EELINK Terminal Communication Protocol Second Edition

V1.8.4

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Revision History

EDITOR	DATE	VERSION	AUDIT	APPROVAL	REVISE
EELINK	2013-6-15	1.8.0			Release initial version
EELINK	2013-6-26	1.8.1			Add GEOfence Add displacement alarm Add collision / fall alarm
EELINK	2013-7-4	1.8.1			Revise some words
EELINK	2013-10-10	1.8.4			Add speeding alarm Add vibrating alarm

CONTENTS

1 COMMUNICATION PROTOCOL

1.1 Introduction

This document defines the positioning terminal and location-based services platform application interface protocols, and positioning commands supported by the terminal.
Interface protocol applies to the location service platform and positioning terminal's interaction through the GPRS communication; Command applies to users and terminal's interaction by SMS.

1.2 Compatibility

This Protocol is downward compatible with GOOME GT12 protocol.

2 TERMS & DEFINITIONS

2.1 Terms and Abbreviations

Terms, abbreviations	Full name
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

2.2 General Definition

2.2.1 Endianness

Protocol related to multi-byte data field, Endianness correspond network byte order.

2.2.2 Time Field Of Message Content

The value of time field contained in messsage content is UTC seconds.
See also: http://en.wikipedia.org/wiki/UTC

2.2.3 Packet Size

A packet size cannot be more than 1024 bytes.

2.2.4 Domain Using Rules

IP obtained from DNS will be cached, if clients can not connect the IP in 5 minutes, DNS will restart to get new IP address.

Purpose:
① Cached IP connect to server faster(avoid DNS delay), better user experience.
② Reduce the number of requests to DNS server (DNS server to the mobile device to avoid excessive pressure, causing false positives).
③ IP access is not affected by DNS server(server IP generally does not change)

Note: For connection times, overall principle is to establish a connection to server as soon as possible. Now some terminal establishes a connection in 20s to 60s, we suggest that the number of connections set at three times, each terminal choose the appropriate algorithm flexibility.

3 BASIC RULE

1. Equipment starts to send login information packet, the server returns a response packet to confirm. (The first packet must be login information packets after connection of device and server).
2. GPS data will be sent to server regularly after connection.

3. In order to ensure the validity of the connection, heartbeat packets will be sent at regular intervals to server, server returns a response packet. Protocol number and serial number inside the response packet is the same with the packets sent to server.

4 DATA PACKET FORMAT

4.1 Format Description

Total length of the packet has 7 + N bytes, uplink and downlink data packets use this packet structure.

Format	Header	Protocol number	Packet length	Serial Number	Content
Length（Byte）	2	1	2	2	N

4.1.1 Header

2 bytes, fixed as 0x67 0x67

4.1.2 Protocol Number

1 byte,relationship of protocol number and data packet,refer to the following table:

Protocol number	Packet description	Response
0x01	Login data packet	YES
0x02	GPS data packet	NO
0x03	Heartbeat data packet	YES
0x04	Alarm data packet	YES
0x05	Terminal state packet	YES
0x06	SMS commands upload data packet	YES
0x07	OBD data packet	YES
0x80	SMS commands / interactive message downlink data packet	YES
0x81	Ordinary messages data packets	NO

4.1.3 Packet Length

2 bytes, packet length is from "message serial number" to "content" including themselves.

4.1.4 Serial Number

The first GPRS data(GPS data packets,Heartbeat packet,Command packet) serial number sent by the rebooted devices is '1', serial number automatically increased by 1 after a data transmission. The serial number will be reset to 1 after reaching a maximum value of 65535 .

4.2 Login Packet (0x01)

Format	**Content**	
	Terminal ID	Terminal language
Length（byte）	8	1

Login packet is used to verify that the server connection is established properly, submit the terminal ID to the server.

4.2.1 Terminal ID (8 bytes)

Terminal ID use the 15 IMEI number. Example: 123456789012345, the terminal ID is: 0x01 0x23 0x45 0x67 0x89 0x01 0x23 0x45

4.2.2 Terminal Language (1 byte)

This field indicates the terminal language.

Number	**Languages**
0x00	Simplified Chinese
0x01	English

Server will return some message with corresponding languages according to terminal language setting.

Terminal language is English, if SOS alarm occurs, the server returns the SOS alarm address in English SMS, such as:
Device SOS alarm! 3 Songpingshan Qimin Road, Nanshan, Shenzhen, Guangdong, China, 518057

4.2.3 Server Response

For example:
Terminal login information packet is sent to the server as follows (an example of a terminal ID: 123456789012345)

0x67 0x67	0x01	0x00 0x0A	0x00 0x01	0x01 0x23 0x45 0x67 0x89 0x01 0x23 0x45	0x01
Header	**Protocol**	**Packet**	**Serial**	**Terminal ID**	**Terminal**

	number	**length**	**Number**		**Language** (English)

Server's response packet to the terminal (protocol number in the response packet is the same with protocol number in the terminal data packet)

0x67 0x67	0x01	0x00 0x02	0x00 0x01
Header	**Protocol number**	**Packet length**	**Serial Number**

4.3 GPS Data Packet (0x02)

Format	Content						
	Date Time	Latitude	Longitude	Speed	Course	Base	Position status
Length (byte)	4	4	4	1	2	9	1

4.3.1 Date Time

4 bytes,the satellite time UTC seconds.

4.3.2 Latitude

4 bytes, latitude values of positioning data. Value range from -162000000 to 162000000, which means -90 degrees (South Latitude) to 90 degrees (North Latitude) , unit: 1/500 second, value conversion is as follows:

Latitude value from GPS divided is converted to decimal that unit is miniute, then put the decimal multiplied by 30,000 and converted into a hexadecimal number.

Such as:

North Latitude: 22° 32.7658 '(22*60+32.7658)*30000= 40582974, and convert it into a hexadecimal number: 0x02 0x6B 0x3F 0x3E

South Latitude: -22° 32.7658 '-(22*60+32.7658)*30000= - 40582974, and convert it into a hexadecimal number: 0xFD 0x94 0xC0 0xC2

4.3.3 Longitude

4 bytes, Longitude values of positioning data. Value range from -324000000 to 324000000, which means -180 degrees (West Longitude) to 180 degrees (East Longitude) , unit: 1/500 second, value conversion is the same with 4.3.2

4.3.4 Speed

One byte, speed from GPS, the value range is 0x00 ~ 0xFF, represents the range from 0 to 255 km / hour.

4.3.5 Course

Two bytes, means the direction of movement of GPS, the range from 0 to 360, unit: degree(north is 0 degrees, clockwise)

4.3.6 Base Station

9 bytes, if not long enough, left fill 0x00.

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

A base station message of CHINA

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

4.3.7 Position Status

One byte, represents the position status of the device. A byte consists of 8-bit, the lowest bit is 0, the highest bit is 7, priority transmit high bit, then low bit. as follows:

High							Low
7	6	5	4	3	2	1	0

Section 0 bit	0: GPS unposition 1: GPS positioned
Section 1 bit	Reserved
Section 2 bit	Reserved
Section 3 bit	Reserved
Section 4 bit	Reserved
Section 5 bit	Reserved
Section 6 bit	Reserved
Section 7 bit	Reserved

4.3.8 Server Response

Does not need response.

4.4 Heartbeat Packets (0x03)

Format	Content
	status
Length (byte)	2

Confirm the connection of terminal and server is normal or not, send the data packet at a fixed frequency.

4.4.1 Status

One byte, represents the position status of the device. A byte consists of 8-bit, the lowest bit is 0, the highest bit is 7, priority transmit high bit, then low bit. as follows:

High							Low
15	14	…	…	…	…	1	0

Section 0 bit	0: GPS unposition 1: GPS positioned
Section 1,2 bits	10: ACC OFF 11: ACC ON 00: None such status
Section 3,4 bits	10: Disarming 11: Fortification 00: None such status
Section 5,6 bits	10: Cut off oil and power 11: Restore oil and power 00: None such status
Section 7,8 bits	10: Charger not plugged 11: Charger plugged 00: None such status
Section 9 bit	Reserved
…	…
Section 14 bit	Reserved
Section 15 bit	Reserved

Example: 0x00BB ie, 10111011, represent that GPS positioned, ACC OFF, fortification, oil and power is cut off, charger is not plugged in.

4.4.2 Server Response

For example: Terminal send heartbeat packet to the server as follows:

0x67 0x67	0x03	0x00 0x04	0x00 0x1A	0x00 0x01
Header	**Protocol**	**Packet length**	**Serial number**	**Status**

	number			

Server's response packet to the terminal (protocol number in the response packet is the same with protocol number in the terminal data packet)

0x67 0x67	0x03	0x00 0x02	0x00 0x1A
Header	**Protocol number**	**Packet length**	**Serial number**

4.5 Alarm Data Packet (0x04)

Format	Content							
	Date time	Latitude	Longitude	Speed	Course	Base Station	Position Status	Alarm Type
Length (byte)	4	4	4	1	2	9	1	1

Upload the packet when occurs an alarm by terminal.

4.5.1 Date Time,Latitude,Longitude,Speed,Course,Base stations, Position Status

Please refer to **4.3 GPS data packet (0x02)** .

4.5.2 Alarm Type

Value	Status
0x01	Power off alarm
0x02	SOS alarm
0x03	Low battery alarm
0x04	Vibration alarm (motion sensor required)
0x05	Displacement alarm
0x06	Enter blind area alarm (not implemented, reserved)
0x07	Left blind area alarm (not implemented, reserved)
0x08	GPS antenna open circuit alarm
0x09	GPS antenna short circuit alarm
0x81	Low speed alarm
0x82	Hight speed alarm
0x83	In geofence alarm
0x84	Out geofence alarm
0x85	Collision alarm (motion sensor required)
0x86	Drop alarm (motion sensor required)

4.5.3 Server Response

Format	Content
	Alarm SMS
Length (byte)	N

Alarm message content use UTF-8 encoding. For example:
Device power off alarm! 3 Songpingshan Qimin Road, Nanshan, Shenzhen, Guangdong, China, 518057

Terminal send alarm SMS to Center number/ SOS number when receives the response. if the alarm message content is empty (0 byte), do not need to send SMS.

4.6 Terminal State Data Packet (0x05)

Format	Content								
	Date time	Latitude	Longitude	Speed	Course	Base Station	Position Status	Status type	Type value
Length (byte)	4	4	4	1	2	9	1	1	N

Upload the Packet when the terminal states change

4.6.1 Date Time,Latitude,Longitude,Speed,Course,Base Station, Position Status

Please refer to **4.3 GPS data packet (0x02)** .

4.6.2 Status Type

Status Type Value	Status Type	Status Value
0x01	ACC ignition	Device time (4 bytes, UTC seconds)
0x02	ACC flameout	Device time (4 bytes, UTC seconds)

Terminal must sync device time and satellite time. Device time equals satellite time with device timezone.

4.6.3 Server Response

Format	Content
	(No content)

Length (byte)	0

4.7 SMS Command Upload Data Packet(0x06)

Format	Content								
	Date Time	Latitude	Longitude	Speed	Course	Base Station	Position Status	Phone number	SMS command
Length (byte)	4	4	4	1	2	9	1	21	N

When terminal receives SMS conmmand, the SMS will be uploaded to the server.
Note: SMS command must obey the rule **4.7.4 SMS commands upload rules**

4.7.1 Date Time,Latitude,Longitude,Speed,Course,Base Stations, Position Status

Please refer to **4.3 GPS data packet (0x02)** .

4.7.2 Phone Number

If the phone number is not enough 21 bytes, right fill 0x00.(Using ASCII encoding)

4.7.3 SMS Commands

SMS commands sent to the device by cellphone (using UTF-8 encoding).

4.7.4 SMS Commands Upload Rules

(1) Some SMS commands needn't be sent to the server, the terminal deal with itself, such as STATUS # . Some SMS commands need to be sent to the server , such as: position # and 123, they will be sent to the server to get the address.
(2) SMS commands without chinese character that the length is more than 2 characters and less than 30 characters needs to be uploaded to the server.

4.7.5 Server Response

Format	Content	
	Phone number	Response
Length (byte)	21	N

Server response message encoded in UTF-8, the terminal send response content in a text SMS to the phone number in the packet. If server response content is empty (0 byte), it means do not need to send SMS to phones number .

4.8 Downlink Command/ Interactive Message Packet (0x80)

Format	Message Content		
	Message Sign	Server flag	Downlink content
Length(byte)	1	4	N

Server send downlink command/ interactive message to terminal

4.8.1 Message Sign

Message Sign value	Downlink message type
0x01	Command
0x02	Interactive news

4.8.2 Server Flag

For server identification, the terminal will return the packet as the receive binary data.

4.8.3 Downlink Content

Command / interactive message, using UTF-8 encoding.

4.8.4 Terminal Response

Format	Message Content		
	Message Sign	Server flag	Response content
Length(byte)	1	4	N

Terminal response content part adopts UTF-8 encoding.

4.9 Messages Downlink Data Packet（0x81）

Format	Message Content	
	Message Sign	Content

Length(byte)	1	N

Terminal get messages from server and display to the screen or forward messages according message type.

4.9.1 Message Sign

To identify the message type, different processing according different types of messages, refer to the following table.

Message Sign value	Message type	Function
0x01	Forward message	Forwards the message to the specified phone number

4.9.2 Forward Message (0x01) Downlink Content Format

Format	Phone number	Message
Length(byte)	21	N

Forwards the message to the specified phone number.

Note: If the phone number is all 0x00, then they would have to send the message to the terminal's center number / SOS number.

4.10 OBD Data Packet

Format	Message Content	
	Date Time	OBD data
Length(byte)	4	N

Terminal uplink data to meet the OBD conditions (ignition, flame, speed increases 20km / h, the speed reducing 20km / h, constant speed 2 minutes), the device sends an uplink data packet to the server OBD.

Device send an uplink OBD data packet to the server in OBD data uplink condintions including ignition, flame, speed increases 20km / h, speed reducing 20km / h, constant speed for 2 minutes.

4.10.1 Date & Time

This is device time (4 bytes, UTC seconds). Terminal must sync device time and satellite time. Device time equals satellite time with device timezone.

4.10.2 OBD Data

Every five bytes represents a PID data in OBD data, which the first byte represent PID number, the subsequent four bytes represent Data corresponding PID. For example: 00FFFFFFFF indicates

PID00 data is FFFFFFFF; 0233445566 indicates PID02 data is 33445566; and so on. Data algorithm corresponding to each PID . see **6.3 OBD standard data flow algorithms**.

Note: MONITOR command is sent to the device, tell device which part PIDs data need to be monitored and uplinked. see **5.3 OBD monitoring command**

4.10.3 Packet Sample

This is an actual uplink OBD packet :
6767070088001050E2281400FFFFFFFF023344556603334455660433445566 05AA00000007334455660A334455660B334455660C4E2000000DAA0000000E334455660F3344556610AAAA000011334455661C334455661F33445566213344556642334455664633445566 4D334455665C334455665E33445566880000000089000000008A000000008B00000000

In this packet, 6767 is the message header, 07 for the protocol No., 0088 for the packet length, 0010 is serial number information, 50E22814 is the current time;
00FFFFFFFF023344556603334455660433445566 05AA00000007334455660A334455660B334455660C4E2000000DAA0000000E334455660F3344556610AAAA000011334455661C334455661F33445566213344556642334455664633445566 4D334455665C334455665E33445566880000000089000000008A000000008B00000000 is the OBD data.

4.10.4 Server Response

Format	**Message Content**
	(No content)
Byte	0

Example: OBD data packet by terminal is sent to the server as follows:

0x67 0x67	0x07	0x00 0x88	0x00 0x1A	……
Header	Protocol No.	Packet length	Serial Number Information	Content

Server response packet is sent to the terminal(Protocol No. are the same in the response packet and terminal packet.

0x67 0x67	0x07	0x00 0x02	0x00 0x1A
Header	Protocol No.	Packet length	Serial Number Information

5 DEVICE COMMAND

5.1 Tracker Command

I Set Command			
Function	**Format**	**Example**	**Note**
APN setting	APN,Network name,[name,password]#	APN,CMNET#	If the setup is successful, the terminal will reply: SET APN OK
Server setting	SERVER,1,domain,port#	SERVER,1,www.access.com,8821#	If the setup is successful, the terminal will reply: SET SERVER OK
	SERVER,0,IP,port#	SERVER,0,113.108.68.8,8821#	
GPRS upload time interval	TIMER,Upload time interval[,Packet number]#	TIMER,10#	Upload interval: 0,10 ~ 18000s, 0 means prohibit uploading, default is 10s . Packag number :1-20, default is 1 If the setup is successful, the terminal will reply: SET TIMER OK
Time zone setting	GMT,Time zone orientation,Whole Time Zone,[Half Time Zone] #	GMT,9# GMT,9,30#	Range: E / W; 0 ~ 12; 0/15/30/45 If the setup is successful, the terminal will reply: SET GMT OK
Language setting	LANG,1/0#	LANG,1# LANG,0#	1 represents Chinese 0 represents English If the setup is successful, the terminal will reply: SET LANG OK
Center number setting	CENTER, A,center number#	CENTER, A,13800138000#	Center number is used for cutting off power and oil. If the setup is successful, the terminal will reply:

			SET CENTER OK
Delete center number	CENTER，D#		Center number is used for cutting off power and oil. If the deletion is successful, the terminal will reply: DEL CENTER OK
Add SOS number	SOS,A,number one,number two,number three#		SOS,A,13800138000,13800138001,13800138002# means to set 3 numbers at a time . SOS,A,13800138000# means to set 1st number. SOS,A,,13800138001# means to set 2nd number. SOS,A,,,13800138002# means to set 3rd number. If the setup is successful,the terminal will reply: SET SOS OK
Delete SOS number	SOS,D,number one, number two, number three# Or: SOS, D,1,2,3#		SOS,D,1# means to delete 1st number SOS,D,3# means to delete 3rd number SOS,D,1,3# means to delete 1st and 3rd number SOS,D,13800138000# means to directly delete the 13800138000 If the deletion is successful, the terminal will reply: DEL SOS OK
Edit location query URL	EURL,website url#	EURL,http://maps.google.com/maps?q=#	If the setup is successful, the terminal will reply: SET EURL OK
Into the monitor delay time setting	DELAY,time#	DELAY,5#	Range: 5-60s, default is 10s. If the setup is successful, the terminal will reply: SET DELAY OK
Heartbeat	HBT,time#	HBT,3#	Range: 1-60min, default 3min.

packet upload			If the setup is successful, the terminal will reply: SET HBT OK
Motion setting	MOTION,sensitivity,timeout#	MOTION,2,5#	Sensitivity range: 0-9 Timeout range: 0-60 Sensitivity: 0: disable vibrating alarm If the setup is successful, the terminal will reply: SET MOTION OK
Speeding setting	SPEED,min speed,max speed#	SPEED,0,80#	Device will rise an alarm when speed is lower than min-speed or higher than max-speed Min-speed: 0: disable low speeding alarm; Max-speed: 0: disable high speeding alarm If the setup is successful, the terminal will reply: SET SPEED OK
Geofence setting	FENCE,fence number,fence marking,fence parameters 1,fence parameter 2,fence parameter 3,fence parameter 4#	FENCE,1,OR,,,500#	Set No.1 round fence, **OR** alarm type: out-fence alarm; current point as the center, radius 500m.
		FENCE,2,IR,,,500#	Set No.2 round fence, **IR** alarm type: in-fence alarm; current point as the center, radius 500m.
		FENCE,3,CR,,,500#	Set No.3 round fence, **CR** alarm type: across-fence alarm; current point as the center, radius 500m.
		FENCE,4,OR,113.5,22.5,500#	Set No.4 round fence, **OR** alarm type: out-fence alarm; Latitude and longitude (113.5,22.5) as the center, radius 500m.
		FENCE,5,IR,113.5,22.5,500#	Set No.5 round fence, **IR** alarm type: in-fence alarm; Latitude

			and longitude (113.5,22.5) as the center, radius 500 m.
		FENCE,6,CR,113.5,22.5,500#	Set No.6 round fence, **CR** alarm type: across-fence alarm; Latitude and longitude (113.5,22.5) as the center, radius 500 m.
		FENCE,1,OS,113.2,22.2，113.8,22.8#	Set No.1 rectangular fence, **OS** alarm type: out-fence alarm; In longitude and latitude (113.5, 22.5), (113.8, 22.8) forming a rectangle.
		FENCE,2,IS,113.2,22.2,113.8,22.8#	Set No.2 rectangular fence, **IS** alarm type: in-fence alarm; In longitude and latitude (113.5, 22.5), (113.8, 22.8) forming a rectangle.
		FENCE,3,CS,113.2,22.2,113.8,22.8#	Set No.3 rectangular fence, **CS** alarm type: across-fence alarm; In longitude and latitude (113.5, 22.5), (113.8, 22.8) forming a rectangle.
Delete Geofence	FENCE,0#	FENCE,0#	Delete all fences
	FENCE,N#	FENCE,5#	Delete the 5th fence
Start Shift alarm	SHIFT,shift range#	SHIFT,100#	Set 100 meters shift alarm range,when the ignition is turned off,Vehicle's 100 meters displacement will trigger the alarm
Close Shift alarm	SHIFT,0#		Close Shift alarm
Remote Upgrade	UPGRADE, upgrade package, domain name / IP, port #	UPGRADE,C4_M5050_v1_7_7.exf,www.hehiqing.com,69#	upgrade package is C4_M5050_v1_7_7.exf Upgrade domain: www.hehiqing.com Port : 69
Ⅱ Control Command			
Cut off oil & power	RELAY，1#		If setup successful, Terminal reply: Relayer enable OK Otherwise, Command can not be executed and reply the reasons:

			Not center number, GPS unpositioning or speed > 20KM / H
Restore oil & power	RELAY，0#		If setup successful, Terminal reply: Relayer disable OK
Restart terminal	RESET#		Terminal reply: Reset OK
Restore factory settings	FACTORY#		Terminal reply: Factory OK

Ⅲ Query Command

Version inquiry	VERSION#		VERSION:M5216_V1.8.0 BUILD:2012-05-09 10:12
Parameter inquiry	PARAM#		IMEI:123456789012345 APN:cmnet IP:Server:port TIMER:GPS Packet Interval CENTER:Center number SOS:Number1,Number2,Number3 LANG:（CN/EN） GMT:（E/W8.00） HBT:Heartbeat interval DELAY:Monitoring delay time
Latitude and Longitude inquiry	WHERE#		Lat:N23.111743 Lon:E114.409238 Course:0.00 Speed:0.17KM/H DateTime:2011-09-13 20:21:20
Status inquiry	STATUS#		BATTERY:100% (Remaining battery)% GPRS:NORMAL / EXCEPTIONAL GSM Signal:HIGH / MIDDLE / LOW GPS:FIXED / UNFIXED GPS Signal:HIGH / MIDDLE / LOW ACC:OPEN / CLOSE RELAYER:ENABLED / DISABLED CHARGER:NORMAL / EXCEPTIONAL
Location Links inquiry	URL#		<DateTime:10-11-18 18:41:04> https://maps.google.com/maps?q=N22.555525,E113.940147
Address inquiry	POSITION#		3 Songpingshan Qimin Road, Nanshan, Shenzhen, Guangdong, China, 518057 Note: Reply position message's language is determined by

			device's language setting, if get position content failed, relpy the device's Google Maps location link.
SMS forwarding	FW,tracking number,content#		Example: balance inquiries FW, 10086, CXYE # FW, 10010, YE # When terminal receives the message, put the query in a text message sent to the tracking number, and return the message to the sender with the conten back from tracking number in 5 miniutes. Can be used for inquiry calls, traffic, etc.

5.2 OBD Command

Note 1: The command field between the English "," separated
Note 2: Server Command format refer to **4.8 issued instructions / interactive message packet (0x80)**

5.2.1 Command Format

OBD,<**Command Code**>, <**Command Parameter**>#
Explanation：

Command Code	01	Get Version
	02	Get Serial
	03	Get VIN
	08	Set car models
	10	Get PID device supports
	11	Get PID data
	12	Get PID in freeze frame
	13	Get PID data in freeze frame
	14	Get fault code data
	15	Clear fault codes
Command Parameter	Some commands have parameters, see **5.2.3 Command Example**	

5.2.2 Return Message Format

OBD, <**Command Code**>, <**Command Results**>, <**Return Message**>

Command Code	Same as above	
Command Results	00	Success
	01	Timeout
	02	Command Code error
	03	Command Parameter error

	04	Communications failure
Return Message	Return Message meaning，see 错误!未找到引用源。 **Return Message Example**	

5.2.3 Command Example

OBD Command	Meaning	Parameter Meaning
OBD,01#	Get Version	
OBD,02#	Get Serial	
OBD,03#	Get VIN	
OBD,08,0000#	Set car models	0000 is set models, see **6.1 OBD vehicle list**
OBD,10#	Get PID device supports	
OBD,11,0020408A8B0C0D0E#	Get PID data	Parameter 0020408A8B0C0D0E indicates to take PID data in PID 00 20 40 8A 8B 0C 0D 0E
OBD,12#	Get PID in freeze frame	
OBD,13,0C0E1C1E#	Get PID data in freeze frame	Parameter 0C0E1C1E indicates to take PID data in PID 0C 0E 1C 1E
OBD,14#	Get fault code data	
OBD,15#	Clear fault codes	

5.2.4 Return Message Example

Return Message	Return Message meaning
OBD,01,00,5100003C0000	5100003C0000 is the retrieved version number
OBD,02,00,066CFF575454834987114547	066CFF575454834987114547 is the retrieved Serial number
OBD,03,00,31323334353637383941424344454647 48	VIN is 31323334353637383941424344454647 48 corresponding 123456789ABCDEFGH
OBD,08,00,0000	0000 is vehicle models, see **6.1 OBD vehicle list**
OBD,10,00,00FFFFFFFF20FFFFE000	00FFFFFFFF : Four bytes behind 00 were named ABCD, then A7-D0 represent PID 0x01-0x20 is surported or not; 20FFFFE000 : Four bytes behind 20 were named ABCD, then A7-D0 represent PID 0x01-0x40 is surported or not; According to the rule of analogy.

OBD,11,00,00FFFFFFFF20FFFFFFFF40FFFFFFFF8A000000008B000000000C4E2000000DAA0000000E33445566	00FFFFFFFF20FFFFFFFF40FFFFFFFF8A000000008B000000000C4E2000000DAA0000000E33445 566 : This part of the data can be divided into the following paragraphs, each of the first byte corresponds the needed PID number in order to take . 00FFFFFFFF : The four bytes behind 00 is the retrieved PID data of the number 00 ..... 0C4E200000 : According to **6.3 OBD standard data-flow algorithm** , we know that 0C corresponding to the engine speed, the result use two bytes , calculated as ((A * 256) + B) / 4, so calculated ((0x4E * 256) +0 x20) / 4 = 5000 rpm; 0E33445566 : Also according to **6.3 OBD standard data-flow algorithm** , we get results through this calculation methods.
OBD,12,00,00445566772044556677404455667676	0044556677: four bytes behind 00 were named ABCD, then A7-D0 represent PID 0x01-0x20 is included in the freeze frame or not; 2044556677: four bytes behind 20 were named ABCD, then A7-D0 represent PID 0x01-0x40 is included in the freeze frame or not; 4044556676: four bytes behind 40 were named ABCD, then A7-D0 represent PID 0x01-0x60 is included in the freeze frame or not; According to the rule of analogy.
OBD,13,00,0C445566770E445566771C445566771E44556677	0C445566770E445566771C445566771E44556677 This part of the data can be divided into the following paragraphs, each of the first byte corresponds the PID number needed to take. 0C44556677 :Four bytes behind 0C is the retrieved PID. 0E44556677 :Four bytes behind 0E is the retrieved PID. “1C 1E” According to the rule of analogy.
OBD,14,00,00	00 shows that there is no fault
OBD,14,00,00020502009302	Indicates a fault, the fault code 00020502009302
OBD,15,00,01	Clear success or failure marks (01: Success 00: Failure)

5.3 OBD Monitoring Command

Command format：MONITOR,<PIDS>#
Return message format：SET MONITOR OK

When vehicle ignition, flame, speed accelerate 20km / h, speed decelerate 20km / h, constant speed for 2 minutes, Device sends PID number to server .

Example：MONITOR，02030405070A0B0C0D0E0F101F111C2142464D5C5E88898A8B#
Explanation：This command sets the device monitors the following PID：02 03 04 05 07 0A 0B 0C 0D 0E 0F 10 1F 11 1C 21 42 46 4D 5C 5E 88 89 8A 8B

6 APPENDIX

6.1 OBD Vehicle List

Code		Cars
01	00	Volkswagen
02	00	Universal
03	00	Ford
04	00	Toyota
05	00	Honda
06	00	Nissan
07	00	Kia
08	00	Hyundai
09	00	BMW
0A	00	Mercedes-Benz
0B	00	Subaru
0C	00	Mitsubishi
0D	00	Renault
0E	00	Peugeot
0F	00	Land Rover
10	00	Volvo
11	00	Ssangyong

Note: Car can be identified through the first byte , there are some cars may also have 2-3 kinds, through the second byte to identify.

6.2 OBD Extended Data Flow Algorithm

ID	Name	Algorithm	Unit	Note
88	One hour Fuel consumption	Y=X	L/H	X=A<<24+B<<16+C<<8+D Meaning of "X" are the same in this table;
89	100KM Fuel consumption	Y=X/10	L/100KM	Show 100 km fuel consumption when the speed is greater than 5km ;
8A	Mileage	Y=X	KM	

8B	Remaining fuel	If (X>=0x8000)
		{
		Y=(X-0x8000)/10
		}
		else
		{
		Y=X/10
		}
			When X> 0X8000 remaining fuel expressed as a percentage;
			When X <0X8000 remaining fuel by L units.
				1, Buick \ Chevrolet \ Honda series remaining fuel is expressed as %;
				2, Volkswagen \ Audi \ Skoda \ Toyota \ Ford \ Nissan Series of remaining fuel is represented by L;
				3, To accurately read the remaining oil, automotive needs in a horizontal stationary state, otherwise, the read data will fluctuate;

6.3 OBD Standard Data Flow Algorithm

Mode hex	PID hex	Data bytes	Description	Min Value	Max Value	Units	Formula
01	00	4	PIDs supported[01-20]				Bit[A7..D0]== [PID 0x01..PID 0x20]
01	01	4	Monitor status since DTCs clear.(Includes malfunction indicator lamp MIL)status and number of DTCs.)				Bit encoded. See below.
01	02	2	Freeze DTC	00 00	FF FF		Hexadecimal
01	03	2	Fuel system status				Bit encoded. See below.
01	04	1	Calculated engine load value	0	100	%	A*100/255
01	05	1	Engine coolant temperature	-40	215	℃	A-40
01	06	1	Short term fuel % trim-Bank 1 Short term fuel % trim-Bank 3	-100（Rich）	99.22（lean）	%	（A-128）*100/128 （B-128）*100/128
01	07	1	Long term fuel % trim-Bank 1 Long term fuel % trim-Bank 3	-100（Rich）	99.22（lean）	%	（A-128）*100/128 （B-128）*100/128
01	08	1	Short term fuel % trim-Bank 2 Short term fuel % trim-Bank 4	-100（Rich）	99.22（lean）	%	（A-128）*100/128 （B-128）*100/128
01	09	1	Long term fuel % trim-Bank 2 Long term fuel % trim-Bank 4	-100（Rich）	99.22（lean）	%	（A-128）*100/128 （B-128）*100/128
01	0A	1	Fuel Pressure	0	765	kPa(gauge)	A*3
01	0B	1	Intake manifold absolute pressure	0	255	kPa(absolute)	A

01	0C	2	Engine RPM	0	16,383.75	rpm	（（A*256）+B）/4
01	0D	1	Vehicle speed	0	255	km/h	A
01	0E	1	Timing advance	-64	63.5	°	A/2-64
01	0F	1	Intake air temperature	-40	215	℃	A-40
01	10	2	MAF air flow rate	0	655.35	g/s	（（256*A）+B）/100
01	11	1	Throttle position	0	100	%	A*100/255
01	12	1	Commanded secondary air status				Bit encoded. See below
01	13	1	Oxygen sensors present				[A0..A3]==Bank 1，Sensors 1-4. [A4..A7]==Bank 2，Sensors
01	14	2	Bank 1, Sensor 1: Oxygen sensor voltage, Short term fuel trim	0 -100（Lean）	1.275 99.2（Rich）	Volts %	A*0.005 （B-128）*100/128（if B=0xFF，sensor is not used in trim calc）
01	15	2	Bank 1, Sensor 2: Oxygen sensor voltage, Short term fuel trim	0 -100（Lean）	1.275 99.2（Rich）	Volts %	A*0.005 （B-128）*100/128（if B=0xFF，sensor is not used in trim calc）
01	16	2	Bank 1, Sensor 3: Oxygen sensor voltage, Short term fuel trim	0 -100（Lean）	1.275 99.2（Rich）	Volts %	A*0.005 （B-128）*100/128（if B=0xFF，sensor is not used in trim calc）
01	17	2	Bank 1, Sensor 4: Oxygen sensor voltage, Short term fuel trim	0 -100（Lean）	1.275 99.2（Rich）	Volts %	A*0.005 （B-128）*100/128（if B=0xFF，sensor is not used in trim calc）
01	18	2	Bank 2, Sensor 1: Oxygen sensor voltage, Short term fuel trim	0 -100（Lean）	1.275 99.2（Rich）	Volts %	A*0.005 （B-128）*100/128（if B=0xFF，sensor is not used in trim calc）
01	19	2	Bank 2, Sensor 2: Oxygen sensor voltage,	0 -100（Lean）	1.275 99.2（Rich）	Volts %	A*0.005 （B-128）*100/128（if B=0xFF，sensor is not used in

			Short term fuel trim				trim calc）
01	1A	2	Bank 2, Sensor 3: Oxygen sensor voltage, Short term fuel trim	0 -100（Lean）	1.275 99.2（Rich）	Volts %	A*0.005 （B-128）*100/128（if B=0xFF，sensor is not used in trim calc）
01	1B	2	Bank 2, Sensor 4: Oxygen sensor voltage, Short term fuel trim	0 -100（Lean）	1.275 99.2（Rich）	Volts %	A*0.005 （B-128）*100/128（if B=0xFF，sensor is not used in trim calc）
01	1C	1	OBD standards this vehicle conforms to				Bit encoded. See below
01	1D	1	Oxygen sensors present				Similar to PID 13，but [A0..A7]==[B1S1，B1S2，B2S1，B2S2，B3S1，B3S2，B4S1，B4S2]
01	1E	1	Auxiliary input status				A0==Power Take off （PTO） status （1==active） [A1..A7] not used
01	1F	2	Run time since engine start	0	65，535	seconds	（A*256）+B
01	20	4	PIDs supported 21-40				Bit encoded[A7..D0]==[PID 0x21..PID 0x40]
01	21	2	Distance traveled with malfunction indicator lamp (MIIL) on	0	65，535	km	（A*256）+B
01	22	2	Fuel Rail Pressure (relative to manifold vacuum)	0	5177.265	kPa	（（A*256）+B）*0.079
01	23	2	Fuel Rail Pressure (diesel)	0	655350	kPa(gauge)	（（A*256）+B）*10
01	24	4	02S1_WR_lambda (1): Equivalence Ratio Voltage	0 0	2 8	N/A V	（（A*256）+B）*0.0000305 （（C*256）+D）*0.000122
01	25	4	02S2_WR_lambda (1): Equivalence Ratio Voltage	0 0	2 8	N/A V	（（A*256）+B）*0.0000305 （（C*256）+D）*0.000122

01	26	4	02S3_WR_lambda (1): Equivalence Ratio Voltage	0 0	2 8	N/A V	（（A*256）+B）*0.0000305 （（C*256）+D）*0.000122
01	27	4	02S4_WR_lambda (1): Equivalence Ratio Voltage	0 0	2 8	N/A V	（（A*256）+B）*0.0000305 （（C*256）+D）*0.000122
01	28	4	02S5_WR_lambda (1): Equivalence Ratio Voltage	0 0	2 8	N/A V	（（A*256）+B）*0.0000305 （（C*256）+D）*0.000122
01	29	4	02S6_WR_lambda (1): Equivalence Ratio Voltage	0 0	2 8	N/A V	（（A*256）+B）*0.0000305 （（C*256）+D）*0.000122
01	2A	4	02S7_WR_lambda (1): Equivalence Ratio Voltage	0 0	2 8	N/A V	（（A*256）+B）*0.0000305 （（C*256）+D）*0.000122
01	2B	4	02S8_WR_lambda (1): Equivalence Ratio Voltage	0 0	2 8	N/A V	（（A*256）+B）*0.0000305 （（C*256）+D）*0.000122
01	2C	1	Commander EGR	0	100	%	100*A/255
01	2D	1	EGR Error	-100	99.22	%	A*0.78125-100
01	2E	1	Commanded evaporative purge	0	100	%	100*A/255
01	2F	1	Fuel Level Input	0	100	%	100*A/255
01	30	1	# of warm-ups since codes cleared	0	255	N/A	A
01	31	2	Distance traveled since codes cleared	0	65，535	km	（A*256）+B
01	32	2	Evap. System Vapor Pressure	-8，192	8，192	Pa	（（A*256）+B）/4-8，192

01	33	1	Barometric pressure	0	255	kPa(absolute)	A
01	34	4	02S1_WR_lambda (1): Equivalence Ratio Current	0 -128	2 128	N/A mA	（（A*256）+B）*0.0000305 （（C*256）+D）*0.00390625-128
01	35	4	02S2_WR_lambda (1): Equivalence Ratio Current	0 -128	2 128	N/A mA	（（A*256）+B）*0.0000305 （（C*256）+D）*0.00390625-128
01	36	4	02S3_WR_lambda (1): Equivalence Ratio Current	0 -128	2 128	N/A mA	（（A*256）+B）*0.0000305 （（C*256）+D）*0.00390625-128
01	37	4	02S4_WR_lambda (1): Equivalence Ratio Current	0 -128	2 128	N/A mA	（（A*256）+B）*0.0000305 （（C*256）+D）*0.00390625-128
01	38	4	02S5_WR_lambda (1): Equivalence Ratio Current	0 -128	2 128	N/A mA	（（A*256）+B）*0.0000305 （（C*256）+D）*0.00390625-128
01	39	4	02S6_WR_lambda (1): Equivalence Ratio Current	0 -128	2 128	N/A mA	（（A*256）+B）*0.0000305 （（C*256）+D）*0.00390625-128
01	3A	4	02S6_WR_lambda (1): Equivalence Ratio Current	0 -128	2 128	N/A mA	（（A*256）+B）*0.0000305 （（C*256）+D）*0.00390625-128
01	3B	4	02S8_WR_lambda (1): Equivalence Ratio Current	0 -128	2 128	N/A mA	（（A*256）+B）*0.0000305 （（C*256）+D）*0.00390625-128
01	3C	2	Catalyst Temperature	-40	6,513.5	℃	（A*256+B）/10-40

			Bank 1, Sensor 1				
01	3D	2	Catalyst Temperature Bank 2, Sensor 1	-40	6,513.5	℃	（A*256+B）/10-40
01	3E	2	Catalyst Temperature Bank 1, Sensor 2	-40	6,513.5	℃	（A*256+B）/10-40
01	3F	2	Catalyst Temperature Bank 2, Sensor 2	-40	6,513.5	℃	（A*256+B）/10-40
01	40	4	PIDs supported 41-60				Bit Encoded[A7..D0]==[PID 0x41..PID 0x60]
01	41	4	Monitor status this drive cycle				Bit encoded. See below.
01	42	2	Control module voltage	0	65.535	V	（A*256+B）/1000
01	43	2	Absolute load value	0	25,700	%	（A*256+B）*100/255
01	44	2	Command equivalence ratio	0	2	N/A	（A*256+B）*0.0000305
01	45	1	Relative throttle position	0	100	%	A*100/255
01	46	1	Ambient air temperature	-40	215	℃	A-40
01	47	1	Absolute throttle position B	0	100	%	A*100/255
01	47	1	Absolute throttle position C	0	100	%	A*100/255
01	49	1	Accelerator pedal position D	0	100	%	A*100/255
01	4A	1	Accelerator pedal position E	0	100	%	A*100/255
01	4B	1	Accelerator pedal position F	0	100	%	A*100/255
01	4C	1	Command throttle actuator	0	100	%	A*100/255
01	4D	2	Time run with MIL on	0	65,535	miniutes	A*256+B
01	4E	2	Time since trouble codes cleared	0	65,535	miniutes	A*256+B
01	51	1	Fuel Type				From fuel tpe table. See below.
01	52	1	Ethanol fuel %	0	100	%	A*100/255
01	53	2	Evap System Vapor Pressure	0	372.675	kPa	（A*256+B）*0.005

01	54	2	Evap System Vapor Pressure	-32768	32768	Pa	（A*256+B）-32768
01	55	2	Short Secondary 02 Fuel TrimB1 Short Secondary 02 Fuel TrimB3	-100	99.22	%	（A-128）*100/128 （B-128）*100/128
01	56	2	Short Secondary 02 Fuel TrimB1 Short Secondary 02 Fuel TrimB3	-100	99.22	%	（A-128）*100/128 （B-128）*100/128
01	57	2	Short Secondary 02 Fuel TrimB2 Short Secondary 02 Fuel TrimB4	-100	99.22	%	（A-128）*100/128 （B-128）*100/128
01	58	2	Short Secondary 02 Fuel TrimB2 Short Secondary 02 Fuel TrimB4	-100	99.22	%	（A-128）*100/128 （B-128）*100/128
01	59	2	Fuel Rail Pressure (absolute)	0	655350	kPa	A*10
01	5A	1	Accelerator Pedal Position	0	100	%	A*100/255
01	5B	1	Hybrid Battery Remaining Life	0	100	%	A*100/255
01	5C	1	Engine Oil Temperature	-40	215	℃	A-40
01	5D	2	Fuel Injection Timing	-210.00	301.992	°	（A*256+B-25880）/128
01	5E	2	Engine Fuel Rate	0	3296.75	L/h	（A*256+B）*0..05
01	5F	1	Emission requirements				Bit encoded. See below
01	60		PIDs supported 61-80				
01	61	1	Engine-Percent Torgue	-125	130	%	A-125
01	62	1	Actual Engine-Percent Torgue	-123	130	%	A-125
01	63	2	Engine-Percent Torgue	0	65535	Nm	A*256+B
01	64	5	Engine Percent Torque Data: At Idle, Point 1 At Point 2 At Point 3 At Point 4 At Point 5	-125	130	%	A-125 B-125 C-125 D-125 E-125

01	65	2	Auxiliary Inputs / Outputs				Bit encoded. See below
01	66	5	MAF Sensor A,B supported Mass Air Flow Sensor A Mass Air Flow Sensor B	0 0	2047.96875 2047.96875	g/s g/s	A0=SA supported，A1=SB supported. A2-A7 reserved. （B*256+C）*0.03125 （D*256+E）*0.03125