Technical Specifications of Vehicle Terminal Communication Protocol

Contents

Vehicle Satellite Positioning System Terminal Communication Protocol and Data Format

1 Scope

This specification specifies the communication protocol and data format between the vehicle satellite positioning vehicle terminal (hereinafter referred to as terminal) monitoring platform (hereinafter referred to as platform), including protocol basis, communication connection, message processing, protocol classification and description and data format.

2 Normative references

The following documents are indispensable for the application of this document.

- ✓ GB/T 2260 Administrative division codes of the People's Republic of China

- ✓ GB/T 19056 Vehicle Travel Recorder

- ✓ JT/T 415-2006 Road transport e-government platform cataloging and coding rules

- ✓ JT/T 794 Satellite positioning system for road transport vehicles Technical requirements for on-board terminals

3 Terms and definitions, abbreviations

3.1 Terms and definitions

The following terms and definitions apply to this document.

3.1.1 Abnormal data communication link

The wireless communication link is disconnected, or temporarily suspended (for example on the call).

3.1.2 register

Send a message to the platform to inform to be installed on a vehicle.

3.1.3 log out

The terminal sends a message to the platform to inform the device uninstall from the vehicle.

3.1.4 authentication

When the terminal is connected to the platform, the message is sent to the platform to verify the platform identity.

3.1.5 location reporting strategy

Timed, fixed-time reporting, or a combination of both.

3.1.6 location reporting program

Determine the rules for the interval of periodic reporting based on the relevant conditions.

3.1.7 additional points report while turning

The terminal sends a location information report message when it is determined that the vehicle is turning. Sampling frequency of not less than 1Hz, car azimuth

The rate of change is not less than 15 ° / s, and at least 3s or more.

3.1.8 answering strategy

The terminal automatically or manually calls the rules of the call.

3.1.9 SMS text alarm

The terminal sends an SMS message in SMS mode.

3.1.10 event item

The event item is set by the platform to the terminal, consisting of the event code and the event name, and the driver operates when the corresponding event is encountered Terminal, triggering event report sent to the platform.

3.2 Abbreviations

The following abbreviations apply to this document.

APN——Access Point Name

GZIP——GNUzip

LCD——Liquid Crystal Display

RSA——An Asymmetric Cryptography Algorithm

SMS——Short Message Service

TCP——Transmission Control Protocol

TTS——Text to Speech

UDP——User Datagram Protocol

VSS——Vehicle Speed Sensor)

4 Protocol basis

4.1 Way of communication

Communication protocol using TCP, the platform as a server, the terminal as a client. When the data communication link is abnormal, the terminal can use SMS message to communicate.

4.2 Type of data

The data types used in the protocol messages are shown in Table 1:

Table 1 data type

Type of data	Description and requirements
BYTE	Unsigned single byte integer (byte, 8 bits)
WORD	Unsigned double-byte integer (word, 16-bit)
DWORD	Unsigned four byte integer (double word, 32 bits)
BYTE[n]	N bytes
BCD[n]	8421 code, n bytes
STRING	GBK code, if no data, empty

4.3 Transmission rules

The protocol uses the (big-endian) network byte order to pass words and double words.

Agreed as follows:

- Byte (BYTE) transmission agreement: according to the byte stream transmission;

- word (WORD) transmission agreement: first pass the high eight, and then the low eight;

- double word (DWORD) transmission agreement: the high 24 bits first, then the high 16 bits, then the high eight bits, and finally the low eight bits

4.4 The composition of the message

4.4.1 Message structure

Each message consists of identification bits, message headers, message bodies and check codes. The message structure is shown in Figure 1:

Identification bit	Message header	Message body	Check code	Identification bit

Figure 1 message structure diagram

4.4.2 Identification bit

Represented by 0x7e. If 0x7e appears in the verification code, message header, and message body, it must be escaped.

The rules are defined as follows

0x7e <----> 0x7d followed by a0x02

0x7d <----> 0x7d followed by a0x01

The escape process is as follows:

- Sending a message: Message encapsulation -> Calculate and populate checksum -> Escape;

- Receiving a message: Escape Restore -> Verify Checksum -> Resolve the message.

Example:

Send a packet containing the contents of 0x30 0x7e 0x08 0x7d 0x55 packets, then the package is transferred as follows: 0x7e 0x30 7d 0x02 0x08 0x7d 0x01 0x55 0x7e.

4.4.3 Message header

The contents of the message header are shown in Table 2:

Table 2 message header content

Start byte	Field	Type of data	Description and requirements
0	Message ID	WORD	
2	Message body properties	WORD	Message body attribute format structure shown in Figure 2
4	Terminal phone number	BCD[6]	Number 0 add the last 11 number of the IMEI
10	Message serial number	WORD	Cycles accumulate from 0 in the order in which they are sent
12	Message package		If the message in the message body attribute determines the message packet processing, then the item has content, otherwise no item

Message body attribute format as shown in Figure 2:

15	14	13	12	11	10	9	7	6	5	4	3	2	1	0
Reserved		Subcont racting	Data encryption			Message body length								

Figure 2 message body attribute format structure

Data encryption:

-- bit10 ~ bit12 is the data encryption flag;

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

-- When the 10th bit is 1, it means that the message body is encrypted by RSA algorithm;

-- others, reserved;

Subcontracting:

When the 13th bit of the message body attribute is 1, it indicates that the message body is a long message and the packet is sent. The packet information is determined by the packet encapsulation item. If the 13th bit is 0, there is no packet encapsulation in the message header Item field.

Message package package items in Table 3:

Table 3 Package Package Contents

Start byte	Field	Type of data	Description and requirements
0	Total number of messages	WORD	The total number of packets after the message is subpackaged
2	Package number	WORD	Starting from 1

4.4.4 Checksum

The checksum refers to starting from the message header, XORing with the next byte, until the previous byte of the checksum, occupying one byte.

5 Communication connection

5.1 The establishment of the connection

The daily connection between the terminal and the platform can be done using TCP or UDP. After the terminal is reset, the connection should be established with the platform as soon as possible. After the connection is established, the terminal will send the terminal authentication message to the platform for authentication.

5.2 The maintenance of the connection

After the connection establishment and the terminal authentication succeed, the terminal shall send the terminal heartbeat message to the platform periodically without the normal packet transmission. The platform shall send the platform general response message to the terminal, and the sending period shall be specified by the terminal parameter.

5.3 The connection is disconnected

Both the platform and the terminal can actively disconnect according to the TCP protocol, and both parties should actively judge whether the TCP connection is disconnected.

The method for the platform to judge the disconnection of the TCP connection:

- According to the TCP protocol to determine the terminal active disconnect;

- The same identity of the terminal to establish a new connection, that the original connection has been disconnected;

- In a certain period of time did not receive the message sent by the terminal, such as terminal heartbeat.

The method for the terminal to judge the disconnection of the TCP connection:

- According to the TCP protocol to determine the platform active disconnect;

- Data communication link disconnected;

- The data communication link is normal and no response has been received after the number of re-transmissions has been reached.

6 Message processing

6.1 TCP message processing

6.1.1 Messges from platform

All the messages from the platform require the terminal to answer, the response is divided into general response and special response, determined by the specific function of the agreement. When the sender waits for a response timeout, the message is re-transmitted. The response timeout time and the number of re-transmissions are specified by the platform parameters. The calculation of the response timeout time after each re-transmission is shown in Equation (1):

$$T_{N+1}=T_N \times （N+1）$$

Where:　T_{N+1} - response timeout after each re-transmission;

　　　　T_N - the previous response timeout;

　　　　N - the number of re-transmissions.

6.1.2 Messages from terminal

6.1.2.1 The data communication link is normal

When the data communication link is normal, all the messages sent by the terminal request the platform to response, the response is divided into general response and special response, determined by the specific function of the agreement. After the terminal waits for the response to be timed out, the message should be re-transmitted. The response timeout time and the number of re-transmissions are specified by the terminal parameters. The response timeout time after each re-transmission is calculated according to equation (1). For a critical alarm message sent by the terminal, if no acknowledgment is received after the number of re-transmissions has been received, it should be saved. And then send the saved key alarm message before sending other messages.

6.1.2.2 Data communication link exception

When the data communication link is abnormal, the terminal shall save the location information report message. After the data communication link returns to normal, the saved message will be sent immediately.

6.2 SMS message processing

When the terminal communication mode is switched to the SMS message mode of the GSM network, the PDU 8-bit encoding mode is used. For messages with a length exceeding 140 bytes, the packet processing should be performed according to the GSM 3G SMS service standard GSM 03.40.

The response, re-transmission and saving mechanism of the SMS message is the same as 6.1, but the response timeout and the number of re-transmissions shall be processed according to the relevant settings of the parameters ID0x0006 and 0x0007 in Table 10.

7 Protocol classification

7.1 Overview

The following describes the protocol by function classification. No special instructions, the default use of TCP communication. See Appendix A for a message comparison of message names and message IDs in the protocol.

7.2 Terminal Management Protocol

7.2.1 Terminal registration / deregistration

The terminal shall be registered first, after the registration, the authentication code will be saved and requested when login. Before the vehicles uninstall or change the terminal, it shall be log out, cancel the link between the terminal and the vehicle.

If the terminal chooses to send the terminal registration and terminal log out message through SMS, the platform shall send the terminal registration reply through SMS to reply to the terminal registration and reply to the terminal log out by sending the platform common response via SMS.

7.2.2 Terminal authentication

After the terminal is registered, it should be authenticated immediately after establishing a connection with the platform. The front end of the authentication must not send other messages.

The terminal responds by sending a terminal authentication message, and the platform replies the platform common reply message.

7.2.3 Set / query terminal parameters

The platform sets the terminal parameters by sending a terminal parameter message, and the terminal responds to the terminal general response message. The platform queries the terminal parameters by sending a query terminal parameter message, and the terminal responds to the terminal parameter response message. Terminals under different network formats should support some of the unique parameters of their networks.

7.2.4 Terminal control

The platform controls the terminal by sending a terminal control message, and the terminal responds to the terminal general response message.

7.3 Location, Alarm Protocol

7.3.1 Location information report

The terminal sends the location information report message periodically according to the parameter setting.

According to the parameter control, the terminal can send the position information report message when it is judged that the vehicle turns.

7.3.2 Location information query

The platform inquires the location information of the designated vehicle terminal by sending the location information inquiry message, and the terminal returns the location information query response message.

7.3.3 Temporary location tracking control

The platform initiates / stops location tracking by sending a temporary location tracking control message, and the location tracking requires periodic reporting before the terminal is stopped and reported at the specified time interval. The terminal responds to the terminal general response message.

7.3.4 Terminal alarm

When the terminal judges that the alarm condition is met, the location information report message is sent and the corresponding alarm flag is set in the location report message. The platform can report the alarm message through the reply platform common response message.

Each alarm type is described in the description of the location information report message body. The alarm flag is maintained until the alarm condition is released. After the alarm condition is released, the position information report message should be sent immediately to clear the corresponding alarm flag.

7.6 Vehicle Control Protocol

The platform allows the terminal to control the vehicle by the specified operation by sending a vehicle control message. The terminal immediately replies to the terminal general response message. The terminal then controls the vehicle and replies to the vehicle control response message based on the result.

7.7 Vehicle Management Protocol

The platform sets the area of the circle, sets the polygon area, sets the route, and so on, and sets the area and the line for the terminal. The terminal determines whether the alarm condition is met according to the region and the line attribute. The alarm includes the over speed alarm, the outbound area / route alarm and the road driving time is insufficient / too long. The location information report message should contain the corresponding location additional information.

Area or route ID is in the range 1 to 0FFFFFFFF. If the set ID is duplicated with the same type or route ID already in the terminal, it is updated.

The platform can also delete the area and route saved on the terminal by deleting the circular area, deleting the rectangular area, deleting the polygon area, deleting the route, and so on.

Set / delete area and route messages, the terminal reply to the terminal general response message.

7.8 Information Collection Protocol

7.8.3 Collect travel record data

The platform requests the terminal to upload the specified data by sending the message, which requires the terminal to reply with the travel record data upload message.

7.8.4 Request travel record parameters

The platform sends the command message, requesting the terminal to upload the specified data, which requires the terminal to reply with the terminal general response message.

7.9 Multimedia Protocol

7.9.3 Camera snapshot

The platform sends the command message to the terminal to let the camera take a picture immediately. The message requires the terminal to reply with the terminal general response message. If the real-time upload is specified, it will upload the camera image / video after shooting. Otherwise, the image / video will be stored.

7.9.4 Start recording

The platform sends the command to the terminal to let the terminal to start recording. The message requires the terminal to reply with a terminal general response message. If the real-time upload is specified, the audio data will be uploaded after recorded, otherwise the audio data will be stored.

7.9.5 Retrieval terminal stores multimedia data and extracts

The platform obtains the status of the multimedia data stored by the terminal by sending the message, which requires the terminal to reply with a stored multimedia data retrieval response message.

According to the search result, the platform can request the terminal to upload specified multimedia data by sending a stored multimedia data upload message, and the message requires the terminal to reply with a terminal general response message.

7.10 General data transfer class

Messages that are not defined in the protocol but need to be transmitted in actual use can use data uplink transparent transmission messages and data downlink transparent transmission messages for uplink and downlink data exchange.

The terminal can use the GZIP compression algorithm to compress long messages, and use data compression to report and upload messages.

7.11 Encryption class protocol

If encrypted communication is required between the platform and the terminal, the RSA public key cryptosystem can be used. The platform informs the terminal of its own RSA public key by sending the platform RSA public key message, and the terminal replies with the terminal RSA public key message, and vice versa.

7.12 Subcontract message

When the message is sent by sub-package, the sub-package message should use a serial number that increases continuously.

For the response to subpackage messages, if there is no special response instruction, the receiver can adopt a general response to all subpackage messages, or use a general response to each subpackage message, and use the result field (success/failure) to inform Whether the

sender has correctly received all subpackage messages. When all subpackage messages are not received correctly, the receiver can use the retransmission subpackage request command to request the sender to retransmit the missing subpackage messages. The sender should use the original message to resend the subpackages in the retransmission package ID list once, and the retransmitted subpackages are exactly the same as the original subpackage messages.

8 Data Format

8.1 Terminal general response

Message ID: 0x0001.

Terminal general response message body data format in Table 4.

Table 4 Terminal General Response Message Body Data Format

Start byte	Field	Type of data	Description and requirements
0	Response serial number	WORD	The serial number of the corresponding platform message
2	Response ID	WORD	The ID of the corresponding platform message
4	result	BYTE	0: success / confirmation; 1: failure; 2: message is wrong; 3: not supported

8.2 Platform general Response

Message ID: 0x8001.

Platform general response message body data format in Table 5.

Table 5 Platform Generic Response Message Body Data Format

Start byte	Field	Type of data	Description and requirements
0	Response serial number	WORD	The serial number of the corresponding terminal message
2	Response ID	WORD	The ID of the corresponding terminal message
4	result	BYTE	0: success / confirmation; 1: failure; 2: message is wrong; 3: not supported; 4: alarm processing confirmation;

8.3 Terminal heartbeat

Message ID: 0x0002.

Terminal heartbeat data message body is empty.

8.5 Terminal registration

Message ID: 0x0100.

The format of the terminal registration message body is shown in Table 7.

Table 7 Terminal Registration Message Body Data Format

Start byte	Field	Type of data	Description and requirements
0	Province ID	WORD	Indicates the province where the terminal-installed vehicle is located, 0 is reserved, and the default value is taken by the platform.
2	City or County ID	WORD	Indicates the city and county where the terminal-installed vehicle is located, 0 is reserved, and the default value is taken by the platform.
4	Manufacturer ID	BYTE[5]	5 bytes, The first 5 digits of the IMEI
9	Terminal model	BYTE[20]	20 bytes, the terminal model by the manufacturer to define their own. When the number of digits is insufficient, add "0X00"
29	Terminal ID	BYTE[7]	7 bytes, composed of capital letters and numbers, the terminal ID by the manufacturer to define their own. When the number of digits is insufficient, add "0X00"
36	License plate color	BYTE	License plate color, according to 5.4.12 of JT/T415-2006. When the card is not listed, the value is 0.
37	Vehicle identification	STRING	When the license plate color is 0, it means the vehicle VIN; otherwise, it means the motor vehicle license plate issued by the traffic management department.

8.6 Terminal registration response

Message ID: 0x8100.

The format of the terminal registration response message is shown in Table 8.

Table 8 Terminal Registration Response Message Body Data Format

Start byte	Field	Type of data	Description and requirements
0	Response serial number	WORD	The serial number of the corresponding terminal registration message
2	result	BYTE	0: success; 1: vehicle has been registered; 2: no vehicle in the database; 3: terminal has been registered; 4: no terminal in the database
3	Authentication code	STRING	This field is only available when the registration is successful

8.8 Terminal authentication

Message ID: 0x0102.

The format of the terminal authentication message is shown in Table 9.

Table 9 Terminal Authentication Message Body Data Format

Start byte	Field	type of data	Description and requirements
0	Authentication code	STRING	Report the authentication code after the terminal reconnects

8.15 Query terminal attribute response

Message ID: 0x0107.

Query the terminal attribute response message body data format in Table 20. Each time the device establishes a connection with the platform, it will report a 0x0107 packet.

Table 20 Query Terminal Attribute Response Message Body Data Format

Start byte	Field	Type of data	Description and requirements
0	terminal type	WORD	bit0, 0: not applicable to passenger vehicles, 1: applicable to passenger vehicles; bit1, 0: not applicable to dangerous goods vehicles, 1: applicable to dangerous goods vehicles; bit2, 0: not applicable to ordinary freight vehicles, 1: applicable to ordinary freight vehicles; bit3, 0: not applicable to rental vehicles, 1: applicable to rental vehicles; bit6, 0: not supporting hard disk recording, 1: supporting hard disk recording; bit7, 0 : All-in-one machine, 1: Split machine.
2	Manufacturer ID	BYTE[5]	5 bytes, the terminal manufacturer code.
7	Terminal model	BYTE[20]	20 bytes. The terminal model is defined by the manufacturer If the number of digits is insufficient, add "0X00".
27	Terminal ID	BYTE[7]	7 bytes, composed of uppercase letters and numbers, this terminal ID is defined by the manufacturer, if the number of digits is insufficient, "0X00" will be added at the end.
42	Terminal SIM card ICCID	BCD[10]	Terminal SIM card ICCID number
52	Length of terminal hardware version number	BYTE	n
53	Terminal hardware version number	STRING	
53+n	Length of terminal firmware version number	BYTE	m
54+n	Terminal firmware version number	STRING	
54+n+m	GNSS module properties	BYTE	bit0, 0: GPS positioning is not supported, 1: GPS positioning is supported; bit1, 0: Beidou positioning is not supported, 1 Beidou positioning is supported; bit2, 0: GLONASS positioning is not supported, 1: GLONASS positioning is supported; bit3 0: No

55+n+m	Communication module attributes	BYTE	bit0, 0: do not support GPRS communication, 1: support GPRS communication; bit1, 0: do not support CDMA communication, 1: support CDMA communication; bit2, 0: do not support TD-SCDMA communication, 1: support TD-SCDMA communication; bit3 , 0: does not support WCDMA communication, 1: supports WCDMA communication; bit4, 0: does not support CDMA2000 communication, 1: supports CDMA2000 communication. bit5, 0: does not support TD-LTE communication, 1: supports TD-LTE communication; bit7, 0: does not support other communication methods, 1: supports other communication methods.

8.18 Location information report

Message ID: 0x0200.

The location information report message body consists of basic location information and a list of additional location information items.

The message structure is shown in Figure 3:

Location basic information	List of location additional items
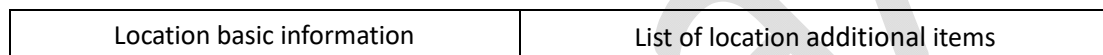
Figure 3 Location report message structure

The location additional information item list is composed of various location additional information items, or there may be no one, based on the length field in the message header.

The location basic information data format is shown in Table 23.

Table 23 Location Basic Information Data Format

Start byte	Field	Type of data	Description and requirements
0	Alarm sign	DWORD	The alarm flag is defined in Table 24
4	status	DWORD	The status bits are defined in Table 25
8	latitude	DWORD	Multiply the latitude value by 10 to the 6th power Accurate to one millionth of a degree
12	longitude	DWORD	Multiply the longitude value by 10 to the 6th power Accurate to one millionth of a degree
16	Elevation	WORD	Elevation in meters (m)
18	speed	WORD	1/10km/h
20	direction	WORD	0-359, positive north 0, clockwise
21	time	BCD[6]	YY-MM-DD-hh-mm-ss (GMT+0 time, the time involved in the document is in this time zone)

15

Table 24 Alarm flag definition

Bit	Definition	Processing instructions
0	1: emergency alarm, trigger the alarm switch after the trigger	Receive a response and clear it
1	1: overspeed alarm	The flag is maintained until the alarm condition is released
2	1: fatigue driving	The flag is maintained until the alarm condition is released
3	1: dangerous warning	Receive a response and clear it
4	1: GNSS module failure	The flag is maintained until the alarm condition is released
5	1: GNSS antenna is missing or cut off	The flag is maintained until the alarm condition is released
6	1: GNSS antenna short circuit	The flag is maintained until the alarm condition is released
7	1: terminal main power undervoltage	The flag is maintained until the alarm condition is released
8	1: The terminal main power is powered down	The flag is maintained until the alarm condition is released
9	1: Terminal LCD or monitor failure	The flag is maintained until the alarm condition is released
10	1: TTS module failure	The flag is maintained until the alarm condition is released
11	1: camera failure	The flag is maintained until the alarm condition is released
12	1: road transport card IC card module failure	The flag is maintained until the alarm condition is released
13	1: Overspeed warning	The flag is maintained until the alarm condition is released
14	1: fatigue driving warning	The flag is maintained until the alarm condition is released
15	1: Vibration alarm	The flag is maintained until the alarm condition is released
16	1: Light alarm	The flag is maintained until the alarm condition is released
17	1: Magnetic inductive alarm	The flag is maintained until the alarm condition is released
18	1: the cumulative driving overtime on that day	The flag is maintained until the alarm condition is released
19	1: timeout parking	The flag is maintained until the alarm condition is released
20	1: entry and exit area	Receive a response and clear it
21	1: out of the route	Receive a response and clear it
22	1: The road travel time is insufficient / too long	Receive a response and clear it
23	1: Route deviation alarm	The flag is maintained until the alarm condition is released
24	1: Vehicle VSS failure	The flag is maintained until the alarm condition is released
25	1: vehicle oil is abnormal	The flag is maintained until the alarm condition is released

26	1: vehicle stolen (through vehicle anti-theft device)	The flag is maintained until the alarm condition is released
27	1: illegal ignition of the vehicle	Receive a response and clear it
28	1: illegal displacement of vehicles	Receive a response and clear it
29	1: collision warning	The flag is maintained until the alarm condition is released
30	1: rollover warning	The flag is maintained until the alarm condition is released
31	1: illegal open the door alarm (when terminal does not set the area, do not judge the illegal open the door)	Receive a response and clear it

Note: In the event of an alarm and early warning, the location information must be reported immediately

Table 25 Status bit definitions

Bit	Status
0	0: ACC off; 1: ACC on
1	0: not positioned; 1: positioned
2	0: north latitude; 1: south latitude
3	0: east longitude; 1: west longitude
4	0: operating state; 1: out of service state
5	0: latitude and longitude have not been encrypted by the security plug-in; 1: latitude and longitude have been encrypted by the security plug-in
6-7	Reserved
8-9	00: empty; 01: half-loaded; 10: reserved; 11: full-loaded (It can be used to indicate the empty and heavy vehicles of passenger cars and the empty and full load status of trucks, manual input or sensor acquisition)
10	0: The fuel line of the vehicle is normal; 1: The fuel linet of the vehicle is disconnected
11	0: vehicle circuit is normal; 1: vehicle circuit is disconnected
12	0: The door is unlocked; 1: The door is 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 opened (rear door)
16	0: Door 4 closed; 1: Door 4 open (driver's door)
17	0: Door 5 closed; 1: Door 5 open (custom)
18	0: GPS satellites are not used for positioning; 1: GPS satellites are used for positioning

19	0: not using the Beidou satellite positioning; 1: the use of Beidou satellite positioning
20	0: GLONASS satellites are not used for positioning; 1: GLONASS satellites are used for positioning
21	0: Galileo satellites are not used for positioning; 1: Galileo satellites are used for positioning
22-31	Reserved

Note: The status changes need to be reported immediately

Location additional information item format is shown in Table 26.

Table 26 Location Additional Information Item Format

Field	type of data	Description and requirements
Additional information ID	BYTE	1-255
Additional information length	BYTE	
Additional information		Additional information is defined in Table 27

Table 27 Additional information definitions

Additional information ID	Additional information length	Description and requirements
0x30	1	BYTE, wireless communication network signal strength
0x31	1	BYTE, GNSS positioning satellite number
0x21	4	BYTE, temperature and humidity sensor. The first two bytes are temperature in 0.1 degrees Celsius; the last two bytes are humidity in 0.1 RH%.
0x50	2	Oil quantity, 2 bytes, single analog
0x51	8	8 bytes, temperature (4 channels), 2 bytes per channel, unit: 0.11/10 degrees The highest bit indicates a negative number, and the 4th temperature indicates the temperature inside the car, for example 0X8008 means minus 0.8 degrees Celsius
0x51	16	16 bytes, 2 bytes in a set of temperature, totally of 8 temperatures When the platform is extended to 0x51, the second byte length is 0x10, which is 8 temperatures. The platform needs to be able to set alarm thresholds (high and low temperature alarms implemented by the platform software) for each vehicle
0x53	1+n*8	2G base station data: the first byte is the number of base stations, followed by base station data; Base station data: 0-1 MCC; 2 MNC; 3-4 LAC; 5-6 CELLID; 7 Signal strength
0x54	1+n*7	WIFI data: the first byte is the number of WIFI, followed by WIFI data; WIFI data: 0-5 WIFI MAC; 6 Signal strength
0x55	8	Load extension, 8 bytes, unit: 0.1 kg

0x56	2	Electricity power extension, 2 bytes, unit: percentage, first byte: 0-100, second byte reserve
0x57	8	Status extension, 8 bytes, 0-1 bytes for alarm state, 2-3 bytes for switch state, 4-7 bytes reserve Alarm status: 0x0001 vibration alarm, 0x0002 anti-dismantling alarm, 0x0004 open cover alarm The lower 4 bits of the second byte of the switch state indicate the external switch state 0006 (0110), bit0-off, bit1-on, bit2-on, bit3-on, bit3-on See table 33B
0x5C	0x12	Indicates fuel consumption sensor data. Field: accumulated fuel consumption, data type: float, data length: 4, unit: liter Field: instantaneous fuel consumption, data type: float, data length: 4, unit: liter/hour Field: cumulative usage time, data type: float, data length: 4, unit: hour Field: single pulse fuel consumption, data type: float, data length: 4, unit: milliliter
0x5D	1+n*10	3G/4G base station data: the first byte is the number of base stations, followed by n base station data; Base station data: 0-1 MCC; 2 MNC; 3-4 LAC; 5-8 CELLID; 9 signal strength
0xAD	2	External voltage, unit 0.1V
0x80	1	Instantaneous velocity in KM/H
0x81	2	Engine rotation speed in RPM (rpm)
0x82	2	OBD battery voltage in 0.1V
0x83	1	Engine load, %
0x84	1	Coolant temperature, in °C
0x85	2	Instantaneous fuel consumption in ML/H
0x86	1	The intake air temperature in -40°C
0x87	2	Air flow, in G/S
0x88	1	Intake manifold absolute pressure in KPA
0x89	1	Throttle position, %
0x8A	2	Fuel pressure measurement in KPA
0x8B	17	VIN code
0x8D	2	Cruising range, in KM
0x8f	1	The number of sharp accelerations of the trip
0x90	1	The number of sharp decelerations for the trip
0x91	1	The number of sharp turns for the trip
0x92	4	THE MILEAGE OF THIS TRIP IS IN 0.1KM
0x93	2	THE FUEL CONSUMPTION OF THE TRIP, IN ML

0x94	2	THE AVERAGE SPEED OF THE TRIP, IN KM/H	
0x95	2	THE MAXIMUM SPEED OF THE TRIP IN KM/H	
0x96	1	The number of times the trip was speeded	
0x97	1	The number of idlings for this trip	
0x98	4	Total fuel consumption of the vehicle in 0.1L	
0xE0	Subsequent information length	Subsequent custom information length	
0xE1-0xFF		Custom area	
0xFD	2	Car battery voltage, unit 0.1V. OBD device, 0x82 is the same as 0xFD	

Table 29 Entry and exit area / route alarm Additional information Message body data format

Start byte	Field	Type of data	Description and requirements
0	Location type	BYTE	1: round area; 2: rectangular area; 3: polygon area; 4: route
1	Area or line ID	DWORD	
5	direction	BYTE	0: In; 1: out

Table 33B Alarm bit definition extension

bit	Definition	Notes
0	1: Vibration alarm	
1	1: Demolition alarm	
2	1: Open lid alarm	
3	1: Light alarm	
4	1: water temperature is too high	
5	1：idle speed	
6		
7		
8	1: Sharp acceleration alarm	
9	1: Sharp deceleration alarm	
10	1: Sharp turn alarm	
11	1: Collision alarm	
12		
13		
14		
15		

8.49 Positioning data bulk upload

Message ID: 0x0704.

Positioning data Batch upload data format is shown in Table 76.

Table 76 Positioning Data Batch Upload Data Format

Start byte	Field	Type of data	Description
0	Number of data items	WORD	The number of location report data items included, >0
1	Location data type	BYTE	0: Batch report of normal position, 1: Supplementary report of blind area
2	Location report data item		The definition is shown in Table 77

Table 77 Location Reporting Data Item Data Format

Start byte	Field	type of data	Description
0	The length of the position report data body	WORD	The length of the position report data body, n
2	Position report data body	BYTE[n]	Definitions See 8.18 Location information

8.61 Data Downlink Transparent Transmission

Message ID: 0x8900.

The Data Downlink Transparent Transmission Message body data format is shown in Table 91.

Table 91 Data Downlink Transparent Transmission Message Body Data Format

Start byte	Field	Type of data	Description and requirements
0	Transparent Transmission message type	BYTE	The definition of Transparent Transmission message type is shown in Table 93
1	Transparent Transmission message content		

8.62 Data Uplink Transparent Transmission

Message ID: 0x0900.

The Data Uplink Transparent Transmission message body data format is shown in Table 92.

Table 92 data format of the uplink message body data

Start byte	Field	Type of data	Description and requirements
0	Transparent Transmission message type	BYTE	The definition of transparent transmission message type is shown in Table 93

1	Transparent Transmission message content		

Table 93 Transparent transmission message type definition table

Transparent Transmission message type	Definition	Description and requirements
GNSS module detailed positioning data	0x00	GNSS module detailed positioning data
Road transport certificate IC card information	0x0B	The upload message of road transport certificate IC card information is 64Byte, and the download message is 24Byte. The timeout time for transparent transmission of road transport certificate IC card authentication is 30s. After timeout, no retransmission.
Serial port 1 transparent transmission	0x41	Serial port 1 transparent transmission message
Serial port 2 transparent transmission	0x42	Serial port 2 transparent transmission message
User-defined transparent transmission	0xF0-0xFF	User-defined transparent transmission message

Appendix A (Normative Appendix) Message Comparison Table

The message comparison table of the terminal communication protocol is shown in TableA.1.

Table A.1 Message Comparison Table

Serial number	Message body name	Message ID	Serial number	Message body name	Message ID
1	Terminal general response	0x0001	24	Event setting	0x8301
2	Platform general response	0x8001	25	Event report	0x0301
3	Terminal heartbeat	0x0002	26	Ask questions issued	0x8302
4	Supplemental subcontract request	0x8003	27	Ask answers	0x0302
5	Terminal registration	0x0100	28	Information On Demand menu settings	0x8303
6	Terminal registration response	0x8100	29	Information on demand / cancellation	0x0303
7	Terminal deregistration	0x0003	30	Information service	0x8304
8	Terminal authentication	0x0102	31	Call back	0x8400
9	Set the terminal parameters	0x8103	32	Set up phone book	0x8401
10	Query the terminal parameters	0x8104	33	Vehicle control	0x8500
11	Query the terminal parameter response	0x0104	34	Vehicle control response	0x0500

12	Terminal control	0x8105	35	Set the circular area	0x8600
13	Query the specified terminal parameters	0x8106	36	Delete the circular area	0x8601
14	Query the terminal properties	0x8107	37	Set the rectangle area	0x8602
15	Query terminal attribute response	0x0107	38	Delete the rectangle area	0x8603
16	Send the terminal upgrade package	0x8108	39	Set the polygon area	0x8604
17	Terminal upgrade result notification	0x0108	40	Delete the polygon area	0x8605
18	Location information report	0x0200	41	Set the route	0x8606
19	Location information query	0x8201	42	Delete route	0x8607
20	Location information query response	0x0201	43	The driving recorder data collection command	0x8700
21	Temporary location tracking control	0x8202	44	The driving recorder data is uploaded	0x0700
22	Manual confirmation alarm message	0x8203	45	Driving recorder parameter download command	0x8701
23	Sending text information	0x8300	46	Electronic shipping documents report	0x0701
47	Driver identity information collection and reporting	0x0702	58	Store multimedia data upload	0x8803
48	Report the driver's identity information request	0x8702	59	recording start command	0x8804
49	Positioning data bulk upload	0x0704	60	Single store multimedia data retrieval upload command	0x8805
50	CAN bus data upload	0x0705	61	Data downlink transparent transmission	0x8900
51	Multimedia event information upload	0x0800	62	Data uplink transparent transmission	0x0900
52	Multimedia data upload	0x0801	63	Data compression report	0x0901
53	Multimedia data upload response	0x8800	64	Platform RSA public key	0x8A00
54	The camera shoots the command immediately	0x8801	65	Terminal RSA public key	0x0A00
55	The camera shoots the command immediately response	0x0805	66	Platform downlink message retention	0x8F00~0x8 FFF
56	Storage multimedia data retrieval	0x8802	67	Terminal uplink message retention	0x0F00~0x0 FFF
57	Store multimedia data retrieval response	0x0802			