Protocol

Attentions: Server must response to Login packet/Heartbeat packet, or else device can't update location in time!!

Terms, Definitions

A. General Definition

Big Endian

Fields and byte order in multibyte data that involved in protocol is called internet byte order, namely Big Endian.

The value for time field referred in data packet is UCT second.

Reference：http://en.wikipedia.org/wiki/UTC

The maximum volume for one data packet is less than 1024 byte.

2.1 Domain usage rules

Domain parse local cache of ip, if can not connect this ip 3 time(tentative, check note below),then re-request domain analysis.

Note: Regarding the times of connections, the general principle is to establish a connection with the server as soon as possible. Currently, some terminals cost 20s to 60s to establish a connection with server, and there is a delay before re-connection. So we recommend 3 time connections . Each terminal chooses the appropriate and flexible algorithm.

Basic Rules

1 The terminal will automatically send a first login message packet to the server, wait confirmation

from server. Server response a data pocket to confirm.(Once the connection is established between server and terminal, the first data packet from terminal must be login message packet)

2. After the connection is build successfully, terminal will send gps data packet to server regularly when GPS information is changed.

3. To ensure the availability of the connection, the terminal will send status information to the

server at regular intervals, the server will return response data packets to confirm the

connection.

4. The protocol number and data series number in responding data packet to terminal are same as server received from terminal.

B. Data packet format

Format	Start Bits	Protocol Length	Length of package	Information Serial Number	Information Content
Length(Byte)	2	1	2	2	N

The total length of packets is 7+N byte
Data packet for upload and download all use this structure.

1. Start Bit
Occupy 2 bits Fixed value in HEX 0x67 0x67

2. Protocol Number
Occupy 1 bit , see below

Value	Description	Respond
0x01	Login data packet	Y
0x02	GPS data packet	N
0x04	Alarm data packet	Y
0x80	GPRS command	Y
0x07	Expanding heartbeat data packet	Y

3. Data Packet Length
Occupy 2 bits
Length = Protocol Number + Information Content + Information Serial Number
Information Serial Number

4. The serial number of the first GPRS data (including status packet and data packet such as GPS,
LBS) sent after booting is „1 , and the serial number of data sent later at each time will be automatically added „1 . It will recount from 1 after reach tomaximum value 65535.

5. Information Content

5.1 Login data packet

Format	Information Content	
	Terminal ID	Terminal Language
Length(byte)	8	1

The login message packet is used to be sent to the server with the terminal ID so as to confirm the
established connection is normal or not.

5.1.1 Terminal ID (8 bits)

The terminal ID applies IMEI number of 15 bits

Example: IMEI number：123456789012345,

Terminal ID ：0x01 0x23 0x45 0x67 0x89 0x01 0x23 0x45

5.1.2 Terminal Language

Value	Language
0x00	Chinese
0x01	English

In some cases when the server needs to respond to the terminal text message, the server will return the text in the corresponding language according to the language set by the terminal.

For Example: SOS alarm. If terminal is Chinese, server will respond text alarm with Chinese address: SOS alarm:广☒省深圳市☒☒大浪瑞信恒☒瑞园 600 米

If terminal is English, server will respond text alarm with English address:SOS!http://maps.google.com/?q=22.577308,113.916685<DateTime:2013-01-22 19:40:00>

5.1.3 Server Corresponding（After get login data packet, server must response）

For Example:

Examples of the login message packet sent from terminal to the server: and are as follows: (in the examples the terminal ID is

0x67 0x67	0x01	0x00 0x0B	0x00 0x01	0x010x23 0x45 0x67 0x89 0x01 0x23 0x45	0x00
Start Bit	Protocol No.	Length	Series No.	Terminal id	Terminal Language

the response packet sent from the server to the terminal （
Same protocol number from terminal data package and corresponding data packet）

0x67 0x67	0x01	0x00 0x02	0x00 0x01
Start Bit	Protocl No.	Length	Series No.

5.2 GPS Data Packet (0x02)

Format	Information Content						
	Date Time	Latitude	Longitude	Speed	Course	Lbs	Location Status
Length(byte)	4	4	4	1	2	9	1

5.2.1 Data Time

Occupy 4 Bits, satellite time at UTC second

5.2.2 Latitude

Occupy 4 bits, defining the latitude value of location data. The range of the value is 0-162000000, indicating a range of 0° . The conversion method thereof is as follow:-90° ,unit: 1/500 second:

Converting the value of latitude and longitude output by GPS module into a decimal based on minute; multiplying the converted decimal by 30000; and converting the multiplied result into hexadecimal.

Example: 22°32.7658 =(22X60+32.7658)X3000=40582974, then converted into a hexadecimal

number 40582974(Decimal)= 26B3F3E(Hexadecimal) at last the value is 0x02 0x6B 0x3F 0x3E.

-22°32.7658 =(22X60+32.7658)X3000=40582974, then converted into a hexadecimal

number 40582974(Decimal)= 26B3F3E(Hexadecimal) at last the value is 0xFD 0x94 0xC0 0xC2.

For Example

1)0x026B3F3E = 40582974 Hexadecimal convert to decimal

2)40582974/30000 = 1352.7658

3)1352/60 = 22 Degree

Latitude: 026c7dc4 40664516 40664516/30000/60 22.591397778

Longitude: 097bdd00 159112448 159112448/30000/60 88.395804444

5.2.3 Longitude

Four bytes are consumed, defining the longitude value of location data. The range of the value is

0-324000000, indicating a range of 0°-180° . Unit:1/500 second, same conversion method as Latitude.

5.2.4 Speed

One byte is consumed, defining the running Speed of GPS. The value ranges from 0x00 to 0xFF indicating a range from 0 to 225km/h.

5.2.5 Course

Two bytes are consumed, defining the running direction of GPS. The value ranges from 0°to 360°measured clockwise from north of 0°

5.2.6 LBS information

nine bits are consumed, add 0x00 in left if item byte is not enough

Format	MCC	MNC	LAC	CI
Length(byte)	2	2	2	3

For example: one Chinese Lbs information

0x01 0xCC	0x00 0x01	0x27 0x49	0x00 0x0C 0xEE
MCC	MNC	LAC	CI

5.2.7 Location status

nine bits are consumed, defining the location status of terminal. Regard first 1 bit as eighth, the lowest number is 0 bit, the highest number is 7 bit. The low number will be after high number when transmit.

High No.							Low No.
7	6	5	4	3	2	1	0

No.	Status
0	0：GPS not located 1：GPS located
1	0：ACC number 0 1：ACC number 1
2	Retained
3	Retained
4	Retained
5	Retained
6	Retained
7	Retained

5.2.8 Corresponding

This protocol is not required to respond

5.2.9 Note

When GPS is not located, the terminal will not upload GPS data packet. Unless trigger the method of forced uploading 10 data packet(call,alarm etc)

5.3 Alarm data packet(0x04)

Format	Information Content							
	Date time	Latitude	Longitude	Speed	course	Lbs	Location Status	Alarm Mode
Length(byte)	4	4	4	1		9	1	1

1)Terminal send Alarm Data Packet to Server

2) Data ,time, Latitude,Longitude,speed, course, LBS,Location Statue. Please refer to 5.2 (GPS data pocket introduction)

3) Alarm Mode

When the alarm is triggered, terminal upload one alarm data packet, corresponding alarm place is 1.

value	status
0x01	Power cut alarm
0x02	
0x03	Low battery alarm (GF10)
0x04	Vibration alarm
0x05	
0x06	
0x07	
0x08	
0x09	
0x0a	
0x0b	
0x0c	
0x0d	
1 0x0e	
0x0f	

4) Server response content

Format	information
	Alarm message
byte	N

Alarm information content is UTF-8 encoded。 For example: Power cut alarm: Gutian 2nd Road, Wuhan City, Hubei Province. About 140 meters away from Changsheng Meat Joint Processing Company (southwest).

After receiving the response, the terminal sends the content of the alarm message to the central number/SOS number by SMS. If the content of the alarm message is empty (0 bytes), then no need to send a text message.

5.4 Sending GPRS command packet(0x80)

format	Information content		
	Information mark	Server mark	Sending content
Length(byte)	1	4	N

Appendix 1: SMS/GPRS Command ending with #

Command		**Example**
Check parameters		PARAM#
Reset device		RESET#
Control fuel	0:resume fuel 1:Cut fuel	RELAY,0# RELAY,1#
Ser time interval	Unit: second	TIMER,60#

The server actively sends command/interactive message to the terminal. Command refer to **below:**

For example:
Cut fuel example below:
676780000FFFFF010128033B52454C41592C3123

Resume fuel example below:
676780000FFFFF010128033B52454C41592C3023

Information mark

Information mark value	**Downstream message type**
0x01	command
0x02	

5.4.1 Server mark

Reserved for server identification, the terminal will receive the data binary as it is in the return packet.。

5.4.2 Sending content

the instruction/interaction message to be delivered is encoded in UTF-8. Please refer to "6. Standard Common Instruction Format" for the contents.

5.4.3 Terminal response

format	Information content		
	Information mark	Server mark	Response content
length(byte)	1	4	N

Terminal response content part encoding is UTF-8 encoded

5.5 LBS Packet(0x91)

format	Information content										
	Date and time	TA	MCC	MNC	LBS numbber	LBS 1	LBS 2	LBS 3	LBS 4	LBS 5	Location status
length(byte)	4	1	2	1	1	6	6	6	6	6	1

5.5.1 Data and Time

4-bit unsigned integer, based on UTC time value, note that the network byte order is used when passing。

5.5.2 TA (Timing advance)

This value can only be obtained during the call or SMS time range, the range is 0-63. In other cases, 255 is an invalid value; multiplying by 550 (m) can estimate the distance from the terminal to the primary cell.

5.5.3 MCC

The mobile user's country code is Mobile Country Code (MCC), China's mobile country number is 460 (decimal)

The value range here is: 0x0000 to 0x03E7.

China's mobile country number is: 0x01 0xCC (decimal 460 converted to hexadecimal).

5.5.4 MNC

The mobile network number Mobile Network Code (MNC), for example, China Mobile is 0x00.。

5.5.5 LBS value

The maximum value is 5, what is the value, and how many LBS is carried in the back. If the number of base stations acquired by the device is more than 5,

The device should report the 5 LBS with the strongest signal strength, and the LBS goes to the back row according to the intensity. The primary LBS is the first one.。

Considering the convenience of the terminal processing, the variable length data packet is not used here. It is assumed that there are 3 LBS, and the data packet always contains 5 LBS , but only the first three LBS has content, and the latter two LBS is filled with 0.

5.5.6 LBS

LAC	CI	RSSI

2	3	1

5.5.7 LAC

Location Area Code (LAC) is contained in the LAI and consists of two bytes.
code. The available range is 0x0001-0xFFFE, and the code groups 0x0000 and 0xFFFF are not available (see GSM specification 03.03,
04.08 and 11.11). A location area may contain one or more cells.

5.5.8 CI

Main cell CI, The cell identification code has a value ranging from 0x000000 to 0xFFFFFF.
See glossary – CI。

5.5.9 RSSI

The signal strength of the primary cell, the value range is 0x00~0xFF, the actual signal strength is negative, and the absolute value is uploaded.
See glossary – RSSI。

5.5.10 Location status

It occupies 1 byte and is used to indicate the positioning status of the terminal device. Think of 1 byte as 8 bits, the lowest bit is 0 bit, and the most significant bit is 7 bits. When transmitting, the high bit is transmitted first, and then the low bit is transmitted. The specific meanings of the delegates are as follows:

Hig h bit							Low bit
7	6	5	4	3	2	1	0

0	0：GPS not located 1：GPS located
1	0: Automatically sent by the device 1：sent by sms
2	Reserved
3	Reserved
4	Reserved
5	Reserved
6	Reserved
7	Reserved

5.5.11 response

This protocol don;t need response

5.6 Extended heartbeat packet(0x07)

format	Information content

	status	GSM signal	Voltage level
length(byte)	2	1	1

5.6.1 Used to confirm that the connection between the terminal and the server is normal, and send the packet at a fixed frequency.

5.6.2 status

It takes 2 bytes and is used to indicate various status information of the terminal device. Think of 1 byte as 8 bits, the lowest bit is 0 bit, and the most significant bit is 7 bits. When transmitting, the high bit is transmitted first, and then the low bit is transmitted. The specific meanings of the delegates are as follows:

Hih No.							Low No.
15	14	…	….	…	…	1	0

0	0：GPS not located 1：GPS located
1，2	10:ACC OFF 11:ACC ON 00:no this status
3,4	Reserved
5，6	Reserved
7，8	Reserved
9	Reserved
…	…
14	Reserved
15	Reserved

Example: eg 0x00BB ie 1011 1011, GPS is positioned, ACC OFF, Arm, oil and electricity disconnected, charger not inserted

5.6.3 GSM signal level

Occupies 1 byte, divided into 5 levels

0x00：no signal；

0x01：Very weak signal

0x02：Weak signal

0x03：Good signal

0x04：Strong signal

Eg：0x03 GSM Good signal

5.6.4 Voltage level

Occupies 1 byte in the range 0-100, indicating the percentage of current power, expressed in hexadecimal.

Eg:0x005D, corresponding to decimal decimal number 93, that is, the current power is 93%

5.6.5 Server Response

For example：

The terminal sends a heartbeat packet to the server as follows:

0x67 0x67	0x03	0x00 0x04	0x00 0x1A	0x00 0x01
Start Bit	Protocol number	Packet length	Information serial number	status

The server responds to the data packet with the terminal (the protocol number in the response packet is the same as the packet protocol number sent by the terminal)

0x67 0x67	0x03	0x00 0x02	0x00 0x1A
Start Bit	Protocol number	Packet length	Information serial number

5.6 Server send command start Voice recording (0x0A)

Model

Server send command to device ：

0x67 0x67	0x0A	0x00 0x02	0x00 0x1A	0x00 0x0A
Start Bit	Protocol number	Packet length	Information serial number	Voice recording time

Device response to server ：

0x67 0x67	0x0A	0x00 0x03	0x00 0x1A	0x00
Start Bit	Protocol number	Packet length	Information serial number	Voice recording status

Recording status：（<=2 means activate succeed, >2 means activate failed）

0: activate OK ；1: device starting recording；2: reserve；3: activate recording failed

5.7 Device upload voice file to server (0x0C)

fomat	I nformations			
	Total packet	serial number	time (BCD[6])	Recording document
length (byte)	1	1	6	N

5.16.1 Total packet

one recording document will separate how many packet upload to server

5.16.2 serial number

which packet number of current uploading

5.16.3 time(BCD[6])

Time of starting recording, all the packet of Same recording document will show the same"time".

180226120030（means recording time is 18year feb. 26th 12:00:30）

5.16.4 Recording document

Data will be 900byte, final data be subject to physical data packet

5.16.5 server response data

For example ：

Device upload voice file to server ：

0x67 0x67	0x0C	0x03 0x8E	0x00 0x1A	0x08	0x01	0x18 0x06 0x20 0x10 0x23 0x50
Start Bit	Protocol number	Packet length	Information serial number	Total packet number	Packet No.	time(BCD[6])

0x01 0x02 0x03 … …0x03 0x02 0x01 (Data will be 900byte, final data be subject to physical data packet)
Recording document

Server response data ：

0x67 0x67	0x0C	0x00 0x09	0x00 0x1A	0x01	0x18 0x06 0x20 0x10 0x23 0x50
Start Bit	Protocol number	Packet length	Information serial number	Packet No.	time(BCD[6])

Appendix 1: SMS/GPRS Command ending with #

Function	Command	Explaination	Example
Check parameters	PARAM		PARAM#
Get Google Link	WHERE		WHERE#

Check version	VERSION		VERSION#
Factory setting	FACTORY		FACTORY#
Reset device	RESET		RESET#
Ser time interval (s)	TIMER		TIMER,60#
Control fuel (Car GPS)	RELAY	0:resume fuel 1:Cut fuel	RELAY,0# RELAY,1#
Set time zone	GMT	Set east time zone fill in with E Set west time zone fill in with W	GMT,E,8,00# means set+8 GMT,E,5,30# means set+5.5 GMT,W,6,00# means set-6
Delete center number	CENTER	A：setup, D：delete	CENTER,A,123456# means set 123456 as center number CENTER,D# delete number; CENTER# check current number
Set alarm method	KC	0:close 1:GPRS alarm 2:SMS+GPRS alarm 3:GPRS+SMS+phonecall Default GPRS alarm	KC,2#
Set low battery alarm(GF10 only)	BATALM	0:close 1: open Default open	BATALM,0#; BATALM,1#
Set Vibrate alarm	SENALM	0:close 1: open Default close	SENALM,0#; SENALM,1#
Activate GPSON (GF10 only)	GPSON	GPSON,T# T can be set from 1~100 minutes	GPSON,5# activate 5 minutes
Working mode (GF10 only)	WKMD	0：Urgent Real time track 1：Power saving mode, 3min time interval update location,10min update heartbeat data 2：GPS close,10min update one heartbeat and disconnect server Default mode 1	WKMD,1#
LBS Open/Close	LBS	0：close 1：open Default Close	LBS,0#
Voice recording (GF10 G500M	JT	0:close 1: open	JT,0#

only)		Default close	

一. 附☒

1. ☒音功能☒☒描述

整体流程及异常情况描述：

1) 下☒☒音指令后，如果平台没有收到☒☒回包，或者☒☒回包状☒异常，☒☒☒开启失☒，提示用☒重新下☒开启☒音指令
2) ☒音文件 10s-30s 一条，每条按照 900 字☒大小分包上☒，最后一条不足 900 字☒按照☒☒大小上☒，同一条☒音文件开始☒☒要相同
3) 一个☒音包是分☒ N 个小包☒送的，☒☒每☒送一个小包，服☒器予以回复，☒☒收到回复☒，接着☒送下一个小包，直到所有小包☒完☒止。