g	y=x; Accuracy: 1g;
0x0150	2	WORD	DPF exhaust temperature	℃	℃, y=x-273; Accuracy: 1℃;

					Range: –273~1735℃
0x0151	2	WORD	Sensor voltage signal (pan test)	mv	y=x/10; Accuracy: 0.1mv; Range: 0~3000.0mv
0x0152	2	WORD	Sensor temperature signal (pan test)	℃	y=x-99; Accuracy: 1℃; Range: –99~+199
Add one by one...					
0x0700-0x07FF	**The ID segment of the NEV data stream is processed following the algorithm specified in GB/T 32960.3-2016.**				
0x0700	1	BYTE	Vehicle Status		Processed following the algorithm specified in GB/T 32960.3-2016
0x0701	1	BYTE	Charging Status		Processed following the algorithm specified in GB/T 32960.3-2016
0x0702	1	BYTE	Operation Mode		Processed following the algorithm specified in GB/T 32960.3-2016
0x0703	2	WORD	Total Voltage		Processed following the algorithm specified in GB/T 32960.3-2016
0x0704	2	WORD	Total Current		Processed following the algorithm specified in GB/T 32960.3-2016
0x0705	1	BYTE	Remaining Battery (SOC)		Processed following the algorithm specified in GB/T 32960.3-2016
0x0706	1	BYTE	DC-DC Status		Processed following the algorithm specified in GB/T 32960.3-2016
0x0707	2	WORD	Insulation Resistance		Processed following the algorithm specified in GB/T 32960.3-2016
0x0708	1	BYTE	Number of Drive Motors		Processed following the algorithm specified in GB/T 32960.3-2016
0x0709	1	BYTE	Drive Motor Number		Processed following the algorithm specified in GB/T 32960.3-2016
0x070A	1	BYTE	Drive Motor Status		Processed following the algorithm specified in GB/T 32960.3-2016

0x070B	1	BYTE	Temperature of the Drive Motor Controller		Processed following the algorithm specified in GB/T 32960.3-2016
0x070C	2	WORD	Rotating Speed of the Drive Motor		Processed following the algorithm specified in GB/T 32960.3-2016
0x070D	2	WORD	Driver Motor Torque		Processed following the algorithm specified in GB/T 32960.3-2016
0x070E	1	BYTE	Driver Motor Temperature		Processed following the algorithm specified in GB/T 32960.3-2016
0x070F	2	WORD	Input Voltage of the Motor Controller		Processed following the algorithm specified in GB/T 32960.3-2016
0x0710	2	WORD	Current of the Motor Controller Linear Bus		Processed following the algorithm specified in GB/T 32960.3-2016
0x0711	2	WORD	Fuel Cell Voltage		Processed following the algorithm specified in GB/T 32960.3-2016
0x0712	2	WORD	Fuel Cell Current		Processed following the algorithm specified in GB/T 32960.3-2016
0x0713	2	WORD	Fuel Consumption Rate		Processed following the algorithm specified in GB/T 32960.3-2016
0x0714	2	WORD	Total number of fuel cell temperature probes (N)		Processed following the algorithm specified in GB/T 32960.3-2016
0x0715	1*N	BYTE[N]	Probe Temperature Value		Processed following the algorithm specified in GB/T 32960.3-2016
0x0716	2	WORD	The Highest Temperature in Hydrogen System		Processed following the algorithm specified in GB/T 32960.3-2016
0x0717	1	BYTE	Code of the Highest Temperature Probe in Hydrogen System		Processed following the algorithm specified in GB/T 32960.3-2016
0x0718	2	WORD	The Highest Concentration of Hydrogen		Processed following the algorithm specified in GB/T 32960.3-2016
0x0719	1	BYTE	Code of the Sensor with the Highest Hydrogen		Processed following the algorithm specified in GB/T

			Concentration		32960.3-2016
0x071A	2	WORD	The Highest Hydrogen Pressure		Processed following the algorithm specified in GB/T 32960.3-2016
0x071B	1	BYTE	Code of the Sensor with the Highest Hydrogen Pressure		Processed following the algorithm specified in GB/T 32960.3-2016
0x071C	1	BYTE	High Voltage DC/DC Status		Processed following the algorithm specified in GB/T 32960.3-2016
0x071D	1	BYTE	Engine Status		Processed following the algorithm specified in GB/T 32960.3-2016
0x071E	1	BYTE	Number of the Highest-Voltage Battery Subsystem		Processed following the algorithm specified in GB/T 32960.3-2016
0x071F	1	BYTE	Code of the Highest-Voltage Battery Cell		Processed following the algorithm specified in GB/T 32960.3-2016
0x0720	2	WORD	The Highest Value of the Voltage of the Battery Cell		Processed following the algorithm specified in GB/T 32960.3-2016
0x0721	1	BYTE	Number of the Lowest-Voltage Battery Subsystem		Processed following the algorithm specified in GB/T 32960.3-2016
0x0722	1	BYTE	Code of the Lowest-Voltage Battery Cell		Processed following the algorithm specified in GB/T 32960.3-2016
0x0723	2	WORD	The Lowest Value of the Voltage of the Battery Cell		Processed following the algorithm specified in GB/T 32960.3-2016
0x0724	1	BYTE	Number of the Highest-Temperature Subsystem		Processed following the algorithm specified in GB/T 32960.3-2016
0x0725	1	BYTE	Code of the Highest-Temperature Battery Cell		Processed following the algorithm specified in GB/T 32960.3-2016
0x0726	1	BYTE	The Highest Temperature Value		Processed following the algorithm specified in GB/T 32960.3-2016
0x0727	1	BYTE	Number of the Lowest-Temperature Subsystem		Processed following the algorithm specified in GB/T 32960.3-2016
0x0728	1	BYTE	Code of the		Processed following the

			Lowest-Temperature Battery Cell		algorithm specified in GB/T 32960.3-2016
0x0729	1	BYTE	The Lowest Temperature Value		Processed following the algorithm specified in GB/T 32960.3-2016
Add one by one...					
0x0500-0x06FF	**Data Stream ID Segment for Passenger Vehicles**				
0x0500	1	BYTE	Light Status (High Beam)	None	y=x; 0: OFF; 1: ON
0x0501	1	BYTE	Light Status (Low Beam)	None	y=x; 0: OFF; 1: ON
0x0502	1	BYTE	Light Status (Side Marker Light)	None	y=x; 0: OFF; 1: ON
0x0503	1	BYTE	Light Status (Fog Light)	None	y=x; 0: OFF; 1: ON
0x0504	1	BYTE	Light Status (Left Turn Signal)	None	y=x; 0: OFF; 1: ON
0x0505	1	BYTE	Light Status (Right Turn Signal)	None	y=x; 0: OFF; 1: ON
0x0506	1	BYTE	Light Status (Hazard Lights)	None	y=x; 0: OFF; 1: ON
0x0507	1	BYTE	Door Status (Left Front Door)	None	y=x; 0: OFF; 1: ON
0x0508	1	BYTE	Door Status (Right Front Door)	None	y=x; 0: OFF; 1: ON
0x0509	1	BYTE	Door Status (Left Rear Door)	None	y=x; 0: OFF; 1: ON
0x050A	1	BYTE	Door Status (Right Rear Door)	None	y=x; 0: OFF; 1: ON
0x050B	1	BYTE	Door Status (Trunk)	None	y=x; 0: OFF; 1: ON
0x050C	1	BYTE	Door Lock (Full Car Lock)	None	y=x; 0: unlocked; 1: locked
0x050D	1	BYTE	Door Lock (Left Front Door)	None	y=x; 0: unlocked; 1: locked
0x050E	1	BYTE	Door Lock (Right Front Door)	None	y=x; 0: unlocked; 1: locked
0x050F	1	BYTE	Door Lock (Left Rear Door)	None	y=x; 0: unlocked; 1: locked
0x0510	1	BYTE	Door Lock (Right Rear Door)	None	y=x; 0: unlocked; 1: locked
0x0511	1	BYTE	Door Lock (Trunk)	None	y=x; 0: unlocked; 1: locked
0x0512	1	BYTE	Window Status (Left Front Window)	None	y=x; 0: OFF; 1: ON
0x0513	1	BYTE	Window Status (Right Front Window)	None	y=x; 0: OFF; 1: ON

0x0514	1	BYTE	Window Status (Left Rear Window)	None	y=x; 0: OFF; 1: ON
0x0515	1	BYTE	Window Status (Right Rear Window)	None	y=x; 0: OFF; 1: ON
0x0516	1	BYTE	Window Status (Sunroof)	None	y=x; 0: OFF; 1: ON
0x0517	1	BYTE	Fault Signal (ECM)	None	y=x; 0: normal; 1: fault
0x0518	1	BYTE	Fault Signal (ABS)	None	y=x; 0: normal; 1: fault
0x0519	1	BYTE	Fault Signal (SRS)	None	y=x; 0: normal; 1: fault
0x051A	1	BYTE	Alarm Signal (Oil)	None	y=x; 0: normal; 1: fault
0x051B	1	BYTE	Alarm Signal (Tire Pressure)	None	y=x; 0: normal; 1: fault
0x051C	1	BYTE	Alarm Signal (Maintenance)	None	y=x; 0: normal; 1: fault
0x051D	1	BYTE	Airbag Status	None	y=x; 0: normal; 1: deployed
0x051E	1	BYTE	Handbrake Status	None	y=x; 0: down; 1: up
0x051F	1	BYTE	Braking Status (Foot Brake)	None	y=x; 0: released; 1: depressed
0x0520	1	BYTE	Seat Belt (Driver)	None	y=x; 0: unbuckled; 1: buckled
0x0521	1	BYTE	Seat Belt (Front Passenger Seat)	None	y=x; 0: unbuckled; 1: buckled
0x0522	1	BYTE	ACC Signal	None	y=x; 0: OFF; 1: ON
0x0523	1	BYTE	Key Status	None	y=x; 0: not inserted; 1: inserted
0x0524	1	BYTE	Remote Control Signal	None	y=x; 0: Not pressed; 1: Unlocked; 2: Locked; 3: Trunk lock; 4: Long press to unlock; 5: Long press to lock
0x0525	1	BYTE	Wiper Status	None	y=x; 0: OFF; 1: ON
0x0526	1	BYTE	Air Conditioner Switch	None	y=x; 0: OFF; 1: ON
0x0527	1	BYTE	Shift Position		y=x; 1: P; 2: R; 3: N; 4: D; Others: --
0x0528	4	DWORD	Total Mileage	KM	y=x/10; Accuracy: 0.1
0x0529	4	DWORD	Endurance Mileage	KM	y=x/10; Accuracy: 0.1
0x052A	2		Instant Fuel Volume	L	y=x/100; Accuracy: 0.01
0x052B	1		Instant Fuel Volume	%	y=x; Accuracy: 1%; Range: 0%-100%
0x052C	4	DWORD	Fuel Consumption	L	y=x/100; Accuracy: 0.01
0x052D	1	BYTE	Water Temperature	℃	y=x-40; Accuracy: 1; Range: –40~210
0x052E	1	BYTE	Engine Inlet Air Temperature	℃	y=x-40; Accuracy: 1; Range: –40~210
0x052F	1	BYTE	Interior Temperature when Air Conditioner is On	℃	y=x-40; Accuracy: 1; Range: –40~210

0x0530	2	WORD	Current Battery Voltage	mV	y=x; Accuracy: 1
0x0531	2	WORD	Left Front Wheel Speed	KM/H	y=x/10; Accuracy: 0.1
0x0532	2	WORD	Right Front Wheel Speed	KM/H	y=x/10; Accuracy: 0.1
0x0533	2	WORD	Left Rear Wheel Speed	KM/H	y=x/10; Accuracy: 0.1
0x0534	2	WORD	Right Rear Wheel Speed	KM/H	y=x/10; Accuracy: 0.1
0x0535	2	WORD	Speed	KM/H	y=x/10; Accuracy: 0.1
0x0536	2	WORD	Rotating Speed	r/min	y=x; Accuracy: 1
0x0537	2	WORD	Fuel Consumption (avg.)	L/100KM	y=x/100; Accuracy: 0.01
0x0538	2	WORD	Fuel Consumption (instant)	L/100KM	y=x/100; Accuracy: 0.01
0x0539	2	WORD	Fuel Consumption (instant)	L/H	y=x/100; Accuracy: 0.01
0x053A	1	BYTE	Oil Life	%	y=x; Accuracy: 1%; Range: 0%-100%
0x053B	2	WORD	Oil Pressure	kPa	y=x/10; Accuracy: 0.1
0x053C	2	WORD	Air Flow	g/s	y=x/10; Accuracy: 0.1
0x053D	2	WORD	Intake Manifold Absolute Pressure	kPa	y=x/10; Accuracy: 0.1
0x053E	2	WORD	Injection Pulse Width	ms	y=x/10; Accuracy: 0.1
0x053F	1	BYTE	Accelerator Pedal Position	%	y=x; Accuracy: 1%; Range: 0%-100%
0x0540	1	BYTE	Accelerator Pedal	None	y=x; 1: depressed; 0: released
0x0541	2	WORD	Steering Wheel Angle	°	y=x; Accuracy: 1; Range: 0-540
0x0542	1	BYTE	Steering Angle Status of Steering Wheel	None	y=x; 1: left; 2: right; 3: middle; Other: unreasonable
0x0543	2	WORD	Remaining Fuel	L	y=x/100; Accuracy: 0.01
0x0544	1	BYTE	Remaining Fuel	%	y=x; Accuracy: 1%; Range: 0%-100%
0x0545	4	DWORD	Mileage ID	None	
0x0546	4	DWORD	Accumulated Mileage	km	y=x/10; Accuracy: 0.1
0x0547	1	BYTE	Relative Throttle Opening	%	y=x; Accuracy: 1%; Range: 0%-100%
0x0548	1	BYTE	Absolute Throttle Opening	%	y=x; Accuracy: 1%; Range: 0%-100%
Add one by one...					

9.14.1.2 Trouble code reporting 0x02

See Table 26 for the data format of the body of the uplink transparently-transmitted trouble code message, which is consistent with the definition of Trouble Codes specified in the ARM Interface Protocol.

Table 26 Data Format of the Body for the Uplink Transparently-Transmitted Trouble Code Message

Start Byte	Field	Data Type	Description and Requirements

10	Number of Systems	WORD	
	System ID1	DWORD	
	Number of Trouble Code 1	WORD	
	Trouble Code List 1	BYTE*16*N	
	System ID2	DWORD	
	Number of Trouble Code 2	WORD	
	Trouble Code List 2	BYTE*16*N	
…			
	Status	DWORD	See Table 20 for status bit definitions.
	Latitude	DWORD	The latitude value in degrees multiplied by 10 to the 6th power. Accurate to one millionth of a degree.
	Longitude	DWORD	The longitude value in degrees multiplied by 10 to the 6th power. Accurate to one millionth of a degree.

9.14.1.3 Report of alarm and driving behavior data 0x03

For the data format of the body of the uplink transparently-transmitted alarm and driving behavior data message, see Table 27.

Table 27 Data Format of the Body of the Uplink Transparently-Transmitted Alarm and Driving Behavior Data Message

Start Byte	Field	Data Type	Description and Requirements
10	Total Number of Data	BYTE	Total Number of Data (n)
	Alarm and Driving Behavior Data ID_1	BYTE	For the definition and description of alarm and driving behavior data ID, see Table 36**.**
	Detail Description Length_1	BYTE	Byte length=m, 0: no detailed description; other value: valid;
	Detailed Description_1	STRING	Describe the specific information of current alarm or driving behavior by using English strings.
	Alarm and Driving Behavior Data ID_n	BYTE	
	Detail Description Length_n	BYTE	
	Detail Description_n	STRING	
	Status	DWORD	See Table 20 for status bit definitions.
	Latitude	DWORD	The latitude value in degrees multiplied by 10 to the 6th power. Accurate to one millionth of a degree.
	Longitude	DWORD	The longitude value in degrees multiplied by 10 to the 6th power. Accurate to one millionth of a degree.

Table 28 Definition and Description of Alarm and Driving Behavior Data ID (Extensible)

Alarm and Driving	Alarm Mask BYTE[32]	Data Name	Detailed Description (Fill in later based on the actual debugging

Behavior Data ID	(0: On; 1: Masked)		results)
0x00	BYTE[0]_Bit0	Hardware failure alert during device self-check	Parameter ID 0xF011, report when the value of critical hardware fault is not 0
0x01	BYTE[0]_Bit1	Terminal plug-in alarm	
0x02	BYTE[0]_Bit2	Terminal plug-out alarm	
0x03	BYTE[0]_Bit3	High voltage alarm	
0x04	BYTE[0]_Bit4	Low voltage alarm	
0x05	BYTE[0]_Bit5	High water temperature alarm	
0x06	BYTE[0]_Bit6	Low water temperature alarm	
0x07	BYTE[0]_Bit7	High oil temperature alarm	
0x08	BYTE[1]_Bit0	High fuel temperature alarm	
0x09	BYTE[1]_Bit1	High oil pressure alarm	
0x0A	BYTE[1]_Bit2	Abnormal tire pressure alarm	
0x0B	BYTE[1]_Bit3	Low fuel alarm	
0x0C	BYTE[1]_Bit4	Feed reminder	
0x0D	BYTE[1]_Bit5	Excessively long preheating duration alarm	
0x0E	BYTE[1]_Bit6	Overrun idling time alarm	
0x0F	BYTE[1]_Bit7	Driving on low fuel	
0x10	BYTE[2]_Bit0	Cold-started car driving at high speed	
0x11	BYTE[2]_Bit1	Driving at night without lights	
0x12	BYTE[2]_Bit2	Driving when the handbrake is not released	
0x13	BYTE[2]_Bit3	Driving with doors open	
0x14	BYTE[2]_Bit4	Driving with doors unlocked	
0x15	BYTE[2]_Bit5	Driving with trunk open	
0x16	BYTE[2]_Bit6	Coasting in neutral alarm	
0x17	BYTE[2]_Bit7	Driver not buckled up	
0x18	BYTE[3]_Bit0	Passenger not buckled up	
0x19	BYTE[3]_Bit1	Quick fuel up alarm	
0x1A	BYTE[3]_Bit2	Sudden acceleration	

		alarm	
0x1B	BYTE[3]_Bit3	Hard braking alarm	
0x1C	BYTE[3]_Bit4	Sharp turn alarm	
0x1D	BYTE[3]_Bit5	Rapid lane change alarm	
0x1E	BYTE[3]_Bit6	Crossing multiple lanes at once alarm	
0x1F	BYTE[3]_Bit7	Continuous lane change alarm	
0x20	BYTE[4]_Bit0	Emergency alarm	
0x21	BYTE[4]_Bit1	Left geofence alarm	
0x22	BYTE[4]_Bit2	Entered geofence alarm	
0x23	BYTE[4]_Bit3	Fatigue driving	
0x24	BYTE[4]_Bit4	Cumulative driving duration over threshold	
0x25	BYTE[4]_Bit5	Speed driving	
0x26	BYTE[4]_Bit6	Ordinary vehicle collision	
0x27	BYTE[4]_Bit7	Severe vehicle collision	
0x28	BYTE[5]_Bit0	Vehicle rollover	
0x29	BYTE[5]_Bit1	Brake down for a long time	
0x2A	BYTE[5]_Bit2	Clutch down for a long time	
0x2B	BYTE[5]_Bit3	Riding the clutch	
0x2C	BYTE[5]_Bit4	Gear alert	
0x2D	BYTE[5]_Bit5	Parking without engaging the P/N gear	
0x2E	BYTE[5]_Bit6	Collision alert when parking	
0x2F	BYTE[5]_Bit7	Fuel theft reminder	
0x30	BYTE[6]_Bit0	Tow Reminder	
0x31	BYTE[6]_Bit1	Doors open alert	
0x32	BYTE[6]_Bit2	Doors unlock alert	
0x33	BYTE[6]_Bit3	Windows open alert	
0x34	BYTE[6]_Bit4	Trunk open alert	
0x35	BYTE[6]_Bit5	Sunroof open alert	
0x36	BYTE[6]_Bit6	Fuel cap open alert	
0x37	BYTE[6]_Bit7	Lights left on	
0x38	BYTE[7]_Bit0	Ignition on reminder	
0x39	BYTE[7]_Bit1	Ignition off reminder	
0x3A	BYTE[7]_Bit2	Wake-up alert	
0x3B	BYTE[7]_Bit3	Abnormal alarm when	

		the urea level remain unchanged	
0x3C	BYTE[7]_Bit4	Alarm for increased urea level	
0x3D	BYTE[7]_Bit5	Alarm for driving with vehicle malfunction	Eco-friendly project
0x3E	BYTE[7]_Bit6	Abnormal fuel level alarm	Fuel level sensor
Add one by one...			

9.14.1.4 Travel data reporting 0x04

The uplink transparent transmission of travel data divides into two parts, that is, report when the travel starts and when the travel ends. Please refer to Table 29 and Table 30 for the data format of the specific message body.

Table 29 Data Format of the Body of the Specific Message Reported When the Travel Starts

Start Byte	Field	Data Type	Description and Requirements
10	Travel Property	BYTE	0x01: travel starts; Other: unreasonable
	Travel Number	DWORD	Accumulated after each travel ends
	Start Time	BCD[6]	YY-MM-DD-HH-MM-SS

Table 30 Data Format of the Body of the Specific Message Reported When the Travel Ends

Start Byte	Field	Data Type	Description and Requirements
10	Travel Property	BYTE	0x02: travel ends; Other: unreasonable
	Travel Number	DWORD	Accumulated after each travel ends
	Start Time	BCD[6]	YY-MM-DD-HH-MM-SS
	End Time	BCD[6]	YY-MM-DD-HH-MM-SS
	Travel start GNSS latitude	DWORD	The latitude value in degrees multiplied by 10 to the 6th power. Accurate to one millionth of a degree.
	Travel start GNSS longitude	DWORD	The longitude value in degrees multiplied by 10 to the 6th power. Accurate to one millionth of a degree.
	Travel end GNSS latitude	DWORD	The latitude value in degrees multiplied by 10 to the 6th power. Accurate to one millionth of a degree.
	Travel end GNSS longitude	DWORD	The longitude value in degrees multiplied by 10 to the 6th power. Accurate to one millionth of a degree.
	Type of Latitude and Longitude	BYTE	Bit0: Travel start GNSS latitude, 0: North latitude; 1: South latitude; Bit1: Travel start GNSS longitude, 0: East longitude; 1: West longitude; Bit2: Travel end GNSS latitude, 0: North latitude; 1: South latitude;

			Bit3: Travel end GNSS longitude, 0: East longitude; 1: West longitude; Bit4 ~ Bit7: 0000
	Idling count	WORD	
	Accumulated overrun idling time	WORD	Unit: second (s)
	Mileage for this travel	WORD	Unit: KM; Algorithm: y=x/10; Accuracy: 0.1
	Fuel consumption for this travel	WORD	Unit: L; Algorithm: y=x/100; Accuracy: 0.01

9.14.1.5 OBD MCU log data reporting 0x05

For the data format of the body of the uplink transparently-transmitted terminal log data message, see Table 31.

Table 31 Data Format of the Body of the Uplink Transparently-Transmitted Terminal Log Data Message

Start Byte	Field	Data Type	Description and Requirements
10	Total number of log packets	WORD	Total number of log packets (n)
	Current log packet number	WORD	From 1 to n
	Current log packet content	STRING	Current Log Content

9.14.1.6 Report data obtained by CAN learning 0x06

For the data format of the message body of the data obtained by CAN learning, see Table 40.

Table 40 Data Format of the Message Body of the Data Obtained by CAN Learning

Start Byte	Field	Data Type	Description and Requirements
10	Total number of data packets	BYTE	
	Current packet number	BYTE	Start from 1
	Data length	WORD	Each data packet is up to 512 bytes long. For data packets less than 512 bytes, sent at actual length; For data packets more than 512 bytes, segment the packets and send by segments.
	Data content	BYTE[n]	

9.14.1.7 Support reporting of data stream ID list 0x07

For the data format of the body of the data stream ID list reporting message, see Table 41.

Table 41 Data Format of the Body of the Data Stream ID List Reporting Message

Start Byte	Field	Data Type	Description and Requirements
10	Total Number of	WORD	Total number of data stream IDs supported by the device

	IDs		
	ID_1	WORD	First ID
	ID_2	WORD	Second ID
	ID_n	WORD	Nth ID

9.14.1.8 Support reporting of alarm and driving behavior data ID list 0x09

For the data format of the body of the alarm and driving behavior data ID list reporting message, see Table 43.

Table 43 Data Format of the Body of the Alarm and Driving Behavior Data ID List Reporting Message

Start Byte	Field	Data Type	Description and Requirements
10	Total Number of IDs	BYTE	Total number of alarm and driving behavior data IDs supported by the device
	ID_1	BYTE	First ID
	ID_2	BYTE	Second ID
	ID_n	BYTE	Nth ID

9.14.1.9 Vehicle VIN Upload 0x0B

For the data format of the body of the vehicle VIN upload message, see Table 32 Data Format of the Body of the Vehicle VIN Upload Message .

Table 32 Data Format of the Body of the Vehicle VIN Upload Message

Start Byte	Field	Data Type	Description and Requirements
10	Support or not	BYTE	0x00: Not support; 0x01: Support
11	VIN code	STRING	ASCII string

9.14.1.10 Upload Vehicle Check Data 0x0C

For the data format of the body of the whole vehicle check data upload message, see Table 33 Data Format of the Body of the Whole Vehicle Check Data Upload Message.

Table 33 Data Format of the Body of the Whole Vehicle Check Data Upload Message

Start Byte	Field	Data Type	Description and Requirements
10	Type of vehicle check	BYTE	0x01: Diagnosis check; 0x02: OBD check; 0x03: Erase DTC; 0x04: OBD clearing; (currently supports only OBD check and OBD clearing)
11	Diagnosis number	DWORD	Diagnostic data timestamp
15	Total number of data packets	BYTE	
16	Current data packet number	BYTE	Start from 1
17	Data length	WORD	Each data packet is up to 512 bytes long. For data packets less than 512 bytes, sent at actual length; For data packets more than 512 bytes, segment the packets and send by segments.

19	Vehicle Check Content	BYTE[n]	Format of OBD Vehicle Check Data: The full format of the OBD vehicle check data after combination is: GPS information + DTC (trouble code) + Data stream, wherein GPS information: Status (DWORD, see Table 20 for status bit definitions) + Longitude (DWORD. The latitude value in degrees multiplied by 10 to the 6th power. Accurate to one millionth of a degree.) +Longitude (DWORD. The longitude value in degrees multiplied by 10 to the 6th power. Accurate to one millionth of a degree.) DTC: data length (WORD) + number of trouble codes (BYTE) + trouble code ID (DWORD) + status ID (DWORD) ... Data stream: data length (WORD) + number of data streams (BYTE) + PID 1 (BYTE) + value 1 (DWORD) ... Format of OBD clearing data: The full format of the OBD clearing data after combination: GPS information + DTC (trouble code before clearing) + DTC (trouble code after clearing), wherein GPS information: status (DWORD, see Table 20 for status bit definitions) + Longitude (DWORD. The latitude value in degrees multiplied by 10 to the 6th power. Accurate to one millionth of a degree.) +Longitude (DWORD. The longitude value in degrees multiplied by 10 to the 6th power. Accurate to one millionth of a degree.) DTC: number of systems (WORD) + system ID1 (DWORD) + number of trouble codes 1 (WORD) + trouble codes list 1...

9.14.1.11 Upload device self-check data 0x0D

For the data format of the body of the device self-check data message, see Table 47.

Table 47 Data Format of the Body of the Device Self-Check Data Message

Start Byte	Field	Data Type	Description and Requirements
10	Number of self-check data	WORD	
12	Self-check ID 1	BYTE	
13	Data 1	BYTE	
14	Self-check ID 2	BYTE	
15	Data 2	BYTE	
…	…	…	
N	Self-check IDn	BYTE	
N+1	Data n	BYTE	

9.14.1.12 Upload device function list 0x0F

For the data format of the body of the device function list upload message, see Table 49.

Table 49 Data Format of the Body of the Device Function List Upload Message

Start Byte	Field	Data Type	Description and Requirements
0	Total Number of Functions	BYTE	The total number of functions is n.
1	Function ID List	BYTE[n]	The functions are arranged in order, such as "Function ID1 Function ID2... Function IDn". Function list: 0x01: Change 3G to WiFi 0x02: One-click clearing function 0x03: Set WiFi name and password with new logic 0x04: Support tire pressure alarm 0x05: Support low battery alert and geofence alert 0x06: Support the alarm when doors are left open after parking 0x07: Windows 0x08: Lights

9.14.1.13 Data packet for emergency scenarios 0x15

Report the current point of the emergency event, latitude and longitude in the first eight seconds and the last five seconds of the emergency event, and the vehicle acceleration and pitch angle. Since the entire data packet is very large, the packet will be segmented. Each data packet segment includes a packet header and can be carried in multiple 0x0900 messages as an extension field. Each emergency event shall use a unique identifier (event ID) for the specific scenario.

Header of Data Packet Segment

Byte Position	Content	Number of Bytes	Data Type	Description
0	Pkg Len	2	U16	Length from event ID to end of Pkg Data content
2	Event ID	4	u32	Event identifier. The terminal generate a unique identifier for this event, which can be a sequence number.
6	Pkg total number	1	u8	Total number of message packets, that is, total number of message packets after segmentation.
7	Pkg current No.	1	u8	It refers to the number of the current packet segment after the message is segmented. It starts from 1.
8	Pkg data	n	u8	Data packet content

Data Packet Content

The complete data packet for emergency scenarios (5256 bytes + extension field)

Byte Position	Content	Number of Bytes	Data Type	Description

0	Event type	4	u32	Type of emergency events 51 Sudden acceleration 52 Hard braking 53 Sharp turn 54 Rapid lane change 56 Horizontal collision 57 Vehicle rollover 58 Vehicle stability alert
4	System time	8	u64	Terminal system time. It refers to the terminal system timestamps when an emergency event occurs. Unix timestamps for the terminal system. Unit: millisecond
12	Peak value of linear acceleration modulus	4	u32	Peak value of acceleration modulus The maximum value obtained after the modulo operation of the acceleration in the three axes of the vehicle in emergency events. Accurate to 0.001, the value displayed is the value reported/1000
16				Acceleration raw value Add the first eight seconds, the current time point, and the last five seconds of the event to a total of 14 seconds, and then collect 280 sets of vehicle three-axis acceleration and attitude angle data in chronological order with a sampling frequency of 20Hz per second.
16	X Data	4	u32	Longitudinal Direction of Vehicle Coordinate System: Group 1 X-axis acceleration (accuracy: 0.001, unit: m/s^2) Indicates the sign of the most significant bit. 1 for negative numbers and 0 for positive numbers.
20	Y Data	4	u32	Lateral Direction of Vehicle Coordinate System: Group 1 Y-axis acceleration (accuracy: 0.001, unit: m/s^2) Indicates the sign of the most significant bit. 1 for negative numbers and 0 for positive numbers.
24	Z Data	4	u32	Vertical Direction of Vehicle Coordinate System: Group 1 Z-axis acceleration (accuracy: 0.001, unit: m/) Indicates the sign of the most significant bit. 1 for negative numbers and 0 for positive numbers.
28	Bank angle	2	u16	Vehicle roll angle: Group 1 Unit: degree. The value displayed is the value uploaded/10 minus 180
30	Pitch angle	2	u16	Vehicle pitch angle: Group 1 Unit: degree. The value displayed is the value uploaded/10 minus 180

32	Yaw angle	2	u16	Vehicle yaw angle: Group 1 Unit: degree. The value displayed is the value uploaded/10
34		18		Group 2: Acceleration attitude angle data
52		18		Group 3: Acceleration attitude angle data
				. . . .
5038		18		Group 280: Acceleration attitude angle data
5056	File name	32	String	Emergency-related data file name Data files include but are not limited to the following types: Pictures, video, audio, radar sensor data, etc. Format: string.
5088				Location, vehicle speed and rotational speed information Add the first eight seconds, the current time point, and the last five seconds of the event to a total of 14 seconds, and then collect 4 sets of positioning data in chronological order with a sampling frequency of 1Hz per second.
5088	Latitude	4	u32	Group 1: Latitude 0.000001 degree unit Bit31=0/1 North latitude/South latitude
5092	Longitude	4	u32	Group 1: Longitude 0.000001 degree unit Bit31=0/1 East longitude/West longitude
5096	Speed	2	u16	Group 1: CAN speed Unit: 0.1 km/h. Use GPS speed if OBD does not fit.
5098	RPM	2	u16	Group 1: Engine speed Unit: rev/min
5100		12		Positioning data group 2
5112		12		Positioning data group 3
				. . . . .
5244		12		Positioning data group 14
5256				Optional extended parameter field. KLV format K: 2-byte key ID, extended parameter type ID L: 2-byte Length, extended parameter length V: n-byte Value, the content of the extended parameter. The length is specified by Length. The extended parameter field may or may not be appended according to specific scenarios.
5256	Key ID 1	2	u16	Key ID of the first extended parameter
5258	Length 1	2	u16	Length of the first extended parameter
5260	Value 1	n		Value of the first extended parameter
	……			

Extended parameter field

Key ID	Length	Field Type	Description
0x0001	2	u16	Collision angle. This field is only available when the event type is 56 (horizontal collision accident); Unit: degree. The value displayed is the value uploaded/10 minus 180
0x0002	1	u8	Collision Type 1: Active collision 2: Passive collision
0x0003	2	u16	Collision factor Value Range: –800~800 The actual value is obtained by subtracting 800 from the uploaded value.

9.15 Set circular geofence--0x8600

Message ID: 0x8600.

For the data format of the body of the circular geofence set message, see Table 55.

Note: This message protocol supports periodic time ranges.

If restrictions are placed between 8:30-18:00 every day, set the start/end time

as: 00-00-00-08-30-00/00-00-00-18-00-00, and so on.

Table 55 Data Format of the Body of the the Circular Geofence Set Message

Start Byte	Field	Data Type	Description and Requirements
0	Set properties	BYTE	0: Update geofence; 1: Add geofence; 2: Modify geofence.
1	Number of geofences	BYTE	
2	Area item		The data format of the area item content of the circular geofence is shown in Table 56.

Table 56 Data Format of the Area Item Content of the Circular Geofence

Start Byte	Field	Data Type	Description and Requirements
0	Geofence ID	DWORD	
4	Geofence properties	WORD	The definition of geofence properties is shown in Table 57.
6	Center point latitude	DWORD	The latitude value in degrees multiplied by 10 to the 6th power. Accurate to one millionth of a degree.
10	Center point longitude	DWORD	The longitude value in degrees multiplied by 10 to the 6th power. Accurate to one millionth of a degree.
14	Radius	DWORD	The unit is meter (m), and the road segment is from the turning point to the next turning point.

18	Start time	BCD[6]	YY-MM-DD-hh-mm-ss. This field is unavailable if the bit 0 of the geofence properties field is 0.
24	End time	BCD[6]	YY-MM-DD-hh-mm-ss. This field is unavailable if the bit 0 of the geofence properties field is 0.
30	Max. Speed	WORD	Km/h. This field is unavailable if the bit 1 of the geofence properties field is 0.
32	Overspeed duration	BYTE	The unit is second (s) (similar expression, same as before). This field is unavailable if the bit 1 of the geofence properties field is 0.

Table 57 Definition of Geofence Properties

Bit	Flag
0	1: Based on time
1	1: Speed limit
2	1: Alert the driver when entering the geofence
3	1: Send alarm to the platform when entering the geofence
4	1: Alert the driver when leaving the geofence
5	1: Send alarm to the platform when leaving the geofence
6	0: North latitude; 1: South latitude
7	0: East longitude; 1: West longitude
8	0: Allow to open the door; 1: Forbid to open the door
9	0: North latitude; 1: South latitude (rectangle: latitude of lower right point)
10	0: East longitude; 1: West longitude (rectangle: longitude of the lower right point)
11-13	Reserved
14	0: Enable the communication module when entering the geofence; 1: Disable the communication module when entering the geofence
15	0: Do not collect detailed GNSS positioning data when entering the geofence; 1: Collect detailed GNSS positioning data when entering the geofence

9.16 Delete circular geofence--0x8601

Message ID: 0x8601.

The data format of the body of the circular geofence deleting message is shown in Table 58.

Table 58 Data Format of the Body of the Deleting the Circular Geofence Deleting Message

Start Byte	Field	Data Type	Description and Requirements
0	Number of geofences	BYTE	The number of geofences in this message shall not exceed 125; if it's more than 125, it is recommended to use multiple messages, and 0 means to delete all circular geofences.
1	Geofences ID 1	DWORD	

	……	DWORD	
	Geofence IDn	DWORD	

9.17 Set rectangular geofence--0x8602

Message ID: 0x8602.

The data format of the body of the rectangular geofence set message is shown in Table 59.

Table 59 Data Format of the Body of the Rectangular Geofence Set Message

Start Byte	Field	Data Type	Description and Requirements
0	Set properties	BYTE	0: Update geofence; 1: Add geofence; 2: Modify geofence.
1	Number of geofences	BYTE	
2	Area item		The data format of the area item content of the rectangular geofence is shown in Table 60.

Table 60 Data Format of the Area Item Content of the Rectangular Geofence

Start Byte	Field	Data Type	Description and Requirements
0	Area ID	DWORD	
4	Geofence properties	WORD	The definition of geofence properties is shown in Table 57.
6	Latitude of upper left point	DWORD	The latitude value in degrees multiplied by 10 to the 6th power. Accurate to one millionth of a degree
10	Longitude of upper left point	DWORD	The longitude value in degrees multiplied by 10 to the 6th power. Accurate to one millionth of a degree
14	Latitude of lower right point	DWORD	The latitude value in degrees multiplied by 10 to the 6th power. Accurate to one millionth of a degree
18	Longitude of lower right point	DWORD	The longitude value in degrees multiplied by 10 to the 6th power. Accurate to one millionth of a degree
22	Start time	BCD[6]	Same as the time range set in the circular geofence
28	End time	BCD[6]	Same as the time range set in the circular geofence
34	Max. speed	WORD	The unit is km/h. This field is unavailable if bit 1 of the geofence properties field is 0.
36	Overspeed Duration	BYTE	The unit is second (s). This field is unavailable if bit 1 of the geofence properties field is 0.

9.18 Delete rectangular geofence--0x8603

Message ID: 0x8603.

The data format of the body of the rectangular geofence deleting message is shown in Table 61.

Table 61 Data Format of the Body of the Rectangular Geofence Deleting Message

Start Byte	Field	Data Type	Description and Requirements
0	Number of geofences	BYTE	The number of geofences in this message shall not exceed 125; if it's more than 125, it is recommended to use multiple messages, and 0 means to delete all rectangular geofences.
1	Area ID 1	DWORD	
	……	DWORD	
	Area IDn	DWORD	

9.19 CAN Bus Data Upload--0x0705

Message ID: 0x0705

The data format of the CAN bus data upload message is shown in Table 62.

Table 62 Data Format of the CAN Bus Data Upload Message

Start Byte	Field	Data Type	Description and Requirements
0	Number of data items	WORD	Include the number of CAN bus data items, > 0
2	CAN bus data reception time	BCD[5]	Receive time of the first piece of CAN bus data, hh-mm-ss-msms
8	CAN bus data item		See definitions in Table 63.

Table 63 Data Format of CAN Bus Data Item

Start Byte	Field	Data Type	Description and Requirements
0	CAN ID	BYTE[4]	Bit31 indicates the CAN channel number. 0: CAN1, 1: CAN2; Bit30 indicates the frame type. 0: Standard frame, 1: Extended frame; Bit29 indicates the data collection method. 0: Raw data, 1: Average inter-collection-area value; Bit28-bit0 indicate the CAN bus ID
4	CAN DATA	BYTE[8]	CAN data

9.20 Sending Text Message

Message ID: 0x8300.

Use 0x0300 response.

The data format of the body of the text message sending message is as follow:

Data Format of the Body of the Text Message Sending Message

Start Byte	Field	Data Type	Description and Requirements
0	Flag	BYTE	The definition of the text message flag bit is shown in the table below.
1	Text message	STRING	Up to 1024 bytes, GBK encoded

Definition of Text Message Flag Bit

Bit	Flag
0	1: Urgent
1	Reserved
2	1: Terminal display
3	1: Terminal TTS read
4	1: Advertising screen display
5	0: Center navigation information; 1: CAN trouble code
6-7	Reserved

9.21 Response to Text Message Sending Message

Message ID: 0x0300

Used to reply to the 0x8300 message.

The data format is shown below:

Start Byte	Field	Data Type	Description and Requirements
0	Response sequence number	WORD	Sequence number of the 0x8300 message
2	Text message encoding	BYTE	0x00: GB2312 0x01: UNICODE
3	Text message	STRING	Message content

10 Appendix

10.1 Diagram

10.2 Tables

10.3 Trouble Code Description

Protocol	Trouble Code Data Format				Remark
	Byte 1	Byte 2	Byte 3	Byte 4	
SEA J1939	SPN lower 8 significant bits (the 8th bit is the most significant bit)	SPN byte 2 (the 8th bit is the most significant bit)	SPN upper 3 significant bits and FMI significant bits (the 8th bit is the most significant bit of SPN and the 5th bit is the most significant bit of FMI)	Occurrence times and fault occurrence period (the 8th bit represents the fault occurrence period. 0: current fault, 1: historical fault; bit1~bit7 are the current fault occurrence times)	
OBDII	Trouble code low byte	Trouble code high byte	Reserved	Fault occurrence period (the 8th bit represents the fault occurrence period. 0: current fault, 1: historical fault)	
SEA J1708					

10.4 Privileged SMS Format

The terminal should have the SMS service activated to ensure effective control over the terminal in case of network failure. **(The terminal can decide whether to require SMS number authentication according to product requirements, that is, to determine whether the sender's SMS number is consistent with the privileged SMS number of the monitoring platform).** The functions are as follows:

Item	Function Name	Message to Send (English, half-width format)	Reply Message from Terminal (English, half-width format)
1	Restart the terminal	Reboot!	If the terminal is restarted successfully, it will reply: Reboot OK!
2	Reset the terminal to factory settings (server address and port remain unchanged);	Restore!	If the terminal is reset to factory settings and restarted successfully, it will reply: Restore OK!
3	Query terminal server address and	Query Port?	Support replying with IP address or domain name:

	port		query Port:123.123.12.232:12345; Or: query Port:dc0.long.launchdbs.com:12345;
4	Set terminal server address and port	Support setting with IP address or domain name: *SETSERVER:IP,PORT#	Terminal response: set server success ip=218.17.167.84 port=20102 Or: set server success ip= dc0.long.launchdbs.com port=20102
5	Query terminal registration status	Register State?	If the terminal is already registered, then it will reply: Registered! If the terminal is not registered, then it will reply: Unregister!
6	Terminal deregistration status	Deregister!	After clearing the registration ID and deleting the secret key, the terminal replies: Deregister OK!
7	Linux upgrade	*MATUPDJLXTSP	After the upgrade is complete, the terminal replies: ec20 update success
8	MCU Upgrade	*OBDUPDJLXTSP	After the upgrade is complete, the terminal replies: mcu update success
9	Issue configuration	*SETVEHICLE:ID#	After the configuration for the terminal-bound vehicle is issued successfully, the terminal replies: set Vehicle success
10	Upload critical error log	*KEYLOG#	After the critical error log is uploaded, the terminal replies: Key log:+log
11	APN Settings	*SETAPN:APN#	After the terminal APN settings is uploaded, the terminal replies: Set Apn success
12	Set the OBD switch	*SETOBD:ON# *SETOBD:OFF#	After setting the OBD switch, the terminal replies: Set OBD on success Set OBD on failed Set OBD off success Set OBD off failed

……

10.5 Device Self-check

Please refer the appendix for self-check IDs

Name	ID	Remarks
GPS Module	0x01	0x00: Succeeded; 0x01: Antenna disconnected; 0x02: Antenna short-circuited;
Bluetooth module	0x02	0x00: Succeeded; 0x01: Failed;
Battery Module	0x03	0x00: Succeeded; 0x01: Low battery; 0x02: Abnormal battery;
CAN Module	0x04	0x00: Succeeded; 0x01: Failed to connect CAN module
G-Sensor/Gyro	0x05	0x00: Succeeded; 0x01: Failed;
K line	0x06	0x00: Succeeded; 0x01: Failed;
Flash chip	0x07	0x00: Succeeded; 0x01: Failed;
Vin ADC sampling	0x08	0x00: Succeeded; 0x01: Failed;
……	……	……