Solar powered GPS Protocol

Version: 1.1.7

Description

The full text is described in the normal No. 5 Song font. The place to be remarked is described by the small fifth bold bold character. You can add the boldface subscript (1.) or the boldface asterisk (*) in front to draw attention. The following are examples:

1.BJ is the abbreviation of Beijing

*The number of re-connections must not exceed 3 times

The full text should use black as the text color as much as possible. If you need special attention, you can use other colors to make it stand out. The old agreement that is no longer used is marked with a strike through and is in gray

History of Version

Date	Main content or major modification	Version
2017/10/22	Add the fishing vessel version related agreement based on the original version, mainly the blind zone supplement transmission and the modification of the alarm position.	V1.0.6
2017/11/14	Re-establishment of the agreement based on the fishing vessel business	V1.1.1
2017/12/01	1. Added the immediate sleep setting command; 2. SOS alarm added to alarm type	V1.1.2
2018/2/4	Completed the terminal default parameter description of the relevant setting field, marked with **blue**	V1.1.3
2018/10/31	Added capsizing alarm switch settings and escalation status reporting.	V1.1.4
2018/11/09	1. Added overturned calibration calibration setting bit (A5H) 2. Added emergency tracking related. Add tracking status bit in location point information, increase A8H tracking request setting frame, increase A9H stop tracking request	V1.1.5
2018/12/9	1. Increase the escalation response bit for the central control terminal beep and illuminate alarm. See 11H's response ack	V1.1.6
2019/3/1	1. Modify the tracking parameter A8H validity to support permanent tracking; 2. Add 23H frames to the large protocol number: TTS broadcast test. TTS broadcasts must be tracked to be broadcast.	V1.1.7
2019/3/9	Increase the mobile status bit A4, and the alarm switch A4	V1.1.8
2020/4/8	1. Add the tag 86H to bring the current altitude and number of satellites when reporting 2. Added B1H for time zone setting, easy to modify overseas version equipment	V1.1.9

table of Contents

1 Genera

1.1 Scope

This specification is used to describe the format, content and data interaction process of the data interaction protocol between the third-party GPS service center and the fishing vessel monitoring terminal. This agreement is applicable to the central platform in line with the "Shenzhen Longqiao Technology Development Co., Ltd. GPS Service Center Network Access Specification".

1.2 Normative references

The terms in the following documents become the terms of this standard by reference to this standard. For dated references, subsequent Amendments (not including errata content) or revisions do not apply to this standard. However, parties to agreements based on this standard are encouraged to study whether the latest versions of these documents are available. . For undated references, the latest edition applies to this standard.

1.3 Terminology

Mobile terminal / terminal: The term of the target downlink terminal as stipulated in this agreement is a fishing vessel monitoring device or vehicle-mounted device with functions such as GPS positioning and network data transmission；

1.4 Abbreviations and Definitions

TLV: abbreviated combination of Tag, Length, and Value, a representation method that describes variable length parameters by means of "parameter label + parameter length + parameter content".

GPS: Global Position System.

GPRS: General Packet Radio Service, a mobile data service available to GSM mobile phone users, commonly known as 2.5G.

CDMA: Code Division Multiple Access code division multiple access, a wireless communication technology.

1.5 Data Encoding

1.5.1 Data Expression

All data formats of this protocol are represented by 8-bit HEX format data streams. In the description, the

numbers 0~9 and the letters A~F are combined and the H is terminated. The description of each 8-bit data adopts the high-order first and the low-order backwards, followed by B7~B0.

Example: ASCII character "L", described as: 4CH.

1.5.2 Data Type

UBYTE: Unsigned single-byte integer (bytes, 8 bits)

The value ranges from 0 to 255. The hexadecimal value indicates 0H~FFH.

UWORD: Unsigned double-byte integer (word, 16 bits)

The value ranges from 0 to 65535. The hexadecimal notation indicates 0H~FFFFH.

ULONG: Unsigned four-byte integer (double word, 32 bits)

The value ranges from 0 to 4294967295. The hexadecimal notation indicates 0H~FFFFFFFFH.

BIT: bit type, (bit type)

It is represented by 1 byte. The meaning of no integer value is only the bearer of information, such as the response type of each command. It can also be set by using different bits or 0s to carry information. The bit field generally expressed by R is a reserved field.

STR: string type

An array of ASCII characters.

ARRAY: Byte array type

A parameter represented by an array of a plurality of bytes, each byte may be a combination of single-byte UBYTE, such as photo data, upgrade package, video stream data, and the like.

1.6 Transmission Rules

Depending on the type of data, in addition to being expressed in bytes (8 bits), the protocol can also express words by using words (16 bits) and double words (32 bits). Regardless of whether the bearer is a wireless network or a short message, the protocol uses a **big-endian** network byte order to transfer words and double words on the transmission. The convention is as follows:

Byte transmission convention: transmission in the order of B7~B0 and byte stream;

Word transfer convention: first pass the upper 8 bits (B15~B8), then pass the lower 8 bits, (B7~B0);

Double word transmission convention: first pass the high 24 bits, (B31~B24), then pass the upper 16 bits (B23~B16), then pass the upper 8 bits (B15~B8), and finally pass the lower 8 bits (B7~B0) .

2 Communication Protocol Overview

2.1 Communication Channel

This protocol is designed to implement the data communication process between the terminal and the central

platform. The protocol is built on top of a GPRS ,CDMA or 4G network. By default, TCP is used for communication.

2.2 Packet Encapsulation

The TCP protocol is a byte-oriented protocol, and there is no concept of "package" or "frame". So we will frame the data, encapsulation rules and steps：

Marker	Escaped protocol body	Marker

Figure 2-1 Message structure diagram

1. Add the keyword 7EH to the beginning and end of the protocol;

2. If 7EH or 7DH appears in the protocol body, the escaping process is performed. The escaping rules are defined as follows:

0x7e <————> 0x7d followed by a 0x02;

0x7d <————> 0x7d is followed by a 0x01.

3. The sender is the encapsulation process when transmitting, and the decapsulation process is received by the receiver.

Example: Send a packet of content 30H 7EH 08H 7DH 55H, after encapsulation：7EH 30H 7DH 02H 08H 7DH 01H 55H 7EH

2.3 Process Flow

Basically, the KN answer and answer mechanism is used, and the sender is obliged to retransmit. The specific process looks at the following figure:

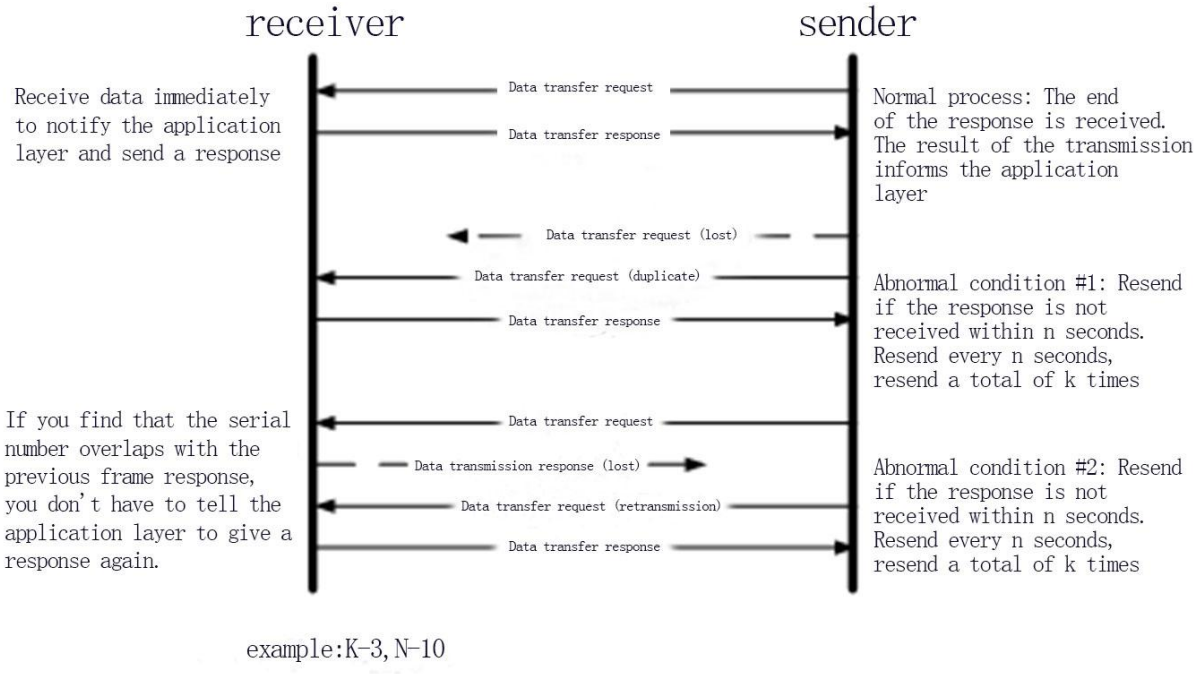


Figure 2-2 Process flow

Currently our default parameter is：K=3，N=15。

3 Agreement specific description

3.1 Message Structure

The application layer message format is as shown below.：

Message header			message body	checksum
DEV_IMEI （8）	CMD_ID （1）	CMD_ATTR （2）	CMD_BODY （Fixed field or TLV expression *N）	CHKSUM （1）

Figure 3-1 Application layer packet format

Description:

1. Packets need to be encapsulated in accordance with the requirements of Chapter 2 when they are sent. A typical frame example: 7EH+ message header + message body + checksum +7EH；

Field explanation：

DEV_IMEI： The ID identification sequence uniquely identifies the terminal, typically the IMEI number of the communication module. The general IMEI number consists of 15 Arabic numerals, so this field uses the BCD encoding expression, 8 bytes of content, and the missing part at the end is filled with 0H.。

Example: Terminal with IMEI card number 493002407599521：49H 30H 02H 40H 75H 99H 52H 10H

Note 1: When the center is downlink, this field is the DEV_IMEI of the target terminal. When the terminal is uplink, this field is the DEV_IMEI of the mobile terminal itself;

Note 2: The telecommunications related field is called MEID, which may be a hexadecimal character, but it does not matter much. In hexadecimal mode, the BCD code expression can still be satisfied.

CMD_ID： Indicates the type of protocol, generally used to refer to a certain or a group of command actions. UBYTE type, ranging from 0 to FFH；

CMD_ATTR： Represents command attributes：

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Retain			data encryption method		Message body length (not exceeding 1024)										

Reserved: reserved field, currently 000B;

Data encryption method: 00B - no encryption, others to be determined;

Message body length: refers to the length of the message body of this command, up to 1024 bytes.

CMD_BODY： The specific data of the order. Represented by a TLV variable parameter set；

校验和： The check code starts from DEV_IMEI and is logically XORed with the last byte until the end of CMD_BODY and the previous byte of the check code. This field occupies one byte.。Pseudo code example。

3.2 Classification of Protocol Types

The protocol types are divided as follows ：

Division	protocol description	protocol type	Function Description
Active reporting class	Active reporting	11H	Location reporting, report reporting, etc.
	Blind area	12H	The location of the signal dead zone is packaged and transmitted.
Set the query class	Terminal parameter configuration	21H	Set terminal related parameters.
	Terminal parameter query	22H	Query terminal related parameters
	Remote upgrade settings	28H	Start remote upgrade

4 message details

Convention: (Important!!!)

- For the interaction of the protocol, we use light blue to indicate that the protocol from the center to the terminal is indicated in green, and the protocol from the terminal to the center is indicated in **orange**.
- For the convenience of extension, all protocol content fields are described by **fixed parameter field + TLV field**. Fixed field is optional. If there is a fixed field, the fixed parameter field must be in the beginning part of the application layer of each protocol frame. Add or delete fixed parameter fields, and the protocol will be upgraded in the future. Try to use TLV description.
- Unless otherwise specified, Tag (label) occupies 1 byte, Length (length) occupies 1 byte, and Value (content) length must not exceed Length value, that is, 255 bytes.
- The TLV is divided into a basic tag tag and an extended tag tag, which are described as follows:
  Basic tag label: common for the entire protocol, currently 128, its Type range is 80H~FFH;
  Extended tag label: Information that is used only by a command protocol itself. The Type between different services can be repeated, ranging from 00H to 7FH.

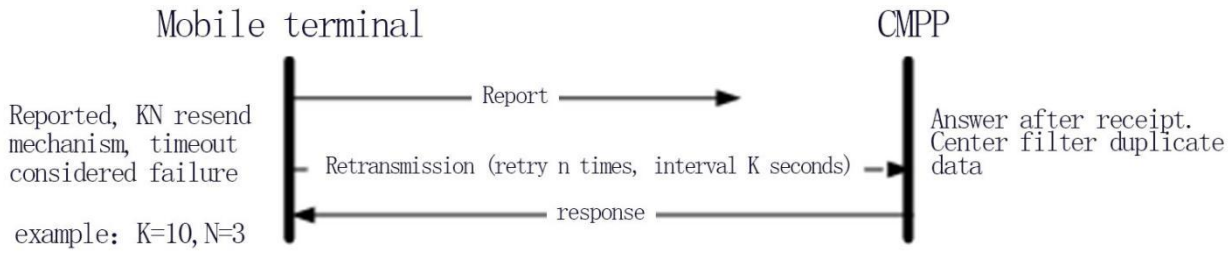
4.1 Active reporting class

The active reporting means that the terminal reports the location and other information to the center according to the set mode/interval and other conditions according to the relevant instructions in the "parameter setting" issued by the center.

After the terminal meets the reporting conditions, it will report it first.

4.1.1 Precautions

4.1.2 Active reporting of interactive procedures



Active reporting process

4.1.3 TAG descriptions specific to this type of command

TAG	LEN	VALUE	Description
81H	19	Status（1）+Date_time（6）+Latitude（4）+Longitude（4）+Speed（1）+Temperature（1）+Voltage（1）+Direction（1）	Basic information about a location. Detailed field
82H	2	Alarm_mask（1）+Alarm_state（1）	Alarm information.Detailed field
83H	16	Total_time(4)+Gps_cnt(4)+Gsm_cnt(4)+pos(1)+creg(1)+attach(1)+signal(1)	Statistics. Detailed field
84H	N	Version（N）	Terminal version number. Detailed field
85H	20	Iccid（20）	Iccid information. Detailed field
A1H	9	Period_base(2)+Sleep_cnt(1)+Max_worktime(2)+Max_gpstime(2)+Max_gsmtime(2)	Terminal working time parameter, the same as the setting field tag (used for problem analysis.)Detailed field
A6H	7	Low_voltage(1)+Low_time(2)+Low_period(2)+High_time(2)	The low-voltage parameters of the terminal, together with the tag of the setting field (used for problem analysis.)Detailed field

4.1.3.1 81H-Detailed location information

<table>
<tr><td>81H</td><td>Status（1）+Date_time（6）+Latitude（4）+Longitude（4）+Speed（1）+Temperature（1）+Voltage（1）+Direction（1）</td></tr>
<tr><td>Status</td><td>status information. BIT type (R is reserved, set to 0):
<table>
<tr><td>R</td><td>R</td><td>T</td><td>D</td><td>La</td><td>Lo</td><td>C</td><td>B</td></tr>
</table>
Emergency tracking status T: 0 = normal status; 1 = emergency tracking status
Positioning status D: 0 = no positioning; 1 = positioned
Latitude status bit LA: 0b = north latitude; 1b = south latitude
Longitude status bit LO: 0b = east longitude; 1b = west longitude
Charging status bit C: 0b=not charged; 1b=charging
Disassembly status bit B: 0b = normal state; 1b = disassembly state</td></tr>
<tr><td>Date_time</td><td>Year, month, day, minute, second, hexadecimal notation, YY-MM-DD-hh-mm-ss
Example: January 10, 2014 12:00:32=0E 01 0A 0C 00 20
Note: GMT+8 time, the time involved in this agreement is the time zone</td></tr>
<tr><td>Latitude</td><td>latitude. ULONG, multiplying the latitude value in degrees by the sixth power of 10, to the nearest millionth of a degree</td></tr>
<tr><td>Longitude</td><td>longitude. ULONG, multiplying the longitude value in degrees by the sixth power of 10, to the nearest millionth of a degree</td></tr>
<tr><td>Speed</td><td>speed. UBYTE, value range 00H~FFH(255) (*unit: km/h)</td></tr>
<tr><td>Temperature</td><td>Ambient temperature. BIT type, unit: Celsius, the highest bit is 1 means the temperature is negative.
<table>
<tr><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr>
<tr><td>Sym bol</td><td colspan="7">temperature value (degrees Celsius)</td></tr>
</table>
Value range：-127℃~+127℃</td></tr>
<tr><td>Voltage</td><td>battery voltage. UBYTE, unit: 20 mV mV. The current battery voltage (millivolts) ÷20 is sufficient.
Example: The current voltage is 4.0V (ie 4000 millivolts), the value is 200 (hexadecimal is C8H)</td></tr>
<tr><td>Direction</td><td>direction. UBYTE, true north is 0 ° , clockwise, true direction angle ÷ 2. Value range 00H~B3H(159)
(*Unit: 2 degrees, the clockwise rotation degree starts from the north direction）</td></tr>
</table>

4.1.3.2 82H-Detailed alarm information

<table>
<tr><td>82H</td><td>Alarm_mask（1）+Alarm_state（1）</td></tr>
<tr><td>Alarm_mask</td><td>Alarm switch status. BIT type. Indicates the alarm enable status of this device, 0 means disable, 1 means enable
<table>
<tr><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr>
<tr><td></td><td></td><td></td><td>M4</td><td>M3</td><td>M2</td><td>M1</td><td>M0</td></tr>
</table>
M4: Enable judgment when starting and stopping: 0 = disable, 1 = enable
M3: Overturn alarm enable bit: 0 = disable, 1 = enable
M2: SOS alarm enable bit: 0 = disable, 1 = enable
M1: Low voltage alarm enable bit: 0 = disable, 1 = enable
M0: Tamper alarm enable bit: 0 = disable, 1 = enable
Other: reserved</td></tr>
</table>

<table>
<tr><td>Alarm_state</td><td>Alarm status. BIT type. Indicates the current alarm condition of the device. 0 means no trigger, 1 means alarm is triggered
<table>
<tr><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr>
<tr><td></td><td></td><td></td><td>A4</td><td>A3</td><td>A2</td><td>A1</td><td>A0</td></tr>
</table>
A4: Open and stop state. 0 = stop, 1 = drive status
A3: Overturning the alarm bit. 0=Normal, 1=Tipping alarm occurred
A2: SOS alarm bit. 0 = normal, 1 = SOS alarm has occurred
A1: Low voltage alarm position. 0 = normal, 1 = low pressure alarm has occurred
A0: tamper alarm bit, 0=normal, 1=disassembly alarm has occurred
Other: reserved</td></tr>
</table>

4.1.3.3 83H-Detailed information

83H	Total_time(4)+Gps_cnt(4)+Gsm_cnt(4)+pos(1)+creg(1)+ attach(1)+signal(1)
Total_time	Total time since the power is turned on, the unit is in seconds, ULONG type
Gps_cnt	The number of times the GPS is turned on since the power-on, the unit is the second, ULONG type
Gsm_cnt	The number of times Gsm is turned on since power-on, the unit is second, ULONG type
Pos	This report, gps positioning time, in seconds, UBYTE type
Creg	This report, the time required to register a GSM/CDMA network, in seconds, UBYTE type
Attach	This report, the time required for this network dialing, in seconds, UBYTE type
Signal	This report reports the current GSM/CDMA network signal strength. Value range 0~31

4.1.3.4 84H-Terminal version number information

84H	Version（N）
Version	version number. STR type **Note: determined by the terminal version number naming rules**

4.1.3.5 85H-ICCID Information (optional)

A1H	iccid(20)
Iccid	Simcic information of the Sim card, UBYTE type, because there may be letters, the expression is ASCII characters Example: 898600810906F8048812, length 20 **Note: This field is only carried in the report frame if the ICCID changes. Such as: the first power-on card to report, change the card**

4.1.3.6 86H-location additional information

82H	Sv_cnt（1）+Altitude（2）
Sv_cnt	The number of visible satellites at the current location. UBYTE type, value range 0~99
Altitude	<table><tr><td>Bit16</td><td>Bit14~0</td></tr></table>

	Sign bit | Height value The altitude at the time of current positioning. The value range is -10000~10000, unit is meter. UWORD type If the altitude is a negative number, the highest position 1 indicates a negative number.

4.1.4 Specific Protocol Frame Description

4.1.4.1 Active reporting[11H]

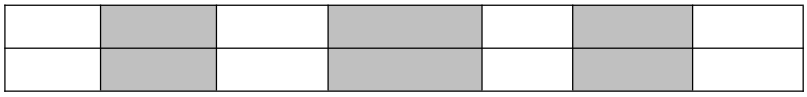
Command type: Actively report 11H		
Command description		
Used to report location information, etc.		
Command data format		
【T(1)+L(1)+V(L)】×N		
TLV parameter description		
Tag	Value	Description
		Usually will carry 81H, 82H, 83H, 84H, then 85H is optional
Example:		
Detailed  **1**		
Remarks		
no		

Command type: Actively reported response 11H (the response ID number is the same as the CMD_ID number of the request frame)			
Command description			
Location escalation response			
Command data format			
Ack(1)+Center_time(6)			
Fixed parameter description			
Ack	UBYTE	Response result	Center response results. status information. BIT type (R is reserved, set to 0): R | R | R | R | R | B | F | W Waiting bit W: 0=The center has no follow-up commands and can

			sleep directly; 1=There are still commands in the center, please wait (assuming max) Answer flash F: 0=No flash; 1=Received please flash Answer beep B: 0 = no beep; 1 = beep if you receive a response
Center_time	HEX	Center time	Year, month, day, hour, minute, second,hexadecimal notation，YY-MM-DD-hh-mm-ss Example: January 10, 2014 12:00:32=0E 01 0A 0C 00 20 **Note: GMT+8 time, the time involved in this agreement is the time zone**

Example： (lifted from the application layer)

Detailed



1

Remarks

no

4.1.4.2 Blind area supplement[12H]

Command type: blind zone supplement 12H

Command description

Dead zone for the fishing boat version. Each time it is packaged and uploaded, one point includes latitude and longitude, speed, voltage, and temperature.

The general situation is: the terminal first reports the location, and then checks whether there is a blind spot, and then packs and transmits 1 packet of data, and then sleeps. Namely: a package of up to 10 blind spots, one upload only one package

Command data format

PackNum（1）+PackSize（1）+【Pack】×N

Parameter Description

PackNum	UBYTE	The number of packets in this package. The value ranges from 1 to 10.
PackSize	UBYTE	The size of a point. Currently fixed at 18
Pack		**Description:**
Time	Hex	**Time Hex Time of the blind spot** Year, month, day, minute, second, hexadecimal notation, YY-MM-DD-hh-mm-ss Example: January 10, 2014 12:00:32=0E 01 0A 0C 00 20 **Note: GMT+8 time, the time involved in this agreement is the time zone**
Status	UBYTE	**Same as the status field in the GPS location information.** status information. BIT type (R is reserved, set to 0): R R R D La Lo C B Positioning status D: 0 = no positioning; 1 = positioned Latitude status bit LA: 0b = north latitude; 1b = south latitude Longitude status bit LO: 0b = east longitude; 1b = west longitude

<table>
<tr><td></td><td></td><td>Charging status bit C: 0b=not charged; 1b=charging
Disassembly status bit B: 0b = normal state; 1b = disassembly state</td></tr>
<tr><td>Latitude</td><td>ULONG</td><td>latitude. Multiply the latitude value in degrees by the sixth power of 10, to the nearest millionth of a degree.</td></tr>
<tr><td>Longitude</td><td>ULONG</td><td>longitude. Multiply the longitude value in degrees by the sixth power of 10, to the nearest millionth of a degree.</td></tr>
<tr><td>Speed</td><td>UBYTE</td><td>speed. Value range 00H~FFH(255) (*unit: km/h)</td></tr>
<tr><td>Temperature</td><td>UBYTE</td><td>Ambient temperature. BIT type, unit: Celsius, the highest bit is 1 means the temperature is negative.
<table>
<tr><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr>
<tr><td>Symbol</td><td colspan="7">temperature value (degrees Celsius)</td></tr>
</table>
Value range: -127℃~+127℃</td></tr>
<tr><td>Voltage</td><td>UBYTE</td><td>battery voltage. Unit: 20 millivolts mV. The current battery voltage (millivolts) ÷20 is sufficient.
Example: The current voltage is 4.0V (ie 4000 millivolts), the value is 200 (hexadecimal is C8H)</td></tr>
<tr><td colspan="3">Example：</td></tr>
<tr><td colspan="3">Detailed
  1</td></tr>
<tr><td colspan="3">Remarks</td></tr>
<tr><td colspan="3">no</td></tr>
</table>

<table>
<tr><td colspan="4">Command type: response 12H for blind zone re-transmission (the response ID number is the same as the CMD_ID number of the request frame)</td></tr>
<tr><td colspan="4">Command description</td></tr>
<tr><td colspan="4">Blind zone re-transmission response</td></tr>
<tr><td colspan="4">Command data format</td></tr>
<tr><td colspan="4">Ack(1)</td></tr>
<tr><td colspan="4">Fixed parameter description</td></tr>
<tr><td>Ack</td><td>UBYTE</td><td>Response Results</td><td>Center response results. The definition is as follows:
00H - success
10H - failure, data is wrong;</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="4">Example： (lifted from the application layer)</td></tr>
<tr><td colspan="4">Detailed
  </td></tr>
</table>

							1

Remarks
no

4.2 Setting the Query Class

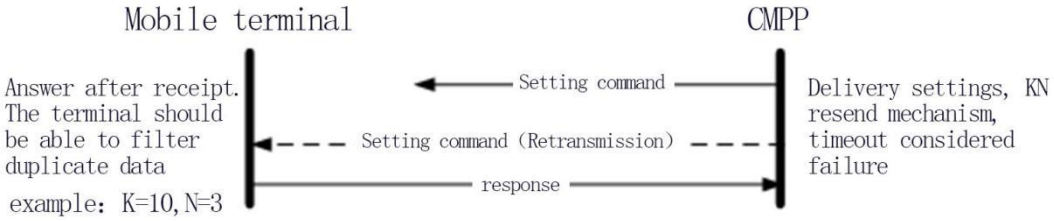
Setting the query class command is a series of parameters and instructions of the platform, controlling the terminal to perform certain actions or returning certain information.

4.2.1 Precautions

If there is a setting command, the center will give 01H (and subsequent commands) in the response field Ack of the active report, and then send the relevant command down. After all the relevant commands have received the response from the terminal, then the system will send an A7H- Tag setting command.

4.2.2 General Interaction Procedure for Setting Query Commands

The following is the general action interaction process of this type of command. If there is a special, please refer to the process description in the specific action. Only the interaction process of the action is described here, and the process of the specific application service is not described.



Delivery process

4.2.3 TAG descriptions specific to this type of command

TAG	LEN	VALUE	Description
A1H	9	Period_base(2)+Sleep_cnt(1)+Max_worktime(2)+Max_gpstime(2)+Max_gsmtime(2)	Working time parameter settings. Detailed field
A2H	2	GPS_OFFSET(2)	Displacement judgment threshold.Detailed field
A3H	N	APN(N)	Mobile access point apn. Detailed field
A4H	6	IP（4）+port（2）	Service center IP settings.

			Detailed field
A5H	1	Alarm_en(1)	Alarm switch settings. Detailed field
A6H	7	Low_voltage(1)+Low_time(2)+Low_period(2)+High_time(2)	Low voltage parameter setting. Detailed field
A7H	1	Stop_cmd(1)	Sleep request. Detailed field

4.2.3.1 A1H-terminal working time parameter setting

A1H	Period_base(2)+Sleep_cnt(1)+Max_worktime(2)+Max_gpstime(2)+Max_gsmtime(2)
Period_base	Period_base Basic working interval, in seconds. UWORD type. Indicates that the terminal wakes up every so long. **Note: The valid range of this field is 300~1800 seconds (ie 5 minutes~30 minutes).** The default is 300 seconds
Sleep_cnt	terminal sleeps up to Sleep_cnt times when it is determined to be stationary/stopped. UBYTE type. **Note: The valid range of this field is 1~200 times.The default is 6 times. Combined with the default value of the Period_base field, the boat can sleep for up to 30 minutes.**
Max_worktime	Maximum working time, in seconds. UWORD type. Indicates the maximum power supply duration for a wake-up. **Note 1: The valid range of the Max_worktime field is between 180 and 1800 seconds (ie 3 minutes to 30 minutes). The default is 240 seconds;** **Note 2: In order to sleep well, the value of this field must not exceed Period_base-60.**
Max_gpstime	Maximum GPS working time in seconds. UWORD type. Indicates the maximum length of time that the GPS module can operate. **Note 1: The valid range of the Max_gpstime field is 60~300 seconds. The default is 120 seconds;** **Note 2: Max_gpstime is added to Max_gsmtime and must not exceed Max_worktime**.
Max_gsmtime	Maximum GSM working time in seconds. UWORD type. Indicates the maximum duration that the GSM module can operate. **Note 1: The valid range of the Max_gsmtime field is 60~300 seconds. The default is 90 seconds;** **Note 2: Max_gpstime is added to Max_gsmtime and must not exceed Max_worktime**.

4.2.3.2 A2H-displacement judgment threshold setting

A2H	GPS_OFFSET(2)
GPS_OFFSET	The threshold value for judging whether the fishing boat is moving. UWORD type, the unit is meter **Example: A value of 50 means that the displacement is more than 50 meters in the interval between two acquisitions of the fishing vessel.** **The default is 50 meters**

4.2.3.3 A3H-Mobile apn settings

Note: This frame is only available for the GPRS version. The CDMA version does not need to be implemented! !

A3H	apn（N）
Apn	Apn center apn. STR type, does not include the so-called string terminator 00H **Example: apn=”CMCWT”, expressed as：43H 4DH 43H 57H 54H**

4.2.3.4 Service Center IP Address Settings

A4H	IP（4）+port（2）
IP	IP address of the IP service center. In the IPv4 style, 4 bytes correspond to 4 ip fields. **Example: 10.64.92.80, expressed as：0AH 40H 5CH 50H**
Port	Port number of the Port Service Center,， UWORD。 **Example: port: 11001, expressed as：2AH F9H (11001=2AF9H)**

4.2.3.5 A5H-Alarm switch settings

A5H	Alarm_en(1)
Alarm_en	Alarm_en alarm switch. BIT type. 0 means that the terminal is prohibited from this type of alarm, and 1 means enabled. 7 6 5 4 3 2 1 0 C M4 M3 M2 M1 M0 C: The level sensor is recalibrated. 1 = Enable calibration. This bit must be set when the M3 bit is enabled. Also, after calibration, if calibration is not required, the C bit should be reset to 0 to avoid the second error calibration horizon. M4: Enable judgment when starting and stopping: 0 = disable, 1 = enable M3: Overturn alarm enable bit; 0 = disable, 1 = enable M2: SOS alarm enable bit; 0 = disable, 1 = enable M1: Low voltage alarm enable bit; 0 = disable, 1 = enable M0: Tamper alarm enable bit; 0 = disable, 1 = enable Other: reserved The default is all 0

4.2.3.6 A6H-low voltage parameter setting

Note: When the terminal's battery low voltage is lower than Low_voltage and continues to exceed Low_time time, it is considered to enter low voltage protection. At this point, the terminal no longer wakes up according to the short period of Period_base, but performs the sleep wakeup operation according to the long period of Low_period (wake up and report the location).

When the terminal is charged, the battery voltage is higher than Low_voltage and continues to exceed the High_time time, it is considered to be able to exit the low voltage protection. At this point, the terminal resumes the original work cycle parameters to work.

A6H	Low_voltage(1)+Low_time(2)+Low_period(2)+High_time(2)
Low_voltage	Low voltage threshold. UBYTE, unit: 20 mV. The voltage value (millivolts) ÷20. **Example: The current voltage is 4.0V (is 4000 millivolts), the value is 200 (hexadecimal is C8H)** **The default is 3.7 volts**
Low_time	Low pressure duration. UWORD, unit: minute. **The default is 15 minutes**
Low_period	Low voltage sleep cycle. UWORD, unit: minute. **The default is 60 minutes**
High_time	High pressure duration. UWORD, unit: minute. **The default is 120 minutes, which is 2 hours.**

4.2.3.7 A7H-Sleep Request Settings

A7H	Stop_cmd(1)
Stop_cmd	The Stop_cmd shutdown instruction is defined as follows: 01H——The terminal should immediately go to sleep to save power;

4.2.3.8 A8H-Emergency Tracking Request Settings

A8H	Track_time(2)+Track_period(1)
Track_time	The duration of the emergency tracking, in seconds. UWORD. After receiving the frame, the terminal immediately starts the emergency location tracking mode, and continues to supply power for so much time after the report is completed; **Note 1: The valid range of track_time is 600~28800 seconds (8 hours);** **Note 2: If track_time is 0, it means permanent tracking**
Track_period	The interval for reporting the interim emergency tracking, in seconds. UBYTE. **Note: The valid range of track_period is 3~240 seconds;**

4.2.3.9 A9H-Stop Emergency Tracking Settings

A9H	Track_stop(1)
Track_stop	stops tracking instructions. The definition is as follows: 01H - Stop tracking and sleep.

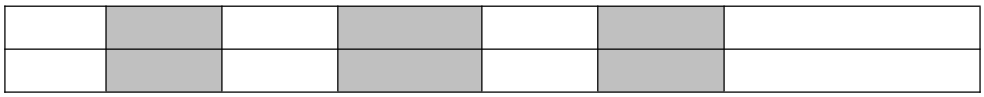
4.2.3.10 B1H-Time zone setting

B1H	Time zone (1)
Time zone	Time zone setting : Bit7 | Bit6~0 Sign bit | Value Set the time zone of the device, value range -11~12 Explanation: a. The number is positive, indicating East x area, 1~12 corresponds to East 1 area ~ East 12 area (also known as West 12 area) b. The number 0 represents the middle time zone (also known as zero time zone)

	c. Negative numbers represent West x zone, -1~-11 correspond to West 1 zone ~ West 11 zone

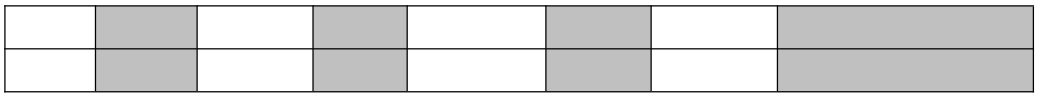
4.2.4 Specific Protocol Frame Description

4.2.4.1 Terminal Parameter Configuration [21H]

Command Type: Terminal Parameter Configuration 21H		
Command description		
Terminal basic parameter settings.		
Command data format		
【T(1)+L(1)+V(L)】×N		
TLV parameter group description		
Tag	Value	description
Refer to "Special TAG for this class of commands"		
Example (lifted from the application layer)		
Detailed  **1**		
Remarks		

Command type: Upstream response 21H. (The response ID number is the same as the CMD_ID number of the request frame)		
Command description		
The answer to the basic settings.		
Command data format		
【ACK_TAG(1)+L(1)+ack(1)】×N		
TLV parameter description		
Tag	Len	Value
ACK_TAG, the response TAG set	Fixed to 1	Ack: The result of processing the tag. 00H - successful, the terminal has processed; 10H - failure, data is wrong;
Example (lifted from the application layer)		

Detailed



1

Remarks

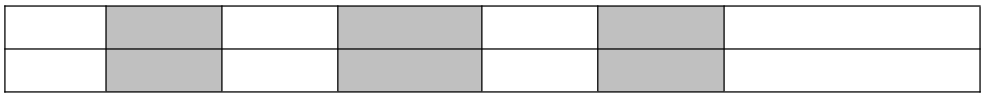
no

4.2.4.2 Terminal Parameter Query [22H]

This frame is temporarily reserved and will not be implemented! !

Command Type: Terminal Parameter Query 22H	
Command description	
Terminal basic parameter settings.	
Command data format	
【Tag(1)】×N	
Parameter Description	
Tag	Each tag number to be queried
Example (lifted from the application layer)	

Detailed



1

Remarks

Command type: Terminal parameter query response 22H. (The response ID number is the same as the CMD_ID number of the request frame)		
Command description		
The answer to the basic settings.		
Command data format		
【T(1)+L(1)+V(L)】×N		
TLV parameter group description		
Tag	Value	description
Refer to "Special TAG for this class of commands"		
Example (lifted from the application layer)		

Detailed

1

Remarks
no

4.2.4.3 TTS broadcast test [23H]

Command Type: TTS Broadcast Request 23H	
Command description	
The binary code of the text string,	
Command data format	
STRING(N)	
Parameter Description	
String	The text string to be broadcast, only supports Chinese and English and Arabic numerals. Hex mode, Chinese is the standard GB2312 mode
Example (lifted from the application layer)	
Example 1: If you play "Hello world", the content is： 48 65 6C 6C 6F 20 77 6F 72 6C 64 **Example 2: If you are broadcasting "Hello China", the content is：C4 E3 BA C3 D6 D0 B9 FA**	
Remarks	

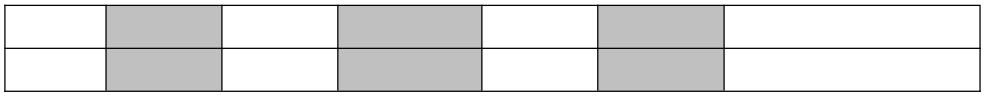
Command type: TTS broadcast request response 23H. (The response ID number is the same as the CMD_ID number of the request frame)			
Command description			
The TTS broadcasts a request response.			
Command data format			
ACK			
TLV parameter group description			
Ack	UBYTE	Response Results	Center response results. 00H - broadcast OK 01H - broadcast abnormality
Example (lifted from the application layer)			
Detailed			

1

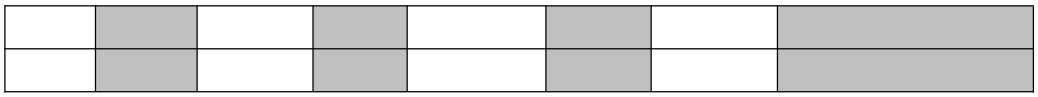
Remarks
no

4.2.4.4 Remote Upgrade Settings [28H]

This frame is temporarily reserved and will not be implemented! !

Command Type: Remote Upgrade Configuration 28H	
Command description	
Remote upgrade settings. After receiving the setting, the terminal determines whether the upgrade is needed by comparing the version number. If the upgrade is required, the response needs to be upgraded and connected to the target server to obtain new firmware.	
Command data format	
OTA_IP(4)+OTA_PORT(2)+VER_LEN(1)+VERSION(N)	
Parameter group description	
OTA_IP	The IP address of the OTA Center. In the IPv4 style, 4 bytes correspond to 4 ip fields. **Example：10.64.92.80，expressed as：0AH 40H 5CH 50H**
OTA_PORT	The port number of the OTA center, UWORD. **Example：port：11001，expressed as：2AH F9H (11001=2AF9H)**
VER_LEN	Target version number length. UBYTE type
VERSION	VERSION target version number. STR type
Example (lifted from the application layer)	
Detailed  **1**	
Remarks	

Command type: Remote upgrade response 28H. (The response ID number is the same as the CMD_ID number of the request frame)		
Command description		
The answer to the basic settings.		
Command data format		
ACK(1)		
Parameter Description		
ACK	UBYTE	Remote upgrade settings processing results 00H - the terminal does not need to be upgraded; 01H——The terminal will go to the target platform to upgrade;

Example (lifted from the application layer)
Detailed  **1**
Remarks
no

Appendix B Example of XOR Checksum Calculation Code

```
public UBYTE Caculate(UBYTE* msg, UWORD len)
{
        UBYTE chksum = 0;
        UWORD i;

        for (i = 0; i < len; i++) {
                chksum = chksum ^ msg[i];
        }
        return chksum;
}
```