LKGPS protocol

1.The structure of commands send by terminal:

Normal information(v1):

*XX,YYYYYYYYYY,V1,HHMMSS,S,latitude,D,longitude,G,speed,direction,DDMMYY,vehicle_status#

Confirmation of information(V4):

*XX,YYYYYYYYYY,V4,CMD,hhmmss,HHMMSS,S,latitude,D,longitude,G,speed,direction,DDMMYY,vehicle_status#

In which:

* : Head of command

XX : Name of maker, Consists of two ASCII characters, such as HQ.

, : separator

YYYYYYYYYY : SN of terminal, is ten characters front of IMEI.

CMD : Command

HHMMSS : Time: hour/minute/second,device time, GMT, Beijing is 8 hours ahead GMT.

S : Effective mark of data, 'A' stand for effective, 'V' stand for invalid.

Latitude : Latitude, format : DDFF.FFFF, DD : Degree（00 ~ 90）, FF.FFFF : minute (00.0000 ~ 59.9999), keep four decimal places.

D : latitude marks (N:north, S:south)

Longitude : longitude, format : DDDFF.FFFF, DDD : Degree （000 ~ 180）, FF.FFFF : minute

(00.0000 ~ 59.9999), keep four decimal places.

G : longitude marks (E:east, W:west)

Speed: speed,range of 000.00 ~ 999.99 knots, Keep two decimal places.

Speed maybe empty, as longitude,G,,direction, speed is 0.

Direction: Azimuth, north to 0 degrees, resolution 1 degrees, clockwise direction.

Direction maybe empty, as longitude,G,speed,, MMDDYY, azimuth is zero.

DDMMYY:day/month/year

vehicle_status(V1): Vehicle state, four bytes, says the terminal parts state, vehicle parts state and alarm state, etc. Use ASCII character and hexadecimal values. Below are the meaning of each byte, use negative logic, bit=0 is effective. The table below:

Rank	Retention		Automotive machine components status		State vehicle parts		Alarm status	
	First Byte		Second Byte		Third Byte		Fourth Byte	
0	0	Temple alarm	0	GPS mistake alarm	0	Door open	0	Illegal door open alarm
1	0	Move alarm	0	Shock alarm	0	Armed	0	SOS
2	0	Blind record alarm	0	Tilt alarm	0	ACC off	0	Speed alarm
3	0	Oil cut off	0	Use backup battery	0	Crash alarm	0	illegal ignition alarm
4	0	Battery demolition	0	Battery remove alarm	1	keep	0	Entering alarm
5	0	Home SOS alarm	0	GPS antenna disconnect	0	pump	0	GPS antenna disconnect alarm
6	0	Office SOS alarm	0	GPS antenna short circuit	0	Custom alarm	0	GPS antenna short circuit alarm
7	0	Low level sensor 1 on	0	Low level sensor 2 on	0	Over speed	0	Out alarm

2.Commands send by center

1) Positioning monitoring command D1

*XX,YYYYYYYYY,D1,HHMMSS,interval,count#

In which:

Interval: The interval produce upload records, value range of 30 ~ 65535, unit is the second.

Count: The recording number of times terminal transfer back data to center.

The command require terminal transfer back data at count on interval, maximum 65535 counts. After receiving the command, terminal transfer back normal information to center. If count as 0 or 1, interval is invalid, then transfer back normal information.

Reply V1 information when received the command, at the meantime set the interval of D1 back from 0 second. If exist unfinished D1, then send new command instead.

E.g.*TH,000,D1,130305,60,4#

This command requires terminal transfer back information every 60 seconds, for 4 counts.

Information for device return as below:

*TH,2020916012,V1,050316,A,2212.8745,N,11346.6574,E,14.28,028,220902,FFFFFBFF#

In which transfer back time is 050316, GMT+0 time 05:00 is same as GMT+8 time 13:00.

2) Automatically Monitoring setting command S17

*XX,YYYYYYYYYY,S17,HHMMSS, interval#

In which:

Interval: The interval produce upload records, value range of 30 ~ 65535, unit is the second.

This command finish automatically monitoring settings, interval is the time interval terminal send records to center. Automatically monitoring setting is on, terminal send normal records to center at appointed time interval.

E.g. *TH,000,S17,130305,1800#

This command requires terminal send records to center every half an hour.

After receiving the command, automatically monitoring setting on, and terminal transfer back confirm information V4 to center. at the meantime set the interval of S17 back from 0 second. If exist unfinished S17, then send new command instead.

*TH,2020916012,V4,S17,130305,050316,A,2212.8745,N,11346.6574,E,14.28,028,220902,FFFFBFF#

Then terminal transfer back normal information V1 (same as D1) by set interval to center.

3)Clear alarm R7

*XX,YYYYYYYYYY,R7,HHMMSS #

For example: *TH, 000000,R7,130305#

Terminal received the command will clear all the alarm information, but does not send back information, monitoring system can be appended to send a single monitoring command to confirm whether have clear alarm or not.

After receiving command, security use equipment 2.20 (included advanced version) and logistics use equipment 1.05 (included advanced version) will automatically send a single monitoring command, as transfer back the normal information.

4)Cold start R1 (Support security use equipment SV204 included advanced version)

*XX,YYYYYYYYYY,R1,HHMMSS #

E.g. *TH, 000000,R1,130305#

Terminal reset cold start after receiving command, not transfer back confirmation, meantime ongoing alarms and calls will stop.

Terminal is in non-alert status after cold start, all status parameter will set back to zero, and system setting will remain.

5)Voice Monitor command R8

*XX,YYYYYYYYYY,R8,HHMMSS,listen_address #

In which:

listen_address: Monitor number terminal calling.

If the monitoring is prohibited terminal return information:

*HQ,2020916012,V4,R8,ERROR,130305,050316,A,2212.8745,N,11346.6574,E,14.28,028,

220902,FFFFFBFF#
Otherwise receiving the command, terminal automatically dials listen_address, and center can be mounted an automatic recording device for monitoring content recording .
Voice monitoring command has the highest class of communication authority. It force to stop other communication as phone calling and GPRS connection, and switch into monitoring dial.

Terminal automatically upload V1 information in command channel in the following situation:
A. Log in for registration;
B. Receiving D1 command;
C. Uploading every 4 minutes for 3 times when alerts(same as SMS);
D. Once calling finished(In, out, and monitoring included);
E. Defined signal in custom information has status change;
F. Receiving command clear alarm R7.

Restore factory settings: Standard mode.

3.GPRS agreement

Standard mode(Binary V1 normal information) encoding format：

No.	00	01	02	03	04	05	06	07	08	09	0A	0B
Content	$	0x1030731001					0x050316			0x220902		
Meaning	Recording Head	Terminal Serial Number					Time			Date		

No.	0C	0D	0E	0F	10	11	12	13	14	15	16	17	18
Content	0x22128745				0x00	0x113466574C					0x014028		
Meaning	Latitude				Reserve	Longitude,N,E,AV					Speed, direction		

No.	19	1A	1B	1C	1D	1E	1F
Content	0Xffffbff				0xff	0x00	
Meaning	vehicle_status				User_alarm_flag	Reserve	Operators Number

In which, "$"(0x24): Recording Head, for the start point of center identity record;

Time: 0x050316, GMT+0 5 o'clock 3 minutes 16 seconds, same as Beijing time(GMT+8) 13 o'clock 3 minutes 16 seconds;

Date: 0x220902, 22th September,2002;

Latitude value: 0x22128745, 22° 12.8745;

Longitude value: 0x113466574C, 113° 46.6574, meaning of last bit(No.0x15):

bit7654, last place of longitude;

bit3, 1: east longitude, 0: west longitude;

bit2, 1: north latitude, 0: south latitude;

bit1, 1: A, 0: V

bit0, not defined

Speed, direction: 0x014028:speed 014 knot, direction 028;

vehicle_status、 User_alarm_flag: Vehicle status in binary system, and user defined alarm status,same meaning as SMS(in ASCII).

Operators number:Recording numbers in binary system, add 1 every time send back record data.

Notice: No temperature data in stand mode record(same as V1 normal information).

Difference between X mode encoding format and stand mode encoding format:

No.	00	01	02	03	04	05	10	15
Stand mode content	$	0x1030731001					0x00	4C
Stand mode meaning	Recording Head	Terminal Serial Number					Reserve	N、E、AV
X mode content	X	0x0000130502					0x31	4D
X mode meaning	Recording Head	Mileage integer part					Temperature absolute value	N、E、AV、TS

In which,

1. Recording head of X mode is "X" (0x58), for start bit of center recording;

2.Mileage integer part: 0000130502: mileage, unit: 0.51444 meter, 130502 is BCD code in decimal system, 130502X0.51444=67135.449 mileage.

1. Temperature absolute value: 0x31=49/2=24.5℃, in no temperature sensor installing, then value 0xff, that is 127.5℃, remove temperature sensor in operation, then value 0xfe, that is 127℃, the maximum temperature values is 125℃, that is 0xfa.

2. Temperature value sign TS: bit0=1 in bit number 0x15 means temperature value is negative value.

Notice: X mode record only for TCP protocol transmission, no serrial number information in record. GRPS communication server that support X mode recording must registering the relevant terminal serial number of the SOCKET when the terminal log in and register, and insert the X record to other service program that to transfer when receive it. UDP protocol only transfer standard mode records.

a、ASCII information must not transfer with records in the same TCP packet.

b、Packet begins with recording head "$" (0x24, that is the first bit of the first record) or begins with "X", length is the integral times of 32; first bit of ASCII packet is "*", first bit of separated transfer no necessary to be "*", but must not to be "$" or "X" (information content no "$" or "X").

First bit of UDP packet is recording head "$", which is the sending sign of UDP record. If first bit of UDP is not "$", then that is other information as pictures, documents, etc., which will define later.

English Address Request Protocol (terminal requests):

* XX, YYYYYYYYYY, V3, HHMMSS, S, latitude, D, longitude, G, speed, direction, DDMMYY, vehicle_status, net_mcc, net_mnc, net_lac, net_cellid #

English address returned protocol (server sends down):

* HQ, 4106000054, I1_2_EN, 130305,10,1,9, test12345

Chinese Address Request Protocol (terminal requests):

* XX, YYYYYYYYYY, V2, HHMMSS, S, latitude, D, longitude, G, speed, direction, DDMMYY, vehicle_status, net_mcc, net_mnc, net_lac, net_cellid #

Chinese address returned protocol (server sends down):

* HQ, 4106000054, I1, 130305,10,1,4, 5e 7f 4e 1c

*HQ,4106000054,I0,130305,10,1,2, 5e 7f 4e 1c
net_mcc,net_mnc,net_lac,net_cellid# 460,01,43559,344224#

Standard mode for uploading data with base station information added:

Encoding format:

No.	00	01	02	03	04	05	06	07	08	09	0A	0B
Content	$	0x1030731001					0x050316			0x220902		
Meaning	Recording Head	Terminal Serial Number					Time			Date		

No.	0C	0D	0E	0F	10	11	12	13	14	15	16	17	18
Content	0x22128745				0x00	0x113466574C					0x014028		
Meaning	Latitude value				Battery level	Longitude value、N、E、AV					Speed, Direction		

No.	19~1C	1D-1E	1F	20	21~24	25	26	27
Content	0Xffffffbf	0xff			0x00001234	0x01CC		0x01
Meaning	vehicle_status	User_alarm_flag	GSM Signal(1~31)	GPS Signal	GPS Mileage Unit: Kilometer	Country Code		Operators Number

No.	28	29	2A	2B	2C
Content	0x8763		0x5B9C		0x00
Meaning	Station number		Cell ID		Operator Number

Base station information

Country code, 460 = 0x01CC
Operator number, 01 = 0x01
Station number, 34569 = 0x8763
Cell ID, 23452 = 0x5B9C

Hexadecimal data flow: 01 CC 01 87 63 5B 9C

Rank	Retention		Automotive machine components status		State vehicle parts		Alarm status	
	First Byte		Second Byte		Third Byte		Fourth Byte	
0	0	Temple alarm	0	GPS mistake alarm	0	Door open	0	Illegal door open alarm
1	0	Move alarm	0	Shock alarm	0	Armed	0	SOS
2	0	Blind record alarm	0	Tilt alarm	0	ACC off	0	Speed alarm
3	0	Oil cut off	0	Use backup battery	0	Crash alarm	0	illegal ignition alarm
4	0	Battery demolition	0	Battery remove alarm	1	keep	0	Entering alarm
5	0	Home SOS alarm	0	GPS antenna disconnect	0	pump	0	GPS antenna disconnect alarm
6	0	Office SOS alarm	0	GPS antenna short circuit	0	Custom alarm	0	GPS antenna short circuit alarm
7	0	Low level sensor 1 on	0	Low level sensor 2 on	0	Over speed	0	Out alarm

Temperature value transfer protocol:
*XX,YYYYYYYYY,V11,HHMMSS,S,latitude,D,longitude,G,speed,direction,DDMMYY,vehicle_status, net_mcc,net_mnc,net_lac,net_cellid,bat,T1_adc,T2_adc#
T1_adc, first temperature signal and abc value
T2_adc, second temperature signal and abc value

>60000 invalid data

Last field of ASCII information is power level information
*HQ,4103000861,V1,092853,A,2234.2029,N,11351.4197,E,000.40,000,270215,FFFFFBFF,460,00,0,0,6#

Multi cell base station protocol

*XX,YYYYYYYYYY,NBR,HHMMSS,MCC,MNC,TA,NUM,LAC,CID,RXLEV ,LAC,CID,RXLEV….,DDMMYY,vehicle_status#

XX：Manufacturer
YYYYYYYYYY：ID
HHMMSS time
MCC Country Code MCC(3 bits)
MNC Network code MNC(3 bits)
NUM Numbers of Base Station, maximum is 6.
TA GSM time delay
LAC Location Area Code LAC(5 bits)
CID Cell Tower CID(5 bits)
RXLEV Signal Strength
DDMMYY Date
vehicle_status （refer to “Common Data Definition”）

E.g.
*HQ,7893267560,NBR,081606,460,0,1,4,9338,3692,150,9338,3691,145,9338,3690,140,9338,3692,139,220513,FFFFFBFF#

Multi cell base station protocol,add Last field of ASCII power level information:

*HQ,7893267560,NBR,081606,460,0,1,4,9338,3692,150,9338,3691,145,9338,3690,140,9338,3692,139,220513,FFFFFBFF,cell#
Cell value 1-6 (1-10%,2-20%,3-40%,4-60%,5-80%,6-100%)

Time calibration protocol in center for long standby time terminals:
Server receive V1 and NBR command, then reply with V4, time calibration as GMT+0 time.
//*HQ,8856000065,V4,NBR,20150525102030#
//*HQ,0600097800,V4,V1,20150525102030#

20150525102030 It is GMT+0 2015-05-25 10 o’clock 20 minutes 30 seconds GMT+8 18 o’clock 20 minutes 30 seconds

SMS setting working time

DWaaa,bb,hhmm
aaa,activated working time，005～720，unit:minute，aaa=999 is keep working
bb,activate interval，01～72，unit: hours，bb=0 hour，activate interval is 30 minutes
hhmm,appointed time for activating, set as local time according to relevant time zone, not GMT+0 TIME, valid when bb equal or less than 24 hours.

DW030,12,0830
030 Keep working for 30 minutes after activating, activate it every 12 hours, appointed activate time is 8:30.

Command send by center：
*HQ,000,S71,085902,31,aaa,bb,hhmm#
Parameter definition same as SMS command.

Terminal reply：
*HQ,0000000000,V4,S71,085902,31#

LK330
Position and 3D variation calibration protocol：

Send this calibration command when finished terminal installation;
Receiving this command, terminal has valid alarm status and effectively locating and updating GPS position, or upload calibration position;
3D coordinate variation value exceed set value alerts

*HQ,0000000000,V4,S71,085902,41,x,y,z,t,114.051248E,22.567185N#

x,y,z value range：10～256
t,time for consecutive shock activate 3～20