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Confidential

Shenzhen Concox Information Technology Co. Ltd

GT300
Communication protocol

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1 Introduction

This document explains the interface protocol between the application layer of vehicles GPS tracker and location-based service platform. Related interface protocol only applies in the interaction between the platform and the position terminal.

2 Terms and Definitions

Terms/ab.	Definition
CMPP	China Mobile Peer to Peer
GPS	Global Positioning System
GSM	Global System for Mobile Communication
GPRS	General Packet Radio Service
TCP	Transport Control Protocol
LBS	Location Based Services
IMEI	International Mobile Equipment Identity
MCC	Mobile Country Code
MNC	Mobile Network Code
LAC	Location Area Code
Cell ID	Cell Tower ID
UDP	User Datagram Protocol
SOS	Save Our Ship/Save Our Souls
CRC	Cyclic Redundancy Check
NITZ	Network Identity and Time Zone,
GIS	Geographic Information System

3 Basic Rules

1. If a GPRS connection is set up successfully, the terminal will send the first login information packet to the server and, within five seconds, if the terminal receives a data packet responded by the server, the connection is considered to be a normal connection. The terminal will start to send location information (i.e., GPS, LBS information package). A status information package will be sent by the terminal after three minutes to regularly confirm the connection.

2. If the GPRS connection is set up unsuccessfully, the terminal will not be able to send the login information packet. The terminal will reboot in twenty minutes if the GPRS connection failed three times. Within twenty minutes, if the terminal successfully connects to the server and receives the data packet from the server as the server's response to the login message packet sent by the terminal, the scheduled reboot will be off and the terminal will not be rebooted; otherwise, the terminal will be rebooted automatically after twenty minutes.

3. After receiving the login message packet, the server will send a respond packet. If the terminal

doesn’t receive the respond packet from the server within five seconds, the current connection is regarded as an abnormal connection. The terminal will start a retransmission of GPS tracking data, which will disconnect the current GPRS, rebuild a new GPRS connection and send a login information packet again.

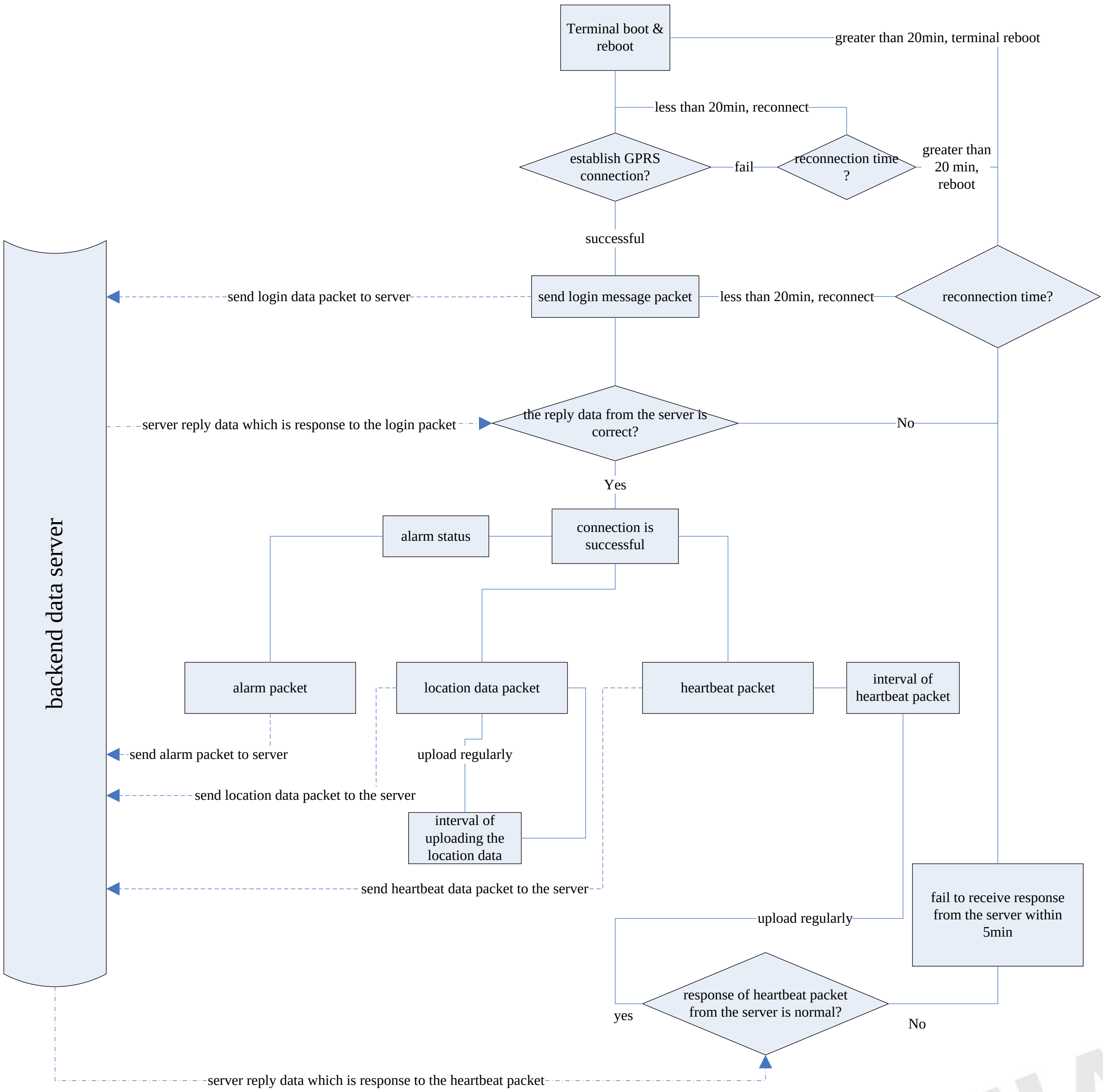
4. If the connection is regarded to be abnormal and the terminal didn't receive the login/statue information packet for three times, the terminal will start to schedule reboot in ten minutes. But if the terminal successfully connects to the server and receives the data packet responded by the server, the schedule reboot will turn off and the terminal will not be rebooted.

5. If the GPS information changes during the normal connection, the terminal will send a combined information packet of GPS and LBS to the server which can set a default protocol by sending commands.

6. To ensure the connection is working, the terminal will send status information to the server at regular intervals, and the server will send response packets to confirm the connection.

7. For the terminal which doesn’t register an IMEI number, the server will reply a login request response and heartbeat packet response rather than directly disconnect. (If the connection is directly disconnected or the server doesn’t reply to the terminal, it will lead to a continuous reconnection by the terminal and the GPRS traffic will be consumed heavily.

3.1 GT300 Basic Procedure



4 Format of Data Packet

The communication is done in an asynchronous way in byte. It transfers serial data stream of every uncertain length data packet between terminal and server.

Data packet length:（10+N）Byte

Format	Length(Byte)
Start Bit	2
Packet Length	1
Protocol Number	1
Information Content	N
Information Serial Number	2
Error Check	2
Stop Bit	2

4.1 Start Bit

Fixed value in HEX 0x78 0x78.

4.2 Package Length

Length = Protocol Number + Information Content + Information Serial Number + Error Check. The information content is in a variable length field, so the total byte is (5+N) bytes.

4.3 Protocol number

Type	Value
Login Information Packet	0x01
LBS Information Packet (UTC)	0x22
Status Information Packet	0x13
String Information Packet	0x21
LBS/Checking Location Via Phone Number Information Packet	0x17
LBS/Status Merged Packet	0x19
LBS/Multi-base Station Information Packet	0x28
Alarm Data	0x26
Alarm Data（UTC）with Multiple Fences	0x27
GPS/Checking Location Via Phone Number Information Packet	0x2A
Server Sends Command to Terminal	0x80

4.4 Information Contents

The specific contents are determined by the protocol numbers corresponding to different applications.

4.5 Information Serial Number

After booting, the first serial number of the GPRS data (including status packet and data packet such as GPS, LBS) is '1', and the serial number of data sent later at each time will be automatically added '1'.

4.6 Error Checking

A check code can be used by the terminal or the server to distinguish whether the received information is right or not. To prevent errors occur during data transmission, error checking is added to against data misoperation, so as to increase the security and efficiency of the system. The check code is generated by the CRC-ITU checking method.

The check codes of data in the structure of the protocol, from the Packet Length to the Information Serial Number (including "Packet Length" and "Information Serial Number") , are the value of CRC-ITU.

If CRC error occurs when the received information is calculating, the receiver will ignore and discard the data packet.

4.7 Stop Bit

Fixed value in HEX 0x0D 0x0A

5 Details about Data Packet Sent From Terminal to Server

The following content is to explain how the common information packets are sent and responded by the server.

5.1 Login Information Packet

5.1.1 Terminal Sending Data Packet to Server

Login Information Package is used to confirm whether the connection is normal and submit terminal ID to server.

	Description	Bits	Example
Login Information Packet (18 Byte)	Start Bit	2	0x78 0x78
	Packet Length	1	0x0D
	Protocol Number	1	0x01
	Terminal ID	8	0x01 0x23 0x45 0x67 0x89 0x01 0x23 0x45
	Type Identifier	2	0x10 0x18
	Time zone language		0x32 0x00
	Information Serial Number	2	0x00 0x01
	Error Checking	2	0x8C 0xDD
	Stop Bit	2	0x0D 0x0A

5.1.1.1 Start Bit

For details see Data Packet Format section 4.1

5.1.1.2 Packet Length

For details see Data Packet Format section 4.2

5.1.1.3 Protocol Number

For details see Data Packet Format section 4.3

5.1.1.4 Terminal ID

E.g. if the IMEI is 123456789012345, the terminal ID is 0x01 0x23 0x45 0x67 0x89 0x01 0x23 0x45.

5.1.1.5 Terminal Type Identifier

Terminal type identifier consumed 2 bytes. It is be used for recognizing terminal type.

The first three bytes represent the type of the device while the last byte represents model branches.

E.g. **the identifier code of ET100**
0x20 0x10 represents the device with locking motor function for electric mobiles.
0x20 0x11 represents the device with oil cut-off function
0x20 0x12 represents the device without the locking motor and oil cut-off function
E.g. **the identifier code of GT300**
0x21 0x20

5.1.1.6 Time zone language

One and a half bytes (bit15—bit4)	15	the 100 times of the time zone value	
	14		
	13		
	12		
	11		
	10		
	9		
	8		
	7		
	6		
	5		
	4		
Low half byte (bit4-bit0)	3	Eastern/western time zone	
	2	No current definition	
	1	Language selection bit	1
	0	Language selection bit	0

Bit3 0------- Eastern time zone
1------- Western time zone

E.g.
Extension bit: 0X32 0X00, it indicates GMT+8:00.
Arithmetic: 8*100=800, converting it into hex value is 0X0320.
Extension bit: 0X4D 0XD8, it indicates GMT-12:45.
Arithmetic: 12.45*100=1245, converting it into hex value is 0X04 0XDD

Algorithmic method: to combine the time zone value with eastern/western time zone and language selection bit, so as to save the bytes.

5.1.1.7 Information Serial Number

For details see Data Packet Format section 4.5

5.1.1.8 Error Checking

For details see Data Packet Format section 4.6

5.1.1.9 Stop Bit

For details see Data Packet Format section 4.7

5.1.2 Server's Responds to Data Packet

Description		Bits	Example
Login Information Packet (18 Byte)	Start Bit	2	0x78 0x78
	Packet Length	1	0x05
	Protocol Number	1	0x01
	Information Serial Number	2	0x00 0x01
	Error Checking	2	0x8C 0xDD
	Stop Bit	2	0x0D 0x0A

5.1.2.1 Start Bit

For details see Data Packet Format section 4.1

5.1.2.2 Packet Length

For details see Data Packet Format section 4.2

5.1.2.3 Protocol Number

For details see Data Packet Format section 4.3

5.1.2.4 Information Serial Number

For details see Data Packet Format section 4.5

5.1.2.5 Error Checking

For details see Data Packet Format section 4.6

5.1.2.6 Stop Bit

For details see Data Packet Format section 4.7

5.2 LBS/GPS Merged Packet

5.2.1 Terminal Sending Data Packet to Server

	Format		Length(Byte)	Example
Content	Start Bit		2	0x78 0x78
	Packet Length		1	0x1F
	Protocol Number		1	0x22
	GPS	Date Time	6	0x0B 0x08 0x1D 0x11 0x2E 0x10
		GPS message length, Quantity of GPS satellites	1	0xCF
		Latitude	4	0x02 0x7A 0xC7 0xEB
		Longitude	4	0x0C 0x46 0x58 0x49
		Speed	1	0x00
		Course, Status	2	0x14 0x8F
	LBS	MCC		0x01 0xCC
		MNC		0x00
		LAC		0x28 0x7D
		Cell ID		0x00 0x1F 0xB8
	ACC		1	0x01
	Data Reporting Mode		1	0x01
	GPS Real Time Resend		1	0x00
	Serial Number		2	0x00 0x03
	Error Checking		2	0x80 0x81
	Stop Bit		2	0x0D 0x0A

5.2.1.1 Start Bit

For details see Data Packet Format section 4.1

5.2.1.2 Packet Length

For details see Data Packet Format section 4.2

5.2.1.3 Protocol Number

For details see Data Packet Format section 4.3.

5.2.1.4 Date and time

Format	Length(Byte)	Example
Year	1	0x0A
Month	1	0x03
Day	1	0x17
Hour	1	0x0F
Minute	1	0x32
Second	1	0x17

E.g. 2010-03-23 15:30:23

Calculated as follows: 10(Decimal)=0A(Hexadecimal)
3 (Decimal)=03(Hexadecimal)
23(Decimal)=17(Hexadecimal)
15(Decimal)=0F(Hexadecimal)
50(Decimal)=32(Hexadecimal)
23(Decimal)=17(Hexadecimal)

Then the value is: 0x0A 0x03 0x17 0x0F 0x32 0x17

5.2.1.5 GPS info length/ Number of satellites involved in locating

1 byte converts to binary is 8 bits, the first 4 bits mean GPS info length, the last 4 bits mean the number of satellite involved in locating.

E.g. 0xCB means GPS information length is 12 bytes; the number of satellite involved in locating is 11. (C=12 bit, B=11.)

5.2.1.6 Latitude

It consumes 4 bytes, representing the latitude value. It ranges from 0 to 162000000, which represents the range form 0 °to 90 °.

Conversion method:

1. Convert the latitude (degrees, minutes) data from GPS module into a new form which represents the value only in minutes;
2. Multiply the converted value by 30000, and then transform the result to hexadecimal number.

E.g. 22°32.7658′,（22×60＋32.7658）×30000=40582974, then converting it to hexadecimal number is 0x02 0x6B 0x3F 0x3E

5.2.1.7 Longitude

It consumes 4 bytes, representing the latitude value. It ranges from 0 to 324000000, which represents the range form 0 °to 180 °.

Conversion method is the same as latitude's.

5.2.1.8 Speed

It consumes 1 byte, representing the speed of the terminal; ranges from 0 to 360, representing 0 to 255km/h respectively.

E.g. 0x00 represents 0km/h
0x10 represents 16km/h
0xFF represents 255/h

5.2.1.9 Status/Course

It consumes 2 bytes; representing the moving direction of the terminal; ranges from 0-360; unit: degree, regards due north as 0 degree; clockwise.

BYTE_1	Bit7	0
	Bit6	0
	Bit5	GPS real-time/differential positioning
	Bit4	GPS has been positioning or not
	Bit3	East Longitude, West Longitude
	Bit2	South Latitude, North Latitude
	Bit1	Course
	Bit0	
BYTE_2	Bit7	
	Bit6	
	Bit5	
	Bit4	
	Bit3	
	Bit2	
	Bit1	
	Bit0	

Note: The status information in the data packet is the status corresponding to the time bit recorded in the data packet.

E.g. the value is 0x15 0x4C, the corresponding binary is 00010101 01001100,
BYTE_1 Bit7 0
BYTE_1 Bit6 0

BYTE_1 Bit5	0 (real time GPS)	
BYTE_1 Bit4	1 (GPS has been positioned)	
BYTE_1 Bit3	0 (East Longitude)	
BYTE_1 Bit2	1 (North Latitude)	
BYTE_1 Bit1	0	
BYTE_1 Bit0	1	
BYTE_2 Bit7	0	
BYTE_2 Bit6	1	
BYTE_2 Bit5	0	→ Course 332 °(0101001100 in Binary, or 332 in decimal)
BYTE_2 Bit4	0	
BYTE_2 Bit3	1	
BYTE_2 Bit2	1	
BYTE_2 Bit1	0	
BYTE_2 Bit0	0	

It means GPS tracking is on, real time GPS, location at north latitude, east longitude and the course is 332 °.

5.2.1.10 MCC

The country code to which a mobile user belongs, i.e., Mobile Country Code(MCC).

E.g. Chinese MCC is 460 in decimal, or 0x01 0xCC in Hex (that is, a decimal value of 460 converting into a hexadecimal value, and 0 is added at the left side because the converted hexadecimal value is less than four digits).

Herein the range is 0x0000 ~ 0x03E7.

5.2.1.11 MNC

Mobile Network Code(MNC)

E.g. Chinese MNC is 0x00.

5.2.1.12 LAC

Location Area Code (LAC) included in LAI consists of two bytes and is encoded in hexadecimal. The available range is 0x0001-0xFFFE, and the code group 0x0000 and 0xFFFF cannot be used. (See GSM specification 03.03, 04.08 and 11.11).

5.2.1.13 Cell ID

Cell Tower ID (Cell ID), which value ranges from 0x000000 to 0xFFFFFF.

5.2.1.14 ACC

Condition	Value
Low	00
High	01

5.2.1.15 Data Reporting Mode

Type	Value
Regular Report	0x00
Interval Report	0x01
Inflexion Report	0x02
ACC Condition Change Report	0x03

5.2.1.16 Information Serial Number

For details see Data Packet Format section 4.5

5.2.1.17 Error Checking

For details see Data Packet Format section 4.6

5.2.1.18 Stop Bit

For details see Data Packet Format section 4.7

5.3 LBS Extension Packet (0X28)

<table>
<tr><th colspan="3">Format</th><th>Length (Byte)</th></tr>
<tr><td rowspan="10">Information Content</td><td colspan="2">Date &Time</td><td>6</td></tr>
<tr><td rowspan="9">LBS info</td><td>MCC</td><td>2</td></tr>
<tr><td>MNC</td><td>1</td></tr>
<tr><td>LAC</td><td>2</td></tr>
<tr><td>CI</td><td>2</td></tr>
<tr><td>RSSI</td><td>1</td></tr>
<tr><td>NLAC1</td><td>2</td></tr>
<tr><td>NCI1</td><td>2</td></tr>
<tr><td>NRSSI1</td><td>1</td></tr>
<tr><td>NLAC2</td><td>2</td></tr>
</table>

		NCI2	2
		NRSSI2	1
		NLAC3	2
		NCI3	2
		NRSSI3	1
		NLAC4	2
		NCI4	2
		NRSSI4	1
		NLAC5	2
		NCI5	2
		NRSSI5	1
		NLAC6	2
		NCI6	2
		NRSSI6	1
	Reserved bit		N

5.3.1 Terminal Sending Data Packet to Server

5.3.1.1 Date &Time

Same as the description of last section

5.3.1.2 MCC

Same as the description of last section

5.3.1.3 MNC

Same as the description of last section

5.3.1.4 LAC

Same as the description of last section

5.3.1.5 CI（Cell ID）

Cell ID, the value range is 0x0000 ～ 0xFFFF。

5.3.1.6 RSSI（Received Signal Strength Indicator）

Received Signal Strength Indicator, the value range is 0x00～0xFF，0x00 signal is the m weakest, 0xFF is strongest.

5.3.1.7 NLAC1～6

Neighboring received location codes, 6 in total.

5.3.1.8 NCI1～6（Neighboring Cell ID）

Neighboring Cell ID, which are corresponded with 6 NLAC.

5.3.1.9 NRSSI1～6（Near Cell ID Signal Strength）

Near Cell ID Signal Strength, which are corresponded with 6 NLAC.

5.4 Alarm Packet

5.4.1 Server Sending Alarm Data Packet to Server (Multi-fence)

<table>
<tr><th colspan="3">Format</th><th>Length (Byte)</th><th>Examples</th></tr>
<tr><td rowspan="18">Information Content</td><td colspan="2">Start Bit</td><td>2</td><td>0x78 0x78</td></tr>
<tr><td colspan="2">Packet Length</td><td>1</td><td>0x0A</td></tr>
<tr><td colspan="2">Protocol Number</td><td>1</td><td>0x27</td></tr>
<tr><td colspan="2">Date Time</td><td>6</td><td>0x0B 0x08 0x1D 0x11 0x2E 0x10</td></tr>
<tr><td rowspan="5">GPS Information</td><td>Quantity of GPS information satellites</td><td>1</td><td>0xCF</td></tr>
<tr><td>Latitude</td><td>4</td><td>0x02 0x7A 0xC7 0xEB</td></tr>
<tr><td>Longitude</td><td>4</td><td>0x0C 0x46 0x58 0x49</td></tr>
<tr><td>Speed</td><td>1</td><td>0x00</td></tr>
<tr><td>Course, Status</td><td>2</td><td>0x14 0x8F</td></tr>
<tr><td rowspan="5">LBS Information</td><td>LBS Length</td><td>1</td><td>0x08</td></tr>
<tr><td>MCC</td><td>2</td><td>0x01 0xCC</td></tr>
<tr><td>MNC</td><td>1</td><td>0x00</td></tr>
<tr><td>LAC</td><td>2</td><td>0x28 0x7D</td></tr>
<tr><td>Cell ID</td><td>3</td><td>0x00 0x1F 0xB8</td></tr>
<tr><td rowspan="2">status Information</td><td>Terminal Information Content</td><td>1</td><td>0x40</td></tr>
<tr><td>Voltage Level</td><td>1</td><td>0x06</td></tr>
</table>

		GSM Signal Strength	1	0x04
		Alarm/Language	2	0x00 0x02
		Fence ID	1	0x01
	Serial Number		2	0x00 0x1F
	Error Check		2	0xC4 0x39
	Stop Bit		2	0x0D 0x0A

5.4.2 Server Sending Alarm Data Packet to Server (Single Fence)

Format			Length (Byte)	Examples
Information Content	Start Bit		2	0x78 0x78
	Packet Length		1	0x0A
	Protocol Number		1	0x26
	Date Time		6	0x0B 0x08 0x1D 0x11 0x2E 0x10
	GPS Information	Quantity of GPS information satellites	1	0xCF
		Latitude	4	0x02 0x7A 0xC7 0xEB
		Longitude	4	0x0C 0x46 0x58 0x49
		Speed	1	0x00
		Course, Status	2	0x14 0x8F
	LBS Information	LBS Length	1	0x08
		MCC	2	0x01 0xCC
		MNC	1	0x00
		LAC	2	0x28 0x7D
		Cell ID	3	0x00 0x1F 0xB8
	status Information	Terminal Information Content	1	0x40
		Voltage Level	1	0x06
		GSM Signal Strength	1	0x04
		Alarm/Language	2	0x00 0x02
	Serial Number		2	0x00 0x1F
	Error Check		2	0xC4 0x39
	Stop Bit		2	0x0D 0x0A

Alarm packet is consisted by adding status information to location packet, so does the encoding format of the protocol.

5.4.2.1 Start Bit

For details see Data Packet Format section 4.1

5.4.2.2 Packet Length

For details see Data Packet Format section 4.2

5.4.2.3 Protocol Number

For details see Data Packet Format section 4.3

5.4.2.4 Date Time

For details see Location Data Packet Format section 5.2.1.4.

5.4.2.5 Length of GPS information, quantity of positioning satellites

For details see Location Data Packet Format section 5.2.1.5.

5.4.2.6 Latitude

For details see Location Data Packet Format section 5.2.1.6.

5.4.2.7 Longitude

For details see Location Data Packet Format section 5.2.1.7.

5.4.2.8 Speed

For details see Location Data Packet Format section 5.2.1.8.

5.4.2.9 Status and Course

For details see Location Data Packet Format section 5.2.1.9.

5.4.2.10 MCC

For details see Location Data Packet Format section 5.2.1.10.

5.4.2.11 MNC

For details see Location Data Packet Format section 5.2.1.11.

5.4.2.12 LAC

For details see Location Data Packet Format section 5.2.1.12.

5.4.2.13 Cell ID

For details see Location Data Packet Format section 5.2.1.13.

5.4.2.14 Terminal Information

One byte is consumed, defining various status information of the mobile phone.

<table>
<tr><th colspan="2">Bit</th><th>Code Meaning</th></tr>
<tr><td rowspan="15">BYTE</td><td rowspan="2">Bit7</td><td>1: oil and electricity disconnected</td></tr>
<tr><td>0: gas oil and electricity connected</td></tr>
<tr><td rowspan="2">Bit6</td><td>1: GPS tracking is on</td></tr>
<tr><td>0: GPS tracking is off</td></tr>
<tr><td rowspan="5">Bit3~
Bit5</td><td>100: SOS</td></tr>
<tr><td>011: Low Battery Alarm</td></tr>
<tr><td>010: Power Cut Alarm</td></tr>
<tr><td>001: Shock Alarm</td></tr>
<tr><td>000: Normal</td></tr>
<tr><td rowspan="2">Bit2</td><td>1: Charge On</td></tr>
<tr><td>0: Charge Off</td></tr>
<tr><td rowspan="2">Bit1</td><td>1: ACC high</td></tr>
<tr><td>0: ACC Low</td></tr>
<tr><td rowspan="2">Bit0</td><td>1: Defense Activated</td></tr>
<tr><td>0: Defense Deactivated</td></tr>
</table>

E.g. 0x44, corresponding binary value is 01000100, which indicates that the status of the terminal is a) oil and electricity connected and b) GPS tracking is on and c) normal without any alarm and d) charge on and e) ACC is low, and f) defense deactivated.

5.4.2.15 Voltage Level

The range is 0~6 defining the voltage is from low to high.

0: No Power (shutdown)

1: Extremely Low Battery (not enough for calling or sending text messages, etc.)

2: Very Low Battery (Low Battery Alarm)

3: Low Battery (can be used normally)

4: Medium

5: High

6: Very High

E.g. 0x02 indicates very low battery and a Low Battery Alarm is sending.

5.4.2.16 GSM Signal Strength Levels

0x00: no signal;
0x01: extremely weak signal;
0x02: very weak signal;
0x03: good signal;
0x04: strong signal.

E.g. 0x03 indicates the GSM signal is good.

5.4.2.17 Alarm/Language

0x00 (former bit) 0x01 (latter bit)
Former bit: terminal alarm status (suitable for alarm packet and electronic fence project)
Latter bit: the current language used in the terminal

former bit	0x00: normal
	0x01: SOS
	0x02: Power Cut Alarm
	0x03: Shock Alarm
	0x04: Fence In Alarm
	0x05: Fence Out Alarm
latter bit	0x01: Chinese
	0x02: English

E.g. No Alarm and Language is Chinese: 0x00 0x01
No Alarm and Language is English: 0x00 0x02

To increase the reliability of alarm information, label the alarm information repeatedly; in most cases, the alarm information keeps consistency with information of former terminal, while the inconsistencies are as follows: a) Low Battery Alarm occurred in the information of the terminal and b) Fence in and out Alarm in the Alarm/Language information.

5.4.2.18 Fence number

It used to identify the alarm number. Only in fence alarm condition will precede the identification.

E.g. 0x00 is default fence. 0x01 is No.1 fence (hexadecimal).

5.4.2.19 Information Serial Number

For details see Data Packet Format section 4.5

5.4.2.20 Error Check

For details see Data Packet Format section 4.6

5.4.2.21 Stop Bit

For details see Data Packet Format section 4.7

5.4.3 Server responding alarm data packet to terminal

Format		Length(Byte)
Information Content	Start Bit	2
	Packet Length	1
	Protocol Number	1
	Serial Number	2
	Error Check	2
	Stop Bit	2

Alarm packet is consisted by adding status information to location packet, so does the encoding format of the protocol.

5.4.3.1 Start Bit

For details see Data Packet Format section 4.1

5.4.3.2 Packet Length

For details see Data Packet Format section 4.2

5.4.3.3 Protocol Number

For details see Data Packet Format section 4.3

5.4.3.4 Information Serial Number

For details see Data Packet Format section 4.5

5.4.3.5 Error Check

For details see Data Packet Format section 4.6

5.4.3.6 Stop Bit

For details see Data Packet Format section 4.7

5.4.4 Server Responding Alarm Data Address Packet to Terminal

5.4.4.1 Response package in Chinese

The response data packet in Chinese is as follow:

<table>
<tr><td rowspan="14">Command packet sent from the server to the terminal (15+M+N Byte)</td><td colspan="3">Start Bit</td><td>2</td></tr>
<tr><td colspan="3">Length of data bit</td><td>1</td></tr>
<tr><td colspan="3">Protocol Number</td><td>1</td></tr>
<tr><td rowspan="8">Information Content</td><td colspan="2">Length of Command</td><td>1</td></tr>
<tr><td colspan="2">Server Flag Bit</td><td>4</td></tr>
<tr><td rowspan="6">Command Content</td><td>ALARMSMS</td><td>8</td></tr>
<tr><td>&&</td><td>2</td></tr>
<tr><td>Address Content</td><td>M</td></tr>
<tr><td>&&</td><td>2</td></tr>
<tr><td>Phone Number</td><td>21</td></tr>
<tr><td>##</td><td>2</td></tr>
<tr><td colspan="3">Information Serial Number</td><td>2</td></tr>
<tr><td colspan="3">Check Bit</td><td>2</td></tr>
<tr><td colspan="3">Stop Bit</td><td>2</td></tr>
</table>

The Protocol Number of request Chinese address response is 0X17.

Command Content: ADDRESS&&Address Content&&Phone Number (All 0)## (ADDRESS, &&, ## are fixed strings)

Chinese address content is sent in UNICODE

Example of Chinese address response information:

7878 // Start Bit

85 // Data Length

17 // Response Protocol Number

7E // Length of Command, i.e., length of the information of the

```
transmitted content
00000001                          // Server Flag Bit
414C41524D534D53                  // ALARMSMS
2626                              //&&    Separator
624059044F4D7F6E0028               // Chinese address is sent in UNICODE
004C004200530029003A
5E7F4E1C77015E7F5DDE
5E0282B190FD533AFF17
FF15FF144E6190530028
004E00320033002E0033
00390035002C00450031
00310032002E00390038
0038002996448FD1
2626                              //&& Separator
000000000000000000000000000000000000000000       // Phone Number
2323                              //##    terminator of content
0106                              // Serial No.
3825                              // Check Bit
0D0A                              // Stop Bit
```

5.4.4.2 Response package in English

Considering the address or other foreign address in English is generally longer than that in Chinese, one data bit may not be enough, so the data bit is consumed in 2 bytes.

Note: only the length of data bit corresponding to the protocol number of response address information is changed into two bytes.

<table>
<tr><td rowspan="14">Command packet sent from the server to the terminal (15+M+N Byte)</td><td colspan="3">Start Bit</td><td>2</td></tr>
<tr><td colspan="3">Length of data bit</td><td>2</td></tr>
<tr><td colspan="3">Protocol Number</td><td>1</td></tr>
<tr><td rowspan="9">Information Content</td><td colspan="2">Length of Command</td><td>2</td></tr>
<tr><td colspan="2">Server Flag Bit</td><td>4</td></tr>
<tr><td rowspan="7">Command Content</td><td>ALARMSMS</td><td>8</td></tr>
<tr><td>&&</td><td>2</td></tr>
<tr><td>Address Content</td><td>M</td></tr>
<tr><td>&&</td><td>2</td></tr>
<tr><td>Phone Number</td><td>21</td></tr>
<tr><td>##</td><td>2</td></tr>
<tr><td></td><td></td></tr>
<tr><td colspan="3">Information Serial Number</td><td>2</td></tr>
<tr><td colspan="3">Check Bit</td><td>2</td></tr>
</table>

	Stop Bit	2

The Protocol Number of request English address response is 0X97.

Command Content: ADDRESS&&Address Content&&Phone Number(All is 0)##(ADDRESS, &&, ## are fixed strings)

E.g.
7878 // Start Bit
00D2 // Data Length
97 // Response Protocol Number
00CA // Length of Command, i.e., length of the information of the transmitted content
00000001 // Server Flag Bit
414C41524D534D53 // ALARMSMS
2626 //&& Separator
0053004F00530028004C // English address is sent in UNICODE
0029003A005300680069
006D0069006E00200046
0061006900720079006C
0061006E006400200057
00650073007400200052
0064002C004800750069
006300680065006E0067
002C004800750069007A
0068006F0075002C0047
00750061006E00670064
006F006E00670028004E
00320033002E00310031
0031002C004500310031
0034002E003400310031
0029004E006500610072
00620079
2626 //&& Separator
000000000000000000000000000000000000000000 // Phone Number
2323 //## terminator of content
0007 //Serial No.
72b5 // Check Bit
0D0A // Stop Bit

Note: Some of the alarm functions don't need the respond address from the server. After s erver receives the alarm packet, they don't need to analyze the address. These alarms as followings: a) low battery alarm b) over-speed alarm c) GPS blind spot d) GPS off-line alarm

5.5 Heartbeat Packet (status information packet)

Heartbeat packet is a data packet to maintain the connection between the terminal and the server.

5.5.1 Terminal Sending Heartbeat Packet to Server

Format			Length (Byte)	Example
Information Content	Start Bit		2	0x78 0x78
	Packet Length		1	0x0A
	Protocol Number		1	0x13
	Status Information	Terminal Information Content	1	0x40
		Voltage Level	1	0x06
		GSM Signal Strength	1	0x04
		Alarm/Language	2	0x00 0x01
	Serial Number		2	0x00 0x1F
	Error Check		2	0xC4 0x39
	Stop Bit		2	0x0D 0x0A

5.5.1.1 Start Bit

For details see Data Packet Format section 4.1.

5.5.1.2 Packet Length

For details see Data Packet Format section 4.2

5.5.1.3 Protocol Number

For details see Data Packet Format section 4.3

5.5.1.4 Terminal Information

One byte is consumed defining for various status information of the mobile phone.

Bit		Meaning
BYTE	Bit7	1: oil and electricity disconnected
		0: gas oil and electricity

	Bit6	1: GPS tracking is on
		0: GPS tracking is off
	Bit3~ Bit5	100: SOS
		011: Low Battery Alarm
		010: Power Cut Alarm
		001: Shock Alarm
		000: Normal
	Bit2	1: Charge On
		0: Charge Off
	Bit1	1: ACC high
		0: ACC Low
	Bit0	1: Defense Activated
		0: Defense Deactivated

E.g. 0x44, corresponding binary value is 01000100, indicates that the status of the terminal is: oil and electricity connected, GPS tracking is on, normal without any alarm, charge on, ACC is low, and defense deactivated.

5.5.1.5 Voltage Level

The range is 0~6 defining the voltage is from low to high.

Value	Meaning
0	No Power (shutdown)
1	Extremely Low Battery (not enough for calling or sending text messages, etc.)
2	Very Low Battery (Low Battery Alarm)
3	Low Battery (can be used normally)
4	Medium
5	High
6	Very High

E.g. 0x02 indicates very low battery and a Low Battery Alarm is sending.

5.5.1.6 GSM Signal Strength Levels

Value	Meaning
0x00	no signal
0x01	extremely weak signal
0x02	very weak signal
0x03	good signal
0x04	strong signal

E.g. 0x03 indicates the GSM signal is good.

5.5.1.7 Alarm/Language

0x00 (former bit) 0x01 (latter bit)
former bit: terminal alarm status (suitable for alarm packet and electronic fence project)
latter bit: the current language of the terminal

former bit	
latter bit	0x01: Chinese
	0x02: English

E.g.
No Alarm and Language is Chinese: 0x00 0x01
No Alarm and Language is English: 0x00 0x02

5.5.1.8 Information Serial Number

For details see Data Packet Format section 4.5

5.5.1.9 Error Check

For details see Data Packet Format section 4.6

5.5.1.10 Stop Bit

For details see Data Packet Format section 4.7

5.5.2 Server Responds the Data Packet

	Description	Bits	Example
Login Message Packet (18 Byte)	Start Bit	2	0x78 0x78
	Packet Length	1	0x05
	Protocol Number	1	0x01
	Information Serial Number	2	0x00 0x01
	Error Check	2	0xD9 0xDC
	Stop Bit	2	0x0D 0x0A

The response packet from the server to the terminal: the protocol number in the response packet is identical to the protocol number in the data packet sent by the terminal.

5.5.2.1 Start Bit

For details see Data Packet Format section 4.1

5.5.2.2 Packet Length

For details see Data Packet Format section 4.2

5.5.2.3 Protocol Number

For details see Data Packet Format section 4.3.

5.5.2.4 Information Serial Number

For details see Data Packet Format section 4.5.

5.5.2.5 Error Check

For details see Data Packet Format section 4.6

5.5.2.6 Stop Bit

For details see Data Packet Format section 4.7.

5.5.3 Examples

Example of data packet sent by the terminal							
78 78 08 13 4B 04 03 00 01 00 11 06 1F 0D 0A							
Explain							
0x78 0x78	0x08	0x13	0x4B 0x04 0x03	0x00 0x01	0x00 0x11	0x06 0x1F	0x0D 0x0A
Start Bit	Length	Protocol No.	Information Content	Reserved bit (Language)	Serial No.	Error Check	Stop Bit

Example of response packet returned by the server					
78 78 05 13 00 11 F9 70 0D 0A					
Explain					
0x78 0x78	0x05	0x13	0x00 0x11	0xF9 0x70	0x0D 0x0A
Start Bit	Length	Protocol No.	Serial No.	Error Check	Stop Bit

5.6 LBS, Phone Number Checking Location Info Package (0X17)

5.6.1 Terminal Sending Data Packet to Server

<table>
<tr><th colspan="3">Format</th><th>Length (Byte)</th><th>Example</th></tr>
<tr><td colspan="3">Start Bit</td><td>2</td><td>0x78 0x78</td></tr>
<tr><td colspan="3">Packet Length</td><td>1</td><td>0x1F</td></tr>
<tr><td colspan="3">Protocol Number</td><td>1</td><td>0x17</td></tr>
<tr><td rowspan="6">Info content</td><td rowspan="4">LBS info</td><td>MCC</td><td>2</td><td>0x01 0xCC</td></tr>
<tr><td>MNC</td><td>1</td><td>0x00</td></tr>
<tr><td>LAC</td><td>2</td><td>0x26 0x6A</td></tr>
<tr><td>Cell ID</td><td>3</td><td>0x00 0x1D 0xF1</td></tr>
<tr><td colspan="2">Phone number</td><td>21</td><td></td></tr>
<tr><td colspan="2">Reserved extension bit</td><td>N</td><td></td></tr>
<tr><td colspan="3">Serial Number</td><td>2</td><td>0x00 0x03</td></tr>
<tr><td colspan="3">Check Bit</td><td>2</td><td>0x80 0x81</td></tr>
<tr><td colspan="3">Stop Bit</td><td>2</td><td>0x0D 0x0A</td></tr>
</table>

5.6.1.1 Start Bit

For details see Data Packet Format section 4.1

5.6.1.2 Packet Length

For details see Data Packet Format section 4.2

5.6.1.3 Protocol Number

For details see Data Packet Format section 4.3.

5.6.1.4 Information content

The format is almost the same as the one mentioned in LBS info content, just reduce an item of date and time and add an item of checking address by phone number.
Note: Reserved extension bit N=0.

5.6.1.5 Information Serial Number

For details see Data Packet Format section 4.5

5.6.1.6 Error Check

For details see Data Packet Format section 4.6.

5.6.1.7 Stop Bit

For details see Data Packet Format section 4.7

5.6.2 Server response

The server replies Chinese address or English address based on the extended command, and the response data packet is inconsistent

The response data packet in Chinese is as follow:

	Format		Length (Byte)	Example
Command packet sent from the server to the terminal（15+M Byte）	Start Bit		2	0x78 0x78
	Packet Length		1	0x05
	Protocol Number		1	0x17
	Information Content	Length of Command	1	0x7E
		Server Flag Bit	4	0x00 0x00 0x00 0x01
		Command content	M	
		Reserved extension bit	0	
	Information Serial Number		2	0x00 0x01
	Check Bit		2	0xD9 0xDC
	Stop Bit		2	0x0D 0x0A

The Protocol Number of request Chinese address response is 0X17.

Info content is as below:

	Format	Length (Byte)	Example
Information Content	Length of Command	1	0x7E
	Server Flag Bit	4	0x00 0x00 0x00 0x01
	Command content	M	
	Reserved extension bit	0	

Command Content: ADDRESS&&Address Content&&Phone Number##

Chinese address content is sent in UNICODE.

Considering the address or other foreign address in English is generally longer than that in Chinese, one data bit is not enough, so the data bit is occupied in 2 bytes.

Note: only the packet length corresponding to the protocol number of response address information is changed into two bytes.

	Format		Length (Byte)	Example
Command packet sent from the server to the terminal （17+M Byte）	Start Bit		2	0x78 0x78
	Packet length		2	0x00 0xD1
	Protocol Number		1	0x97
	Information Content	Length of Command	2	0x00 0xCA
		Server Flag Bit	4	0x00 0x00 0x00 0x01
		Command content	M	
		Reserved extension bit	0	
	Information Serial Number		2	0x00 0x01
	Check Bit		2	0xD9 0xDC
	Stop Bit		2	0x0D 0x0A

The Protocol Number of request English address response is 0X97.

5.6.3 Functions

The terminal will send this status package to ask terminal address info when SMS command DW is sent.

Note: Some of the alarm functions don't need the respond address from the server. After server receives the alarm packet, they don't need to analyze the address. These alarms as followings: a) low battery alarm b) out of battery then power off c) over-speed alarm d) SIM card change alarm e) low battery protection f) blind-area alarm g) power on alarm h) power off alarm i) GPRS off-line alarm.

5.7 LBS, Status info package（0X19）

5.7.1 Terminal Sending Data Packet to Server

Format	Length (Byte)	Example
Start Bit	2	0x78 0x78

Packet Length			1	0x15
Protocol Number			1	0x19
Information Content	LBS Information	MCC	2	0x01 0xCC
		MNC	1	0x00
		LAC	2	0x26 0x6A
		Cell ID	3	0x00 0x1D 0xF1
	Status Information	Terminal Information Content	1	0x40
		Voltage Level	1	0x06
		GSM Signal Strength	1	0x04
		Extent Language	2	0x00 0x01
Serial Number			2	0x00 0x1F
Error Check			2	0xC4 0x39
Stop Bit			2	0x0D 0x0A

5.7.1.1 Start Bit

For details see Data Packet Format section 4.1

5.7.1.2 Packet Length

For details see Data Packet Format section 4.2

5.7.1.3 Protocol Number

For details see Data Packet Format section 4.3

5.7.1.4 Information Content

Almost the same as ones mentioned in LBS info content above.

5.7.1.5 Information Serial Number

For details see Data Packet Format section 4.5

5.7.1.6 Error Check

For details see Data Packet Format section 4.6

5.7.1.7 Stop Bit

For details see Data Packet Format section 4.7.

5.7.2 Server response

The server needs to response after receiving the data packet.

	Format	Length (Byte)	Example
Server response（10 Byte）	Start Bit	2	0x78 0x78
	Packet length	1	0x05
	Protocol Number	1	0x19
	Information Serial Number	2	0x00 0x01
	Check Bit	2	0xD9 0xDC
	Stop Bit	2	0x0D 0x0A

5.7.2.1 Start Bit

For details see Data Packet Format section 4.1

5.7.2.2 Packet Length

For details see Data Packet Format section 4.2

5.7.2.3 Protocol Number

For details see Data Packet Format section 4.3.

5.7.2.4 Information Serial Number

For details see Data Packet Format section 4.5

5.7.2.5 Error Check

For details see Data Packet Format section 4.6

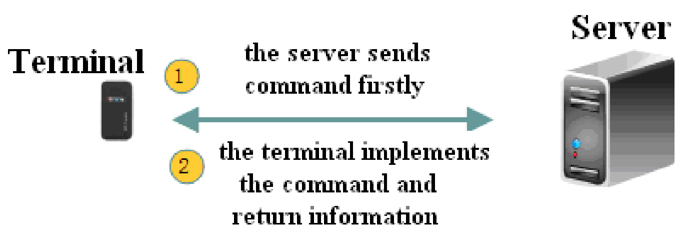
5.7.2.6 Stop Bit

For details see Data Packet Format section 4.7

5.7.3 Functions

After terminal and platform are connected, presses SOS key to send this data package, send terminal alarm status and apply for LBS location info to server.

6 Data Packet Sent From Server to Terminal



6.1 Packet Sent by Server

Format		Length (Byte)	Examples
Start Bit		2	0x78 0x78
Packet length		1	0x0F
Protocol Number		1	0x80
Information Content	Length of Command	1	0x00 0xCA
	Server Flag Bit	4	0x00 0x00 0x00 0x01
	Command Content	M	
Information Serial Number		2	0x00 0x01
Error Check		2	0xD9 0xDC
Stop Bit		2	0x0D 0x0A

6.1.1 Start Bit

For details see Data Packet Format section 4.1

6.1.2 Packet Length

For details see Data Packet Format section 4.2

6.1.3 Protocol Number

The Protocol Number of terminal transmission is 0x80.

6.1.4 Length of Command

Server Flag Bit + Length of Command Content
Example: measured in bytes, 0x0A means the content of command occupied ten bytes.

6.1.5 Server Flag Bit

It is reserved to the identification of the server. The binary data received by the terminal is returned without change.

6.1.6 Command Content

It is represented in ASC II of string, and the command content is compatible with text message command.

6.1.7 Information Serial Number

For details see Data Packet Format section 4.5

6.1.8 Error Check

For details see Data Packet Format section 4.6

6.1.9 Stop Bit

For details see Data Packet Format section 4.7

6.2 Packet Replied by Terminal

Format		Length (Byte)	Example
Start Bit		2	0x79 0x79
Packet Length		1	0x00 0x09
Protocol Number		1	0x21
Information Content	Server Flag Bit	4	0x00 0x00 0x00 0x01
	Command Content	M	
	Language	2	
Information Serial Number		2	0x00 0x01
Error Check		2	0xD9 0xDC
Stop Bit		2	0x0D 0x0A

6.2.1 Start Bit

Set Value: 0x79 0x79

6.2.2 Packet Length

It consumes two bytes.

6.2.3 Protocol Number

It uses 0x21.

6.2.4 Server Flag Bit

It is reserved to the identification of the server. The binary data received by the terminal is returned without change.

6.2.5 Command Code

0x01 ASCⅡ
0x02 UTF16-BE

6.2.6 Command content

The command content is compatible with text message command.

6.2.7 Information Serial Number

For details see Data Packet Format section 4.5

6.2.8 Error Check

For details see Data Packet Format section 4.6.

6.2.9 Stop Bit

For details see Data Packet Format section 4.7

6.3 White list

Function Description: the command to obtain the positioning information. A mobile phone user or a short message server may obtain the positioning information by this command.
In an example, the transmitting and returning strings are converted into ASCII to generate command contents.

Sending by the server
Set WN,A, No.1, No.2, No.3, No.4 …….No.15
Delete
WN, D, 1,3 #(delete the first and third SOS numbers and name)
WN,D,132487346727# (delete the number 132487346727 and the name)
Check
WN#
Returned by the terminal
if successful, return
WN=Success!
if failed, return
WN=Fail！
check, return
WN= No.1, No.2, No.3, No.4 …….No.15

6.4 Looking Up Location Information

Function Description: the command to obtain the positioning information. A mobile phone user or a short message server may obtain the positioning information by this command.

In an example, the transmitting and returning strings are converted into ASCII to generate command contents.

Sending by the server

DWXX#

Returned by the terminal

if successful, return

DWXX=Lat:<North/South Latitude>,Lon:<East/West Longitude>,Course:<angle>,Speed:<speed>,DateTime:<time>

if failed, return

DWXX=Command Error!

if tracking unsuccessful, return

DWXX=Lat:,Lon:, Course:,Speed:,DateTime:-:

Example:

DWXX=Lat:N23d5.1708m,Lon: E114d23.6212m,Course:120,Speed:53.02;DateTime:08-09-12 14:52:36

Explain: which means: N23d5.1708m, E114d23.6212m, Course: 120, Speed: 53.02km/h, Date Time: 08-09-12 14:52:36.

6.5 Cutting Oil and Electricity

Function Description: cutting off the vehicle oil-electric control circuit

In an example, the transmitting and returning strings are converted into ASCII to generate command contents.

Sending by the server

DYD#

Returned by the terminal

if successful, return

DYD=Success!

if failed, return

DYD=Unvalued Fix or DYD=Speed Limit, Speed 40km/h

Explain: the oil and electricity are not allowed to be disconnect when the GPS tracking is off or the running speed is higher than 20KM/H.

6.6 Connecting Oil and Electricity

Function Description: connecting the vehicle oil-electric control circuit

In an example, the transmitting and returning strings are converted into ASCII to generate command contents.

Sending by the server

HFYD#

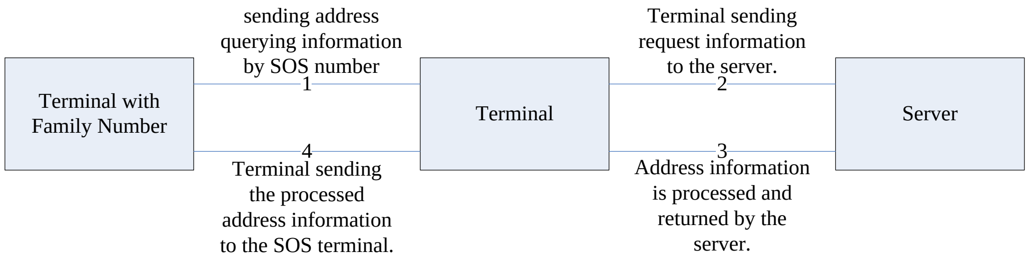
Returned by the terminal
if successful, return
HFYD=Success!
if failed, return
HFYD=Fail!

6.7 Address Querying Information Sent by the Server

In an example, the transmitting and returning strings are converted into ASCII to generate command contents.

Sending by the server
ADDRESS, Address Content, Phone Number
Note: The address content in Chinese is sent in UNICODE.

6.8 GPS, Phone Number Querying Address Information Package (0X1A)



6.8.1 Information from Terminal to Server

The information is received by the terminal.
The format is basically same to the format mentioned as GPS information content, and the difference is that phone number for querying address is added here.

Format			Length (Byte)	Example
Start Bit			2	0x78 0x78
Packet Length			1	0x1F
Protocol Number			1	0x2A
Information Content	Date Time		6	0x0B 0x08 0x1D 0x11 0x2E 0x10
	GPS	Length of GPS information,	1	0xCF

	Information	quantity of positioning satellites		
		Latitude	4	0x02 0x7A 0xC7 0xEB
		Longitude	4	0x0C 0x46 0x58 0x49
		Speed	1	0x00
		Course, Status	2	0x14 0x8F
	Phone Number		21	
	Language		2	0x00 0x01
Information Serial Number			2	0x00 0x03
Error Check			2	0x80 0x81
Stop Bit			2	0x0D 0x0A

6.8.1.1 Start Bit

For details see Data Packet Format section 4.1

6.8.1.2 Packet Length

For details see Data Packet Format section 4.2

Example: measured in bytes, 0x2E means the content of command occupied 46 bytes.

6.8.1.3 Protocol Number

0x1A is utilized.

6.8.1.4 Date Time

For details see Location Data Packet Format section 5.2.1.4.

6.8.1.5 Length of GPS information, quantity of positioning satellites

For details see Location Data Packet Format section 5.2.1.5.

6.8.1.6 Latitude

For details see Location Data Packet Format section 5.2.1.6.

6.8.1.7 Longitude

For details see Location Data Packet Format section 5.2.1.7.

6.8.1.8 Speed

For details see Location Data Packet Format section 5.2.1.8.

6.8.1.9 Course

For details see Location Data Packet Format section 5.2.1.9.

6.8.1.10 Phone Number

The SOS phone number used for requesting address query, which is converted by ASCII and 0 is added at the right side if less than 21 bits.

6.8.1.11 Language

A bit indicates the current language used in the terminal.
Chinese: 0x00 0x01
English: 0x00 0x02

6.8.1.12 Information Serial Number

For details see Data Packet Format section 4.5

6.8.1.13 Error Check

For details see Data Packet Format section 4.6

6.8.1.14 Stop Bit

For details see Data Packet Format section 4.7

6.8.2 Response of Server

The server replies Chinese address or English address based on the extended command, and the response data packet is inconsistent

6.8.2.1 Response package in Chinese

The response data packet in Chinese is as follow:

<table>
<tr><th></th><th colspan="3">Format</th><th>Length</th><th>Example</th></tr>
<tr><td rowspan="14">Command packet sent from the server to the terminal (15+M+N Byte)</td><td colspan="3">Start Bit</td><td>2</td><td>0x78 0x78</td></tr>
<tr><td colspan="3">Length of data bit</td><td>1</td><td>0x0F</td></tr>
<tr><td colspan="3">Protocol Number</td><td>1</td><td>0x17</td></tr>
<tr><td rowspan="8">Information Content</td><td colspan="2">Length of Command</td><td>1</td><td>0x7E</td></tr>
<tr><td colspan="2">Server Flag Bit</td><td>4</td><td>0x00 0x00 0x00 0x01</td></tr>
<tr><td rowspan="6">Command Content</td><td>ADDRESS</td><td>7</td><td>0x41 0x44 0x44 0x52 0x45 0x53 0x53</td></tr>
<tr><td>&&</td><td>2</td><td>0x26 0x26</td></tr>
<tr><td>Address Content</td><td>M</td><td></td></tr>
<tr><td>&&</td><td>2</td><td>0x26 0x26</td></tr>
<tr><td>Phone Number</td><td>21</td><td></td></tr>
<tr><td>##</td><td>2</td><td>0x23 0x23</td></tr>
<tr><td colspan="3">Information Serial Number</td><td>2</td><td>0x00 0x01</td></tr>
<tr><td colspan="3">Check Bit</td><td>2</td><td>0xD9 0xDC</td></tr>
<tr><td colspan="3">Stop Bit</td><td>2</td><td>0x0D 0x0A</td></tr>
</table>

The Protocol Number of request Chinese address response is 0X17.
Command Content: ADDRESS&&Address Content&&Phone Number## (ADDRESS, &&, ## are fixed strings)
Chinese address content is sent in UNICODE.

Example of Chinese address response information:

7878 //Start Bit
84 //Data Length
17 //Response Protocol Number
7E //Length of Command, i.e., length of the information of the transmitted content
00000001 //Server Flag Bit
41444452455353 //ADDRESS
2626 //&& Separator
624059044F4D7F6E0028 //Chinese address is sent in UNICODE
004C004200530029003A
5E7F4E1C77015E7F5DDE
5E0282B190FD533AFF17
FF15FF144E6190530028
004E00320033002E0033
00390035002C00450031

00310032002E00390038
0038002996448FD1
2626 //&&Separator
3133373130383139313335000000000000000000 //Phone Number
2323 //## terminator of content
0106 //Serial No.
3825 //Check Bit
0D0A //Stop Bit

6.8.2.2 Response package in English

Considering the address or other foreign address in English is generally longer than that in Chinese, one data bit is not enough, so the data bit is occupied in 2 bytes.

Note: only the length of data bit corresponding to the protocol number of response address information is changed into two bytes.

<table>
<tr><td rowspan="14">Command packet sent from the server to the terminal (15+M+N Byte)</td><td colspan="3">Start Bit</td><td>2</td></tr>
<tr><td colspan="3">Length of data bit</td><td>2</td></tr>
<tr><td colspan="3">Protocol Number</td><td>1</td></tr>
<tr><td rowspan="8">Information Content</td><td colspan="2">Length of Command</td><td>2</td></tr>
<tr><td colspan="2">Server Flag Bit</td><td>4</td></tr>
<tr><td rowspan="6">Command Content</td><td>ADDRESS</td><td>7</td></tr>
<tr><td>&&</td><td>2</td></tr>
<tr><td>Address Content</td><td>M</td></tr>
<tr><td>&&</td><td>2</td></tr>
<tr><td>Phone Number</td><td>21</td></tr>
<tr><td>##</td><td>2</td></tr>
<tr><td colspan="3">Information Serial Number</td><td>2</td></tr>
<tr><td colspan="3">Check Bit</td><td>2</td></tr>
<tr><td colspan="3">Stop Bit</td><td>2</td></tr>
</table>

The Protocol Number of request English address response is 0X97.

Command Content: ADDRESS&&Address Content&&Phone Number##(ADDRESS, &&, ## are fixed strings)

Example of English address response information:

7878 //Start Bit
00D1 //Data Length
97 //Response Protocol Number
00CA //Length of Command, i.e., length of the information of the transmitted content
00000001 //Server Flag Bit

41444452455353 //ADDRESS
2626 //&& Separator
0053004F00530028004C //English address is sent in UNICODE
0029003A005300680069
006D0069006E00200046
0061006900720079006C
0061006E006400200057
0065007300740020052
0064002C004800750069
006300680065006E0067
002C004800750069007A
0068006F0075002C0047
00750061006E00670064
006F006E00670028004E
00320033002E00310031
0031002C004500310031
0034002E003400310031
0029004E006500610072
00620079
2626 //&& Separator
31323532303133373930373734303531000000000 //Phone Number
2323 //## terminator of content
0007 // Serial No.
72b5 //Check Bit
0D0A //Stop Bit

Ⅶ. Appendix A: code fragment of the CRC-ITU lookup table algorithm implemented based on C language

Code fragment of the CRC-ITU lookup table algorithm implemented based on C language is as follow:

```
static const U16 crctab16[] =
{
    0X0000, 0X1189, 0X2312, 0X329B, 0X4624, 0X57AD, 0X6536, 0X74BF,
    0X8C48, 0X9DC1, 0XAF5A, 0XBED3, 0XCA6C, 0XDBE5, 0XE97E, 0XF8F7,
    0X1081, 0X0108, 0X3393, 0X221A, 0X56A5, 0X472C, 0X75B7, 0X643E,
    0X9CC9, 0X8D40, 0XBFDB, 0XAE52, 0XDAED, 0XCB64, 0XF9FF, 0XE876,
    0X2102, 0X308B, 0X0210, 0X1399, 0X6726, 0X76AF, 0X4434, 0X55BD,
    0XAD4A, 0XBCC3, 0X8E58, 0X9FD1, 0XEB6E, 0XFAE7, 0XC87C, 0XD9F5,
    0X3183, 0X200A, 0X1291, 0X0318, 0X77A7, 0X662E, 0X54B5, 0X453C,
    0XBDCB, 0XAC42, 0X9ED9, 0X8F50, 0XFBEF, 0XEA66, 0XD8FD, 0XC974,
    0X4204, 0X538D, 0X6116, 0X709F, 0X0420, 0X15A9, 0X2732, 0X36BB,
    0XCE4C, 0XDFC5, 0XED5E, 0XFCD7, 0X8868, 0X99E1, 0XAB7A, 0XBAF3,
    0X5285, 0X430C, 0X7197, 0X601E, 0X14A1, 0X0528, 0X37B3, 0X263A,
    0XDECD, 0XCF44, 0XFDDF, 0XEC56, 0X98E9, 0X8960, 0XBBFB, 0XAA72,
    0X6306, 0X728F, 0X4014, 0X519D, 0X2522, 0X34AB, 0X0630, 0X17B9,
    0XEF4E, 0XFEC7, 0XCC5C, 0XDDD5, 0XA96A, 0XB8E3, 0X8A78, 0X9BF1,
    0X7387, 0X620E, 0X5095, 0X411C, 0X35A3, 0X242A, 0X16B1, 0X0738,
    0XFFCF, 0XEE46, 0XDCDD, 0XCD54, 0XB9EB, 0XA862, 0X9AF9, 0X8B70,
    0X8408, 0X9581, 0XA71A, 0XB693, 0XC22C, 0XD3A5, 0XE13E, 0XF0B7,
    0X0840, 0X19C9, 0X2B52, 0X3ADB, 0X4E64, 0X5FED, 0X6D76, 0X7CFF,
    0X9489, 0X8500, 0XB79B, 0XA612, 0XD2AD, 0XC324, 0XF1BF, 0XE036,
    0X18C1, 0X0948, 0X3BD3, 0X2A5A, 0X5EE5, 0X4F6C, 0X7DF7, 0X6C7E,
    0XA50A, 0XB483, 0X8618, 0X9791, 0XE32E, 0XF2A7, 0XC03C, 0XD1B5,
    0X2942, 0X38CB, 0X0A50, 0X1BD9, 0X6F66, 0X7EEF, 0X4C74, 0X5DFD,
    0XB58B, 0XA402, 0X9699, 0X8710, 0XF3AF, 0XE226, 0XD0BD, 0XC134,
    0X39C3, 0X284A, 0X1AD1, 0X0B58, 0X7FE7, 0X6E6E, 0X5CF5, 0X4D7C,
    0XC60C, 0XD785, 0XE51E, 0XF497, 0X8028, 0X91A1, 0XA33A, 0XB2B3,
    0X4A44, 0X5BCD, 0X6956, 0X78DF, 0X0C60, 0X1DE9, 0X2F72, 0X3EFB,
    0XD68D, 0XC704, 0XF59F, 0XE416, 0X90A9, 0X8120, 0XB3BB, 0XA232,
    0X5AC5, 0X4B4C, 0X79D7, 0X685E, 0X1CE1, 0X0D68, 0X3FF3, 0X2E7A,
    0XE70E, 0XF687, 0XC41C, 0XD595, 0XA12A, 0XB0A3, 0X8238, 0X93B1,
    0X6B46, 0X7ACF, 0X4854, 0X59DD, 0X2D62, 0X3CEB, 0X0E70, 0X1FF9,
    0XF78F, 0XE606, 0XD49D, 0XC514, 0XB1AB, 0XA022, 0X92B9, 0X8330,
    0X7BC7, 0X6A4E, 0X58D5, 0X495C, 0X3DE3, 0X2C6A, 0X1EF1, 0X0F78,
};

//  calculate the 16-bit CRC of data with predetermined length.
U16 GetCrc16(const U8* pData, int nLength)
{
    U16  fcs  =  0xffff;            //  initialization
    while(nLength>0){
        fcs = (fcs >> 8) ^ crctab16[(fcs ^ *pData) & 0xff];
        nLength--;
        pData++;
    }
    return  ~fcs;           //  negated
}
```

Ⅷ. Appendix B: a fragment of example of data packet of communication protocol

The following data displayed in hexadecimal are intercepted from the communication between a terminal and a server, wherein transmission means sending by the terminal and reception means returned from the server:

Login packet:

transmission: 78 78 0D 01 03 53 41 35 32 15 03 62 00 02 2D 06 0D 0A

reception: 78 78 05 01 00 02 EB 47 0D 0A

GPS data packet (06 adopts combined information package of GPS and LBS):

transmission: 78 78 1F 12 0B 08 1D 11 2E 10 CF 02 7A C7 EB 0C 46 58 49 00 14 8F 01 CC 00 28 7D 00 1F B8 00 03 80 81 0D 0A

Status packet:

transmission: 78 78 0A 13 44 01 04 00 01 00 05 08 45 0D 0A

reception: 78 78 05 13 00 05 AF D5 0D 0A

disconnect oil and electricity online:

reception: 78 78 15 80 0F 00 01 A9 58 44 59 44 2C 30 30 30 30 30 30 23 00 A0 DC F1 0D 0A

transmission: 78 78 18 15 10 00 01 A9 58 44 59 44 3D 53 75 63 63 65 73 73 21 00 02 00 18 91 77 0D 0A

the server sending DYD,000000#

reply: DYD=Success!

Command sent during disconnection of oil and electricity:

reception: 78 78 15 80 0F 00 01 A9 61 44 59 44 2C 30 30 30 30 30 30 23 00 A0 3E 10 0D 0A

transmission: 78 78 53 15 4B 00 01 A9 61 41 6C 72 65 61 64 79 20 69 6E 20 74 68 65 20 73 74 61 74 65 20 6F 66 20 66 75 65 6C 20 73 75 70 70 6C 79 20 63 75 74 20 6F 66 66 2C 74 68 65 20 63 6F 6D 6D 61 6E 64 20 69 73 20 6E 6F 74 20 72 75 6E 6E 69 6E 67 21 00 02 00 1C F3 0D 0D 0A

the server sending DYD,000000#

reply: Already in the state of fuel supply cut off, the command is not running!

Connect oil and electricity online:

reception: 78 78 16 80 10 00 01 A9 63 48 46 59 44 2C 30 30 30 30 30 30 23 00 A0 7B DC 0D 0A

transmission: 78 78 19 15 11 00 01 A9 63 48 46 59 44 3D 53 75 63 63 65 73 73 21 00 02 00 1E F8 93 0D 0A

the server sending: HFYD,000000#

reply: HFYD=Success!

Command sent during connection of oil and electricity:

reception: 78 78 16 80 10 00 01 A9 64 48 46 59 44 2C 30 30 30 30 30 30 23 00 A0 8B 1B 0D 0A

transmission: 78 78 55 15 4D 00 01 A9 64 41 6C 72 65 61 64 79 20 69 6E 20 74 68 65 20 73 74 61 74 65 20 6F 66 20 66 75 65 6C 20 73 75 70 70 6C 79 20 74 6F 20 72 65 73 75 6D 65 2C 74 68 65 20 63 6F 6D 6D 61 6E 64 20 69 73 20 6E 6F 74 20 72 75 6E 6E 69 6E 67 21 00 02 00 1F DB BF 0D 0A

the server sending: HFYD,000000#

reply: Already in the state of fuel supply to resume, the command is not running!

Querying address information online:

reception: 78 78 16 80 10 00 01 A9 67 44 57 58 58 2C 30 30 30 30 30 30 23 00 A0 06 2D 0D 0A

transmission: 78 78 64 15 5C 00 01 A9 67 44 57 58 58 3D 4C 61 74 3A 4E 32 33 2E 31 31 31 36 38 32

2C 4C 6F 6E 3A 45 31 31 34 2E 34 30 39 32 31 37 2C 43 6F 75 72 73 65 3A 30 2E 30 30 2C 53 70 65 65 64 3A 30 2E 33 35 31 38 2C 44 61 74 65 54 69 6D 65 3A 31 31 2D 31 31 2D 31 35 20 20 31 31 3A 35 33 3A 34 33 00 02 00 23 07 AE 0D 0A
Content sent by the terminal: DWXX=Lat:N23.111682,Lon:E114.409217,Course:0.00,Speed:0.3518,DateTime:11-11-15 11:53:43

The terminal obtains address information from the server:

Chinese:

transmission: 78 78 2E 1A 0B 0B 0F 0E 21 17 CF 02 7A C8 87 0C 46 57 E3 00 14 02 36 36 33 36 36 00 03 00 04 00 00 00 00 00 00 00 00 00 00 00 00 00 01 00 34 AD E9 0D 0A

reception: 78 78 94 17 8E 00 00 00 01 41 44 44 52 45 53 53 26 26 4F 4D 7F 6E 00 3A 5E 7F 4E 1C 77 01 60 E0 5D DE 5E 02 4E 91 5C 71 89 7F 8D EF 00 2E 65 87 53 4E 4E 00 8D EF 00 2E 79 BB 60 E0 5D DE 5B 89 4F 17 4F 1A 8B A1 5E 08 4E 8B 52 A1 62 40 7E A6 00 33 00 32 7C 73 00 2E 79 BB 60 E0 5D DE 5E 02 59 16 55 46 62 95 8D 44 67 0D 52 A1 4E 2D 5F C3 7E A6 00 33 00 32 7C 73 00 2E 26 26 36 36 33 36 36 00 03 00 04 00 00 00 00 00 00 00 00 00 00 00 23 23 00 01 E4 2A 0D 0A

The content sent by the server is: Locating: Wenhua Rd. 1, Huizhou, Guangdong, about 32 meters from Huizhou Anzhong Accounting Firm, about 32 meters from Huizhou Foreign Investment Service Center.

Mobile Phone Number is 66366.

English:

transmission: 78 78 2E 1A 0B 0B 0F 0E 1E 08 CF 02 7A C8 A2 0C 46 57 D7 00 14 02 36 36 33 36 36 00 03 00 04 00 00 00 00 00 00 00 00 00 00 00 00 00 02 00 32 04 3A 0D 0A

reception: 78 78 00 E9 97 00 E2 00 00 00 01 41 44 44 52 45 53 53 26 26 00 50 00 72 00 65 00 63 00 69 00 73 00 65 00 6C 00 79 00 20 00 4C 00 6F 00 63 00 61 00 74 00 69 00 6E 00 67 00 3A 00 31 00 30 53 F7 00 20 00 59 00 75 00 6E 00 73 00 68 00 61 00 6E 00 20 00 57 00 65 00 73 00 74 00 20 00 52 00 64 00 2C 00 48 00 75 00 69 00 63 00 68 00 65 00 6E 00 67 00 2C 00 48 00 75 00 69 00 7A 00 68 00 6F 00 75 00 2C 00 47 00 75 00 61 00 6E 00 67 00 64 00 6F 00 6E 00 67 00 2C 00 35 00 31 00 36 00 30 00 30 00 33 00 28 00 4E 00 32 00 33 00 2E 00 31 00 31 00 31 00 37 00 37 00 2C 00 45 00 31 00 31 00 34 00 2E 00 34 00 30 00 39 00 32 00 32 00 29 26 26 36 36 33 36 36 00 03 00 04 00 00 00 00 00 00 00 00 00 00 00 23 23 00 01 AF 4D 0D 0A

The content sent by the server is: Precisely Locating: No.10 Yunshan West Rd, Huicheng, Huizhou, Guangdong, 516003(N23.11177,E114.40922)

Mobile Phone Number is 66366.

Process of Alarm packet:

Short message in Chinese:

transmission: 78 78 25 16 0B 0B 0F 0E 24 1D CF 02 7A C8 87 0C 46 57 E6 00 14 02 09 01 CC 00 28 7D 00 1F 72 65 06 04 01 01 00 36 56 A4 0D 0A

reception: 78 78 05 16 00 36 95 70 0D 0A

reception: 78 78 BE 17 B8 00 00 00 01 41 4C 41 52 4D 53 4D 53 26 26 7D 27 60 25 54 7C 53 EB 00 3A 5E 7F 4E 1C 77 01 60 E0 5D DE 5E 02 4E 91 5C 71 89 7F 8D EF 00 2E 65 87 53 4E 4E 00 8D EF 00 2E 79 BB 4E 2D 88 4C 00 41 00 54 00 4D 7E A6 00 33 00 31 7C 73 00 2E 79 BB 4E 2D 88 4C 6C 5F 53 17 65 2F 88 4C 7E A6 00 33 00 31 7C 73 00 2E 00 2C 00 31 00 31 00 2D 00 31 00 31 00 2D 00 31 00 35 00 20 00 31 00 34 00 3A 00 33 00 36 00 3A 00 32 00 39 26 26 30 30 30 30 30 30 30 30 30 30

30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 23 23 00 01 B6 D8 0D 0A

Content of Short message is: Emergency Call: Wenhua Rd. 1, Huizhou, Guangdong, about 31 meters away from ATM machine of Bank of China, about 31 meters away from Jiangbei branch of of Bank of China, 11-11-15 14:36:29.

The specific meanings of the above commands can be looked up in the protocol document.

Ⅸ. Appendix C: Complete Format of the Information Package

A. data packet sent by the terminal to the server

Login Message Packet (18 Byte)						
Start Bit	Packet length	Protocol Number	Terminal ID	Information Serial Number	Check Bit	Stop Bit
2	1	1	8	2	2	2

GPS Information Package (26+N Byte)												
Start Bit	Packet length	Protocol Number	Information Content							Information serial number	check bit	stop bit
			Date Time	GPS Information					Reserved extended bit			
				Length of GPS information, quantity of positioning satellites	Latitude	Longitude	Speed	Course, Status				
2	1	1	6	1	4	4	1	2	N	2	2	2

LBS information package (23+N Byte)											
Start Bit	Packet length	Protocol Number	Information Content						Information serial number	check bit	stop bit
			Date Time	LBS Information				Reserved extended bit			
				MCC	MNC	LAC	Cell ID				
2	1	1	6	2	1	2	3	N	2	2	2

LBS complete information package (42+N Byte)																								
Start Bit	Packet length	Protocol Number	Information Content																			Information serial number	check bit	stop bit
			Date Time	LBS Information																	Reserved extended bit			
				MCC	MNC	LAC	MCI	MCISS	NCI1	NCISS1	NCI2	NCISS2	NCI3	NCISS3	NCI4	NCISS4	NCI5	NCISS5	NCI6	NCISS6				
2	1	1	6	2	1	2	2	1	2	1	2	1	2	1	2	1	2	1	2	1	N	2	2	2

GPS、LBS information package (34+M+N Byte)																	
Start Bit	Packet length	Protocol Number	Information Content												Information serial number	check bit	stop bit
			Date Time	GPS Information						LBS Information				Reserved and extended			
				Length of GPS information, quantity of positioning satellites	Latitude	Longitude	Speed	Course, Status	Reserved extended bit	MCC	MNC	LAC	Cell ID				
2	1	1	6	1	4	4	1	2	M	2	1	2	3	M	2	2	2

Status Packet(13+N Byte)									
St	Packet Length	Protocol	Information Content				Information Serial	Check Bit	Stop Bit
			Terminal Information	Voltage	GSM Signal	Reserved			

Start Bit		Number	Content	Level	Strength Level	and Extended Bit (language)	Number		
2	1	1	1	1	1	2	2	2	2

SNR information of satellite (11+M+N Byte)								
			Information Content					
Start Bit	Packet Length	Protocol Number	Quantity of positioning satellites	SNR of Satellite 1 | 2 | 3 | …… | n	Reserved and Extended Bit	Information Serial Number	Check Bit	Stop Bit
2	1	1	1	M	N	2	2	2

terminal responds to the command sent by server (15+M+N Byte)									
			String Content						
Start Bit	Packet Length	Protocol Number	Length of Command	Server Flag Bit	Command Content	Reserved and Extended Bit (language)	Information Serial Number	Check Bit	Stop Bit
2	1	1	1	4	M	2	2	2	2

GPS, LBS, Status Information Package (40+M+N+L Byte)																						
			Information Content																			
				GPS Information						LBS Information						Status Information						
Start Bit	Packet Length	Protocol Number	Date Time	Length of GPS information, quantity of positioning satellites	Latitude	Longitude	Speed	Course, Status	Reserved and Extended Bit	LBS Length	MCC	MNC	LAC	Cell ID	Reserved and Extended Bit	Terminal Information Content	Voltage Level	GSM Signal Strength Level	Reserved and Extended Bit (language)	Information Serial Number	Check Bit	Stop Bit
2	1	1	6	1	4	4	1	2	M	1	2	1	2	3	N	1	1	1	2	2	2	2

B. Data Packet Sent by Server to Terminal

Response of Server after receiving Status Packet from Terminal (10 Bytes)					
Start Bit	Packet Length	Protocol Number	Information Serial Number	Check Bit	Stop Bit
2	1	1	2	2	2

Command Packet Sent by Server to Terminal (15+M+N Byte)									
			Information Content						
Start Bit	Packet Length	Protocol Number	Length of Command	Server Flag Bit	Command Content	Reserved extended bit	Information Serial Number	Check Bit	Stop Bit
2	1	1	1	4	M	N	2	2	2