

Cityeasy 520 GPS watch Communication protocolv1.2

Revise record

作者	日期	版本	审核	描述
程俊	2014-09-18	V0.0	程俊	儿童卫士 520 协议规范定义
程俊	2014-09-28	V0.1	程俊	调试确认协议，补充范例
程俊	2014-10-16	V0.2	程俊	增加蓝牙、参数同步等协议
程俊	2014-10-29	V0.3	程俊	完成基本 function 协议定义
程俊	2014-11-03	V1.0	程俊	发布协议用于内部测试
程俊	2014-11-05	V1.1	程俊	修改工作模式设置包和定位包格式，同步修改范例
程俊	2014-11-25	V1.2	程俊	发布正式版协议

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发送邮件到 chengjun02zml@163.com

谢谢

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1. Protocol format

GPRS data package transfer by TCP, protocol format setting as below:

Terminal device upload data to server (Up-link)

<TT><L><IMEI><protocol><data><index><checksum>\r\n

Server down link data to terminal device(down-link)

<SS><L><protocol><data><index><checksum>\r\n

Protocol field	Byte	Format Specification
TT	2	Terminal device upload to server start but, character T hex-code 0x54.
SS	2	Terminal down link to device start bit, character S hex-code 0x53.
L	2	Packet length, the entire packet length hexadecimal, include start bit and end bit.
IMEI	7	14 digit IMEI (parity bit exclude) translate to 7 bytes. For example IMEI is 12345678901234 coding to 0x12,0x34,0x56, 0x78, 0x90, 0x12, 0x34
Protocol number	2	Reference data packet description on the next chapter
Data	N	Data message
index	4	Packet serial number, cumulative count after data send, serial number remain the same on response packet and active packets
checksum	2	Data packet CRC parity bit, check length from the start bit, exclude parity bit and data packet end bit
\r\n	2	Data packet end bit, hexadecimal representation 0x0D 0x0A

Remark:

- 1、“<” and “>” only used to separate data, it is not data.
- 2、Terminal device upload data packet to server define as up link, server send data packet to terminal device define as down link.
- 3、“request” and “upload” means sending data packet from terminal to server. “setting” and “inquire” means server initiative send data configuration .
- 4、Server down link data will omit “IMEI” digit, the parameter server will sent the data to the terminal after legitimate verification.
- 5、These specification have the same meaning on blow. <flag> in the Protocol packets means 1 digit data, 1 means operation works, 0 means operation failed. <data> without special instructions means 1 digit data, the higher level on the front in multibyte values. Unicode code character is Little-endian.
- 6、All the data on example shows hexadecimal.

2. Protocol specifications

2.1 Request allocate dynamic address(0x0001)

Function	Terminal request the server allocate dynamic address, and link to the new address, realize Server Load Balancing.
Up link	<TT><L><IMEI><0x0001><index><checksum>\r\n
Down link	<SS><L><0x0001><IP port><index><checksum>\r\n
e.g.	54 54 00 15 35 20 00 00 00 00 01 00 01 00 00 00 01 11 00 0D 0A 53 53 00 1C 00 01 31 32 37 2E 30 2E 30 2E 31 3A 38 30 39 30 00 00 00 01 66 AA 0D 0A

Attention:

IP port is ASCII character string, format like “127.0.0.1:8090” , it will analyze at the terminal and start to work after link to the new address again .

2.2 StateBag (0x0002)

function	Terminal report working status regularly and check if the GPRS network works, otherwise it will connect the network again.
Up link	<TT><L><IMEI><0x0002><data><index><checksum>\r\n
Down link	<SS><L><0x0002><index><checksum>\r\n
e.g.	54 54 00 19 35 20 00 00 00 00 01 00 02 52 04 04 80 00 00 00 1B 63 1D 0D 0A 53 53 00 0E 00 02 00 00 00 1B 06 4B 0D 0A

Attention:

Data include terminal type, battery life, GSM signal and device working status. The state bag report regularly, it will report immediately if the status changes.

information	bit
Terminal type	1
Battery life	1
GSM signal	1
Device status	1

2.1.1 terminal type

Mark current terminal type.

Allocation mark	Terminal type
0x52	520 GPS watch

2.1.2 Battery life

The range from 0~7, means the voltage from low to high.

Volt level	Remark
0	No battery (power off)
1	Very low battery (can not calling/send message)
2	Low battery (low battery warning)
3	Low battery (all functions available)
4	1 column battery
5	2 column battery
6	3 column battery
7	4 column battery

2.1.3 GSM signal

Signal intensity	Remark
0	No signal
1	Very weak signal
2	Weak signal
3	Good signal
4	Perfect signal

2.1.4 Device status

Take 1 bit to show status of the device, server will make valid analysis based on terminal type.

bit	remark
Bit7	1: GPS located
	0: GPS not located (including GPS locating status)
Bit6	1: set perimeter
	0: set off perimeter
Bit5	1: charging
	0: not charging
Bit4	1: ACC high
	0: ACC low
Bit2~Bit0	keep (000)

2.3 Location information report (0x0003)

function	Terminal report position information
Up link	<TT><L><IMEI><0x0003><GPS/Cell data><index><checksum>\r\n
Downlink	<SS><L><0x0003><index><checksum>\r\n
e.g.	54 54 00 29 35 20 00 00 00 00 01 00 03 3B 34 36 30 2C 30 2C 31 30 31 37 33 2C 34 36 35 32 2C 34 31 00 00 00 02 AB 5A 0D 0A
e.g.	54 54 00 61 35 20 00 00 00 00 01 00 03 32 30 31 34 31 31 31 30 30 39 35 34 30 39 2C 41 2C 34 2C 4E 2C 32 32 2E 35 33 37 32 32 38 2C 45 2C 31 31 34 2E 30 32 32 37 37 34 2C 30 2E 31 2C 31 2E 39 2C 35 30 2E 36 3B 34 36 30 2C 30 2C 31 30 31 37 33 2C 34 36 35 32 2C 34 31 00 00 00 0B 63 13 0D 0A
e.g.]53 53 00 0E 00 03 00 00 00 0B 1D 8E 0D 0A

attention: GPS/Cell data format reference on appendix 1, data on 0x0003 on the example meaning "20141110095409,A,4,N,22.537228,E,114.022774,0.1,1.9,50.6;460,0,10173,4652,41" on ASCII.

2.4 Singler location inquiry (0x0004)

Function	Server inquiry terminal location
Down link	<SS><L><0x0004><index><checksum>\r\n
Up link	<TT><L><IMEI><0x0004><GPS/Cell data><index><checksum>\r\n
e.g.	53 53 00 0E 00 04 00 00 00 45 86 28 0D 0A
e.g.	54 54 00 61 35 20 00 00 00 00 01 00 04 32 30 31 34 31 31 31 30 30 39 35 33 30 36 2C 41 2C 35 2C 4E 2C 32 32 2E 35 33 37 32 33 35 2C 45 2C 31 31 34 2E 30 32 32 38 38 31 2C 30 2E 32 2C 31 2E 36 2C 35 34 2E 31 3B 34 36 30 2C 30 2C 31 30 31 37 33 2C 34 36 35 32 2C 34 31 00 00 00 45 EC 62 0D 0A

Attention: Down link packet is the same as up link packet 0x0003.

2.5 Set location packet uploading interval(0x0005)

function	Set terminal location packet 0x0003 uploading interval
Down link	<SS><L><0x0005>< interval (2 bytes)><index><checksum>\r\n
Up link	<TT><L><IMEI><0x0005><flag><index><checksum>\r\n
e.g.	53 53 00 10 00 05 00 B4 00 00 00 02 D8 14 0D 0A
e.g.	54 54 00 16 35 20 00 00 00 00 01 00 05 01 00 00 00 02 CD 61 0D 0A

attention: The time unit is second, it will stop uploading when set to 0.

2.6 Set relative number (0x0006)

function	Set relative number
Down link	<SS><L><0x0006><total><button index>< phone number > <index><checksum>\r\n
Up link	<TT><L><IMEI><0x0006> <flag><index><checksum>\r\n
e.g.	53 53 00 53 00 06 04 00 31 31 32 00 00 00 00 00 00 00 00 00 00 00 00 00 00 01 31 31 31 31 31 31 00 00 00 00 00 00 00 00 00 00 02 32 32 32 32 32 32 00 00 00 00 00 00 00 00 00 00 80 31 32 33 34 35 36 00 00 00 00 00 00 00 00 00 00 00 00 00 04 2B 6E 0D 0A 54 54 00 16 35 20 00 00 00 00 01 00 06 01 00 00 00 04 CE 77 0D 0A

attention:

- 1、 Total is 1 bit data, it means the quantity of set relative number.
- 2、 It is the same format when set multi number, button index is 1 bit data, means the serial number of the relative number, follow by 16 digit number .
- 3、 It could set multi number continuous, <button index>< phone number > like these:
<SS><L><0x0006><total><button index>< phone number ><button index>< phone number ><index><checksum>\r\n

4、 button index corresponding SOS button and relative button, extensible.

button index	Corresponding button
0x00	SOS button
0x01	button 1 (relative 1 or father)
0x02	button 2 (relative 2 or mother)
0x03	button 3 (relative 3)
0x80	Monitoring number

- 3、 telephone number shows on 16 digit ASCII, less than 16 digit will use 0x00 as blank. Every telephone number in this protocol should follow this rule. For example number"123456" should write as"31 32 33 34 35 36 00 00 00 00 00 00 00 00 00 00".

2.7Set enable monitoring function(0x0007)

function	Set monitoring number
Down link	<SS><L><0x0007><phone number><index><checksum>\r\n
Up link	<TT><L><IMEI><0x0007><flag><index><checksum>\r\n
e.g.	53 53 00 1E 00 07 31 32 33 34 35 36 37 38 39 00 00 00 00 00 00 00 00 00 00 00 00 08 1D BC 0D 0A
	54 54 00 16 35 20 00 00 00 00 01 00 07 01 00 00 00 08 BF 7B 0D 0A

Attention: parameter “phone number” format like 0x0006 packet, if the number is not empty, terminal will call this number and start monitoring function. If the set number is empty (16 digit 0x00), it will check the monitoring number preserved on terminal, if the number is valid it will enable monitoring, otherwise it will report setting failure.

2.8set timezone (0x0008)

function	Set timezone on terminal
Down link	<SS><L><0x0008><timezone(3 bytes)><index><checksum>\r\n
Up link	<TT><L><IMEI><0x0008><flag><index><checksum>\r\n
e.g.	53 53 00 11 00 08 00 01 68 00 00 00 0B 60 82 0D 0A
	54 54 00 16 35 20 00 00 00 00 01 00 08 01 00 00 00 0B D8 48 0D 0A

attention:

timezone	bit	remark
E/W	1	1=E/0=W
minute	2	It will use minute as time unit

e.g. “00 01 68” means west 6 time zone.

2.9 inquiry relative number(0x0009)

function	Server inquiry the relative number of the terminal
Down link	<SS><L><0x0009><index><checksum>\r\n
Up link	<TT><L><IMEI><0x0009><total><button index>< phone number ><index><checksum>\r\n
e.g.	53 53 00 0E 00 09 00 00 00 05 B8 58 0D 0A
	54 54 00 5A 35 20 00 00 00 00 01 00 09 04 00 32 32 32 32 00 00 00 00 00
	00 00 00 00 00 00 00 00 01 31 31 31 00 00 00 00 00 00 00 00 00 00 00
	02 31 35 33 36 36 35 35 35 38 39 36 00 00 00 00 00 80 33 33 33 33 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 05 02 10 0D 0A

attention: Server will check all the relative number by once, total value means the quantity of relative number, if the number is empty it will write 16 0x00, the reply format is the same as 0x0006 Down link data.

2.10 parameter updating(0x000A)

function	Terminal connect to server and updating present working parameter.
Up link	<TT><L><IMEI><0x000A><param><index><checksum>\r\n
Down link	<SS><L><0x000A>< flag><index><checksum>\r\n
e.g.	54 54 01 05 35 20 00 00 00 00 01 00 0A 56 45 52 53 49 4F 4E 3D 35 32 30 5F 52 45 4C 5F 56 30 30 3B 43 45 4E 54 45 52 3D 32 32 32 32 3B 46 41 4D 49 4C 59 4E 55 4D 3D 31 31 31 2C 31 35 33 36 36 35 35 35 38 39 36 3B 4D 4F 4E 49 54 4F 52 3D 33 33 33 33 33 3B 41 4C 41 52 4D 3D 31 2C 30 2C 30 30 2C 30 30 2C 32 2C 31 2C 31 30 2C 35 32 2C 33 2C 30 2C 30 33 2C 30 30 2C 34 2C 31 2C 31 30 2C 34 32 2C 35 2C 31 2C 30 36 2C 33 31 2C 36 2C 31 2C 31 31 2C 34 39 2C 37 2C 30 2C 30 35 2C 33 31 2C 38 2C 31 2C 31 35 2C 32 35 3B 41 50 4E 3D 63 6D 6E 65 74 2C 2C 3B 54 49 4D 45 5A 4F 4E 45 3D 45 2C 34 38 30 3B 57 4F 52 4B 4D 4F 44 45 3D 31 3B 46 49 52 45 57 41 4C 4C 3D 31 3B 42 54 3D 31 3B 52 46 49 44 3D 30 2C 31 3B 50 45 44 4F 4D 45 54 45 52 3D 31 2C 30 2C 33 30 30 30 23 00 00 00 03 67 33 0D 0A
	53 53 00 0F 00 0A 01 00 00 00 03 14 D0 0D 0A

attention: param is terminal present parameter on ASCII, explanation on e.g. ls parameter
“VERSION=520_REL_V00;CENTER=2222;FAMILYNUM=111,15366555896;MONITOR=33333;ALARM=1

,0,00,00,2,1,10,52,3,0,03,00,4,1,10,42,5,1,06,31,6,1,11,49,7,0,05,31,8,1,15,25;APN=cmnet,,,TIMEZON
E=E,480;WORKMODE=1;FIREWALL=1;BT=1;RFID=0,1;PEDOMETER=1,0,3000#" , take appendix 2 for
conference。

2.11 inquiry terminal parameter(0x000B)

function	Server inquiry terminal parameter
Down link	<SS><L><0x000B><index><checksum>\r\n
Up link	<TT><L><IMEI><0x000B><param><index><checksum>\r\n
e.g.	53 53 00 0E 00 0B 00 00 00 2D 03 9A 0D 0A 54 54 01 05 35 20 00 00 00 00 01 00 0B 56 45 52 53 49 4F 4E 3D 35 32 30 5F 52 45 4C 5F 56 30 30 3B 43 45 4E 54 45 52 3D 32 32 32 32 3B 46 41 4D 49 4C 59 4E 55 4D 3D 31 31 31 2C 31 35 33 36 36 35 35 35 38 39 36 3B 4D 4F 4E 49 54 4F 52 3D 33 33 33 33 33 3B 41 4C 41 52 4D 3D 31 2C 30 2C 30 30 2C 30 30 2C 32 2C 30 2C 30 30 2C 30 30 2C 33 2C 30 2C 30 33 2C 30 30 2C 34 2C 31 2C 31 30 2C 34 32 2C 35 2C 31 2C 30 36 2C 33 31 2C 36 2C 31 2C 31 31 2C 34 39 2C 37 2C 30 2C 30 35 2C 33 31 2C 38 2C 31 2C 31 35 2C 32 35 3B 41 50 4E 3D 63 6D 6E 65 74 2C 2C 3B 54 49 4D 45 5A 4F 4E 45 3D 45 2C 34 38 30 3B 57 4F 52 4B 4D 4F 44 45 3D 31 3B 46 49 52 45 57 41 4C 4C 3D 31 3B 42 54 3D 31 3B 52 46 49 44 3D 30 2C 31 3B 50 45 44 4F 4D 45 54 45 52 3D 31 2C 30 2C 32 39 39 38 23 00 00 00 2D 24 21 0D 0A

attention: param is terminal present parameter on ASCII, 0x000B and 0x000A have same Up link packet format. The former is server inquiry terminal to updating, the later is terminal updating by itself.

2.12 network updating time(0x000C)

function	Server will provide UTC time to the terminal
Down link	<SS><L><0x000C><time><index><checksum>\r\n
Up link	<TT><L><IMEI><0x000C><flag><index><checksum>\r\n
e.g.	53 53 00 14 00 0B 0E 0A 10 03 0A 33 00 00 00 01 25 B9 0D 0A 54 54 00 16 35 20 00 00 00 00 01 00 0B 01 00 00 00 01 BB 52 0D 0A

attention:

	format	length(Byte)	remark
Time content	Year/month/date/ hour/minute/second	6	hexadecimal data

0x0E means year 2014, terminal will update time based on timezone.

2.13 Reset to defaults(0x000D)

function	Server will reset terminal setting to defaults.
Down link	<SS><L><0x000D><index><checksum>\r\n
Up link	<TT><L><IMEI><0x000D><flag><index><checksum>\r\n
e.g.	53 53 00 0E 00 0D 00 00 00 03 F0 7E 0D 0A
	54 54 00 16 35 20 00 00 00 00 01 00 0D 01 00 00 00 03 CD 60 0D 0A

It will extend on function protocol

2.14 set recording function(0x0080)

function	Server will order terminal to start recording for 10 seconds.
Down link	<SS><L><0x0080><data><index><checksum>\r\n
Up link	<TT><L><IMEI><0x0080><flag><index><checksum>\r\n
e.g.	53 53 00 0F 00 80 0A 00 00 00 01 5C 82 0D 0A
	54 54 00 16 35 20 00 00 00 00 01 00 80 01 00 00 00 01 00 02 0D 0A

attention: datafunction in the Down link data packet will preserve. This function need big data process, the minimum interval of 2 down link data packet is 60 second.

2.15 pedometer data update(0x0081)

function	When terminal activate pedometer, it will update steps to server regularly.
Up link	<TT><L><IMEI><0x0081><count(2 bytes)><index><checksum>\r\n
Down link	<SS><L><0x0081><index><checksum>\r\n
e.g.	54 54 00 17 35 20 00 00 00 00 01 00 81 00 64 00 00 00 04 9B 51 0D 0A
	53 53 00 0E 00 81 00 00 00 04 79 A4 0D 0A

2.16 set pedometer(0x0082)

function	Server set pedometer on/off and updating interval.
Down link	<TT><L><IMEI><0x0082><data><index><checksum>\r\n
Up link	<SS><L><0x0082><flag><index><checksum>\r\n
e.g.	53 53 00 0F 00 82 01 00 00 00 63 53 2C 0D 0A
	54 54 00 16 35 20 00 00 00 00 01 00 82 01 00 00 00 63 32 10 0D 0A

attention:

data	remark
0	Pedometer off
1	Pedometer on
0x80	Pedometer reset

2.17 temperature value upload(0x0083)

function	Terminal will upload the measured temperature.
Up link	<TT><L><IMEI><0x0083><data(2 bytes)><index><checksum>\r\n
Down link	<SS><L><0x0083><index><checksum>\r\n
e.g.	54 54 00 17 35 20 00 00 00 00 01 00 83 0E 7E 00 00 00 05 FD 68 0D 0A 53 53 00 0E 00 83 00 00 00 05 7E A5 0D 0A

attention: data is 100 multiple on real temperature, e.g.0x0E 0x7E means 37.1 °C.

2.18 attendance upload(0x0084)

function	Terminal will upload the record of RFID
Up link	<TT><L><IMEI><0x0084><RFID data><index><checksum>\r\n
Down link	<SS><L><0x0084><index><checksum>\r\n
e.g.	54 54 00 2A 35 20 00 00 00 00 01 00 84 32 30 31 34 31 31 30 33 30 36 32 32 33 34 2C 30 30 30 32 2C 32 00 00 00 06 56 37 0D 0A 53 53 00 0E 00 84 00 00 00 06 7C E2 0D 0A

attention: RFID data is ASCII coded string, format like below:

“yyyymmddHHMMSS,RFID,status”

It means the UTC time, RF code and attendance status, separate by “,”.

status	Attendance status
1	Arrive the school
2	Leave the school
3	Get on the bus
4	Get off the bus

Content “20141103062234,0002,2” on the example means received the signal from RF0002, means leave the school.

2.19 set terminal working status(0x0085)

function	Server set terminal working status.
Down link	<SS><L><0x0085><mode><index><checksum>\r\n
Up link	<TT><L><IMEI><0x0085><flag><index><checksum>\r\n
e.g.	53 53 00 0F 00 85 01 00 00 00 03 2C FB 0D 0A 54 54 00 16 35 20 00 00 00 01 00 85 01 00 00 00 03 45 20 0D 0A

attention:

Working status define as below

mode	Working status	备注
1	Power saving mode	GPS off when stand-by, command will trigger GPS working for 2minute at most.
2	Tracking mode	GPS will working every 10 minutes when the terminal is moving, GPS working for 2minute at most.

- 1、 Working status “mode” used to set GPS working period on the terminal, the GPS will work at most 3 minutes at the first time.
- 2、 Switch on automatically on every 6:00, switch off on 23:00. It working as the working status, shut off after GPS positioned.
- 3、 The watch must have vibration in last 10 minutes for tracking mode trigger automatically at preset time.

2.20 set alarm clock(0x0086)

function	Server set alarm clock
Down link	<SS><L><0x0086><total><alarm clock(4 bytes)><index><checksum>\r\n
Up link	<TT><L><IMEI><0x0086><flag><index><checksum>\r\n
e.g.	53 53 00 2F 00 86 08 01 00 08 00 02 00 0A 00 03 00 0C 00 04 00 0E 00 05 00 10 00 06 00 12 00 07 00 14 00 08 00 16 00 00 00 00 02 C9 40 0D 0A 54 54 00 16 35 20 00 00 00 00 01 00 86 01 00 00 00 02 FE 71 0D 0A

attention: alarm clock data have 4 byte.

alarm clock	byte	remark
Serial number	1	Alarm clock
mode	1	
time	2	Hexadecimal data to show hours and minutes.

Corresponding mode

Alarm clock mode	remark
0	off
1	Circulate (active everyday)

It is able to set multi alarm clock at once, set <alarm clock>as below:
 <TT><L><IMEI><0x0036><total><alarm clock> <alarm clock>
 <index><checksum>\r\n

2.21 Find the device(0x0087)

function	Server will help the parent mobile to find the device.
Down link	<SS><L><0x0087><index><checksum>\r\n
Up link	<TT><L><IMEI><0x0087><flag><index><checksum>\r\n
e.g.	53 53 00 0E 00 87 00 00 00 67 13 A1 0D 0A
	54 54 00 16 35 20 00 00 00 00 01 00 87 01 00 00 00 67 47 34 0D 0A

2.22 Bluetooth switch(0x0088)

function	Server set Bluetooth switch on the device.
Down link	<SS><L><0x0088><data><index><checksum>\r\n
Up link	<TT><L><IMEI><0x0088><flag><index><checksum>\r\n
e.g.	53 53 00 0F 00 88 01 00 00 00 14 7D 1A 0D 0A
	54 54 00 16 35 20 00 00 00 00 01 00 88 01 00 00 00 14 20 07 0D 0A

attention

data	remark
0	Turn off bluetooth
1	Turn on bluetooth

2.23 Incoming firewall(0x0089)

function	Server set incoming firewall.
Down link	<SS><L><0x0089><data><index><checksum>\r\n
Up link	<TT><L><IMEI><0x0089><flag><index><checksum>\r\n
e.g.	53 53 00 0F 00 89 00 00 00 00 1A 9B 0B 0D 0A
	54 54 00 16 35 20 00 00 00 00 01 00 89 01 00 00 00 1A 41 09 0D 0A

attention

data	remark
0	Disable incoming firewall
1	Enable incoming firewall

2.24 RFID switch(0x008A)

function	Server set RFID switch on device.
Down link	<SS><L><0x008A><data><index><checksum>\r\n
Up link	<TT><L><IMEI><0x008A><flag><index><checksum>\r\n
e.g.	53 53 00 0F 00 8A 01 00 00 00 69 DD 2E 0D 0A
	54 54 00 16 35 20 00 00 00 00 01 00 8A 01 00 00 00 69 EA 5A 0D 0A

attention

data	remarks
0	Disable RFIDfunction
1	Enable RFIDfunction

2.25 Attendance record (0x008B)

function	Server will change attendance status of the device.
Down link	<SS><L><0x008B><data><index><checksum>\r\n
Up link	<TT><L><IMEI><0x008B><flag><index><checksum>\r\n
e.g.	53 53 00 0F 00 8B 01 00 00 00 6B FA 17 0D 0A
	54 54 00 16 35 20 00 00 00 00 01 00 8B 01 00 00 00 6B EB 58 0D 0A

After device enable RFID function, the attendance status will change and report 0x0084to server. And it can set if enable other functions.

data	remarks
0x00	No notice
0x01	Only SMS notice

2.26 Pedometer task(0x008C)

function	Server set pedometer target, it will notice to reward when reach the target.
Down link	<SS><L><0x008C><data(2 bytes)><index><checksum>\r\n
Up link	<TT><L><IMEI><0x008C><flag><index><checksum>\r\n
e.g.	53 53 00 10 00 8C 17 70 00 00 00 6C AD 4E 0D 0A
	54 54 00 16 35 20 00 00 00 00 01 00 8C 01 00 00 00 6C 24 2F 0D 0A

attention: device will receive the target sent from server, and enable pedometer automatically.

2.27 Timing shutdown(0x008D)

function	Server set timing boot and timing shutdown of the device.
Down link	<SS><L><0x008D><data(5 bytes)><index><checksum>\r\n
Up link	<TT><L><IMEI><0x008D><flag><index><checksum>\r\n
e.g.	

Data format:

	format	Byte	Remarks
Data content	enabled	1	0 disable timing shutdown function, 1 enable timing shutdown function.
	Switch on time	2	Set timing boot time, use hexadecimal to show hour and minute, 0x06 0x00 as default.
	Switch off time	2	Set timing shutdown time, use hexadecimal to show hour and minute, 0x17 0x00 as default.

2.28 Enable **temperature** measuring(0x0093)

function	Server set device to measuring temperature.
Down link	<SS><L><0x0093><data><index><checksum>\r\n
Up link	<TT><L><IMEI><0x0093><flag><index><checksum>\r\n
e.g.	53 53 00 0F 00 93 01 00 00 00 A9 7C E1 0D 0A
	54 54 00 15 35 20 00 00 00 00 01 00 93 00 00 00 A9 51 0A 0D 0A

data	remarks
0	Cancel temperature measuring
1	Start temperature measuring

Special function protocol extension

2.29 Location information request(0x0100)

function	Device upload location information, require server to turn into location description.
Up link	<TT><L><IMEI><0x0100><phone number><GPS/Cell data><language><index><checksum>\r\n
Down link	<SS><L><0x0100><phone number><SMS data><index><checksum>\r\n
e.g.	<pre> 54 54 00 72 35 20 00 00 00 00 01 01 00 31 35 38 39 39 37 39 33 34 35 30 00 00 00 00 00 32 30 31 34 31 31 31 30 31 30 30 35 33 36 2C 41 2C 37 2C 4E 2C 32 32 2E 35 33 37 32 35 32 2C 45 2C 31 31 34 2E 30 32 32 39 33 34 2C 30 2E 32 2C 31 2E 31 2C 35 30 2E 32 3B 34 36 30 2C 30 2C 31 30 31 37 33 2C 34 36 35 32 2C 33 38 01 00 00 00 0F 61 08 0D 0A 53 53 00 F8 01 00 31 35 38 39 39 37 39 33 34 35 30 00 00 00 00 00 9D 5B 1D 8D 30 00 30 00 30 00 31 00 3A 00 7F 5E 1C 4E 01 77 F1 6D 33 57 02 5E 8F 79 30 75 3A 53 66 8F 6C 51 99 5E 2E 00 DD 8D BB 79 F0 6C 36 71 E5 5D 38 8D ED 56 32 00 31 00 36 00 0B 68 32 00 33 00 30 00 73 7C 2E 00 DD 8D BB 79 F0 6C 36 71 D1 79 80 62 ED 56 33 00 30 00 36 00 0B 68 32 00 33 00 31 00 73 7C 2E 00 DD 8D BB 79 F0 6C 36 71 D1 79 80 62 ED 56 33 00 30 00 34 00 0B 68 32 00 37 00 32 00 73 7C 2E 00 DD 8D BB 79 F1 6D 33 57 02 5E B3 52 B7 5F 29 52 7D 6C 66 8F 0D 67 A1 52 09 67 50 96 6C 51 F8 53 33 00 36 00 73 7C 2E 00 DD 8D BB 79 E5 65 1A 90 0D 54 66 8F F4 7E EE 4F 33 00 38 00 73 7C 2E 00 DD 8D BB 79 B0 73 E3 4E A8 53 4A 57 34 00 32 00 73 7C 00 00 00 0F 06 DA 0D 0A </pre>

attention:

- 1、“phone number” is 16 digit ASCII telephone number.
- 2、“GPS/Cell data” address information format as the appendix 1.
- 3、“SMS data” is an Unicode, address information on the example is digit.
- 4、“language” is the language on device.

language	Language
0	English
1	Simplified Chinese
2	Chinese Traditional

2.30 Device alarm request (0x0101)

functi	Device detect error and sent alarm information to server.
--------	---

on	
Up link	<TT><L><IMEI><0x0101><alarm(2 bytes)><addr><GPS/Cell data><language><index><checksum>\r\n
Down link	<SS><L><0x0101><addr><SMS data><index><checksum>\r\n
e.g.1	54 54 00 65 35 20 00 00 00 00 01 01 01 00 04 00 32 30 31 34 31 31 31 30 31 30 30 35 33 36 2C 41 2C 37 2C 4E 2C 32 32 2E 35 33 37 32 35 32 2C 45 2C 31 31 34 2E 30 32 32 39 33 34 2C 30 2E 32 2C 31 2E 31 2C 35 30 2E 32 3B 34 36 30 2C 30 2C 31 30 31 37 33 2C 34 36 35 32 2C 33 30 01 00 00 00 0E 34 26 0D 0A 53 53 00 0F 01 01 00 00 00 00 0E 76 81 0D 0A
e.g.2	54 54 00 2D 35 20 00 00 00 00 01 01 01 80 02 01 3B 34 36 30 2C 30 2C 31 30 31 37 33 2C 34 36 38 30 2C 33 36 01 00 00 00 05 A8 44 0D 0A 53 53 00 E1 01 01 01 DD 84 59 72 22 4E 31 59 A5 62 66 8B 2C 00 7F 5E 1C 4E 01 77 F1 6D 33 57 02 5E 8F 79 30 75 3A 53 66 8F 6C 51 99 5E 2E 00 DD 8D BB 79 F0 6C 36 71 D1 79 80 62 ED 56 33 00 30 00 36 00 0B 68 32 00 32 00 36 00 73 7C 2E 00 DD 8D BB 79 F0 6C 36 71 E5 5D 38 8D ED 56 32 00 31 00 36 00 0B 68 32 00 32 00 39 00 73 7C 2E 00 DD 8D BB 79 F0 6C 36 71 D1 79 80 62 ED 56 33 00 30 00 34 00 0B 68 32 00 36 00 36 00 73 7C 2E 00 DD 8D BB 79 B0 73 E3 4E A8 53 4A 57 33 00 35 00 73 7C 2E 00 DD 8D BB 79 52 60 E1 4F 5E 74 F6 94 D1 91 8D 87 F9 57 AD 8B 66 5B 62 96 33 00 35 00 73 7C 2E 00 DD 8D BB 79 E5 65 1A 90 0D 54 66 8F F4 7E EE 4F 33 00 39 00 73 7C 00 00 00 05 34 F7 0D 0A

1、“alarm” is 2 digit, define as below:

field	Alarm description
0x0000	No alarm information
0x0001	Vibration alarm
0x0002	Low battery alarm
0x0004	SOS alarm
0x8002	Bluetooth lost alarm

2、“addr” means whether there is address information in the alarm packet:

Field	Alarm description
-------	-------------------

0x00	Server only receive alarm message, no address information in the reply data packet.
0x01	Server must reply with address information.

When the value is 0, the data format will simply as below:

<SS><L><0x0101><addr><index><checksum>\r\n

- 3、“GPS/Cell data” reference appendix 1
- 4、“language” reference 0x0100。
- 5、“SMS data” is Unicode, reference 0x0100.

2.31 Message forward(0x0102)

function	Server down load telephone number and message content, device forward it.
Down link	<SS><L><0x0102><phone number><SMS data><index><checksum>\r\n
Up link	<TT><L><IMEI><0x0102><flag><index><checksum>\r\n
e.g.	53 53 00 38 01 02 31 35 38 39 39 37 39 33 34 35 30 00 00 00 00 00 43 00 61 00 72 00 73 00 6F 00 6E 00 40 00 0D 4E 81 89 F7 8F 4B 60 E5 54 00 00 00 00 00 53 5C 3A 0D 0A 54 54 00 16 35 20 00 00 00 00 01 01 02 01 00 00 00 53 BA 51 0D 0A

attention:

- 1、“phone number” is a 16 digit ASCII telephone number.
- 2、“SMS data” is unicode.
- 3、format is the same as 0x0100 data packet.

Special coding association extension

2.32 Request AGPS ephemeris (0x434A)

When GPS enable on the device and it have connected to network, the device will request AGPS ephemeris to the server. And server will sent the latest ephemeris data to device, shorter the first GPS locating time.

function	Device require AGPS data from server to locating faster.
Up link	<TT><L><IMEI><0x434A><data(2 bytes)><index><checksum>\r\n
Down link	<SS><L><0x434A><AGPS data><index><checksum>\r\n
e.g.	<pre> 54 54 00 17 35 20 00 00 00 00 01 43 4A 02 01 00 00 00 05 02 1E 0D 0A 53 53 04 10 43 4A 0A 02 8A 04 D3 FF 77 FF 0B 00 7C 3A 66 04 F4 9C 99 F3 AB 85 B2 08 86 71 2F 00 97 BB F7 FF EE 5F DD FF 1C 3E 39 0D D5 EF E8 F7 C2 67 45 FC 20 AB 09 00 AC D2 23 00 83 8C D2 FF BE 9E FF 08 2C 70 3F 04 0F C9 7A F3 43 18 DB FF EC E9 2B 00 8F 92 F4 FF 10 0C F8 FB D1 94 68 0C 2E 4C F6 F6 EC B4 D0 FF 52 A9 08 00 5E 18 22 00 F3 DF 08 F3 63 49 29 08 BA D1 6C 03 A1 F8 F5 FF 4F BE DB FF ED 37 2E 00 26 41 6C F7 E3 60 93 FB 9A B2 51 0C 00 4A 26 00 EB 66 D3 FF 4D DB 0A 00 7B F3 B2 04 1D 7F 8C F3 18 D0 78 08 2C 07 2F 00 E6 D7 F8 FF 7B 98 DC FF 40 81 47 0D 2B 5B 23 F8 B5 C5 FA FB 67 84 08 00 36 85 24 00 A7 E3 D2 FF 85 91 C2 08 A2 B5 86 04 0B D9 68 F3 5D 56 DA FF 87 8B 2B 00 69 AA F5 FF 47 8B AB FB 14 57 76 0C 23 23 2F F7 09 15 D1 FF F1 91 07 00 00 E4 22 00 2A 84 38 01 60 6A 53 00 CE 13 5E EC EA 88 89 18 20 6B 53 00 20 1C 0C 00 9F 4A C1 0E EB 79 CE 05 FA 94 F4 FE 32 83 F0 FF DB F5 1E 00 86 5B D0 FF 84 47 CF 03 FE 92 20 0A 74 DC 61 F4 ED D8 C8 FF 60 E7 FC FF 10 6F EB FF EE 01 15 F5 0A BC 57 04 60 83 69 F5 F6 39 D8 FF 07 BE DD FF D7 4B 1B 00 0E 9F 5F F1 E5 91 33 FA D7 6C 18 01 73 F8 0F 00 64 F3 E0 FF 6E F9 2F 00 9B A9 80 FC EA A7 F2 F5 A5 FE A8 0B D7 A8 37 00 53 A5 03 00 73 0E 14 00 56 37 31 0B 7C 53 DE FB B3 2C 6E 0A 13 06 27 00 F5 71 22 00 2B 1C E4 FF DC 51 AE 0E 9D C0 F2 05 6E 62 BA FE 0C 8E EF FF 29 94 1E 00 01 6F D0 FF E8 AC 8C 03 39 0C 1C 0A 79 2B 49 F4 8E 9A C8 FF 77 41 FC FF 22 34 EC FF 41 43 E5 F4 09 B6 2E 04 FF 41 8B F5 E2 F2 D8 FF E3 78 DD FF 9C FF 1B 00 AA 31 73 F1 D3 37 0F FA 4B F9 52 01 E8 F0 10 00 17 57 E1 FF B4 E4 2F 00 A6 E3 C3 FC 71 DA F7 F5 30 08 C1 0B 0A E3 37 00 C1 4C 04 00 6A 45 13 00 AE 14 60 0B 44 95 07 FC 59 AE 4B 0A A1 49 26 00 30 B3 22 00 15 6C E3 FF 2A 85 38 01 60 6A 53 00 6E 14 FD FF 45 5E 2E 11 20 6B 53 00 20 1C 0C 00 89 0C 8F 02 95 3E 5A 09 5C 98 79 F3 E8 2A CF FF D4 A5 1E 00 47 E5 0C 00 59 00 ED F5 66 56 C8 0B 6B F4 C1 FC D7 65 DF FF 1E 03 F1 FF 22 F2 2E 00 FC 13 69 F3 BA DF 61 02 C9 3B 4B 09 FC 66 10 00 F8 63 D2 FF 07 DA 21 00 14 5C 8D FD 7F 00 97 F6 2A 51 7B 0C 84 F6 30 00 70 9D E1 FF E1 AE F2 FF D9 FA 27 0A 49 D6 44 F4 7B 0E 1B 03 9F 42 20 00 4E 6D 0F 00 E7 E5 D0 FF D1 D6 8A 0C C0 BE C0 FD 82 09 9A F6 18 22 EF FF 01 B0 2D 00 32 83 DE FF 48 3E 53 02 E2 A1 7F 09 5E 19 8A F3 73 03 CF FF 88 07 1E 00 D4 BC 0D 00 96 09 C6 F5 21 2A B6 0B CD 46 FC FC B7 13 E0 FF 31 3B F0 FF 28 28 2F 00 6F 1F 7E F3 D4 57 2A 02 A7 CD 74 09 EA 3B 11 00 32 3B D2 FF EC 37 21 00 F3 4D C9 FD B1 EE 71 F6 49 4B 6A 0C 33 1C 31 00 41 3D E2 FF 66 D7 F1 FF B6 82 4E 0A DE 8A 57 F4 CF 8E E0 02 FB 92 1F 00 DC 34 10 00 22 B2 D0 FF F0 3B 75 0C A2 5E F8 FD EB EE 70 F6 37 4E EE FF 79 D6 2D 00 EE 26 DF FF [2]2A 86 38 01 60 6A 53 00 98 78 FA 17 C3 C7 BE 17 20 6B 53 00 20 1C 0C 00 96 71 D0 F6 BA 40 D4 0B AA DA D5 04 6C 52 DB FF 5F C1 F5 FF 89 55 D2 FF BE 1F 0A F3 4D DA 65 03 FF F6 CB F7 B8 72 0C 00 C8 FF D3 FF B2 D4 D9 FF 44 FE 8B FC C1 61 78 F7 32 7C 26 F3 9B 9F 30 00 D3 35 DF FF F3 20 08 00 F4 38 97 09 A1 AD 1D F4 C1 8B 7B FB C3 8E 23 00 8D FD 0A 00 03 79 2D 00 61 4D 29 0D FB E5 89 FC 31 3D 52 08 0D 8C F3 FF 05 64 2B 00 2C 77 25 00 AA 6E C1 03 A8 83 5C 08 00 00 00 05 94 A2 0D 0A 54 4 00 17 35 20 00 00 00 00 01 43 4A 02 02 00 00 00 06 12 1E 0D 0A </pre>

1、 Device will require AGPS data based on GPS type, and the data define as below:

field	length(Byte)
GPS hardware type	1
AGPS packet serial	1

field	GPS hardware type
0x01	Ublox
0x02	Sony

For the AGPS packet serial, the first request with serial number 0, after receive the AGPS data sent from server, the reply serial number will be the same as the received data packet.

2、The AGPS data download from server will be large, it need to be divided before download to device .

AGPS data will divided as below:

format		length (Byte)	Remarks
AGPS data content	Quantity of ephemeris data packet	1	
	Present ephemeris data serial number	1	Count from 1, device will reply this serial number to server after received data, and require for next data packet.
	Ephemeris data	M	Content length based on packet length $M \leq 1024$

The ephemeris content will be divided by 1024 byte, quantity of ephemeris data packet is how many packet it has been divided, serial number of present ephemeris data packet count from 1.

3、3 data in the example means the device use Sony GPS hardware. Device reply to server that it has received first packet, server will sent the second packet after confirmation, device will reply received the second packet.

4、 If server cannot provide AGPS data, download data packet is also needed. Set quantity of ephemeris data packet and present ephemeris data serial number as 0xFF, and the content is empty,

the AGPS data is:53 53 xx xx 43 4A FF FF xx xx xx xx xx xx 0D 0A

Otherwise, the device will sent request again.

2.33 push recording(0x434B)

function	After device recording, it will upload voice recording to server.
Up link	<TT><L><IMEI><0x434B><time>< voice><index><checksum>\r\n
Down link	<SS><L><0x434B><voice index><index><checksum>\r\n
e.g.	<p>54 54 04 1F 35 20 00 00 00 00 01 43 4B 0E 01 01 00 08 29 3E E6 10 01 23 21 41 4D 52 0A 3C 47 01 1F B9 80 77 A5 C0 49 80 AA E9 E0 8D CC A5 8A B8 DC 6D E1 A3 20 93 07 82 10 25 AA B1 E0 3C 47 01 1F B9 80 77 A5 C0 49 80 AA E9 E0 8D CC A5 8A B8 DC 6D E1 A3 20 93 07 82 10 25 AA B1 E0 3C 47 01 1F B9 80 77 A5 C0 49 80 AA E9 E0 8D CC A5 8A B8 DC 6D E1 A3 20 93 07 82 10 25 AA B1 E0 3C 72 5D 79 48 58 3C 00 00 0A 0A 2B 1B AA 9A 8A 64 90 65 96 A5 C8 BD 5D 65 A3 2C BF C0 14 71 00 3C 60 FD 1F B2 B7 C0 01 01 24 F7 FF 7C 54 48 05 86 0D 7F 18 07 FC 76 7C A9 7D 2F C6 D5 0D 5E 80 3C 46 71 64 44 3A 02 01 00 A1 B1 6A 0A 2F A5 B2 DA 91 D2 F0 21 1B 3A B2 4C CF 71 3D 06 29 9C 90 3C 54 F8 7B 8F 4E 1C 04 00 1F A6 EA D0 40 32 28 E7 99 F7 21 46 99 F4 CF AC 65 CF 5C DF 4C 85 80 3C 40 ED 69 B1 EF F2 01 61 07 2D 0A 65 86 49 05 29 B0 3D 42 91 AC B7 F5 87 4F 0E 31 57 9D BC C0 3C 8A FC 77 88 C3 00 05 00 1F ED CF A2 90 CD 51 8A 69 91 D3 B4 2B F5 F2 45 3D 74 EB 03 89 8C D0 3C 36 76 85 9B A6 5A 03 01 43 CD 8A E5 48 45 C1 C3 88 58 DE 93 34 B6 7D 61 69 D2 7D AE 34 8E 80 3C 60 ED 1F 88 19 32 03 40 1F C7 5F 46 8C C8 A4 A3 0A 49 73 13 64 06 98 8A FB 0A 18 98 7D 41 50 3C 32 F9 63 B2 BE 50 01 60 96 A9 CA D0 89 09 12 DC 83 90 0A 56 04 C5 48 30 F0 F7 D0 91 35 C7 70 3C B4 76 7B 4D 6E 18 09 60 1F F4 2A 10 71 F4 95 E0 C5 A2 8F C8 3E FE 46 B1 ED 9A 8B 70 46 5D 40 3C F8 ED 5F 9A BC FA 08 41 2D 82 07 88 C5 64 EA 53 8B FE 12 19 39 AA 3C 77 1B 9A 14 68 6F 09 40 3C 88 80 7F 8D 46 32 00 80 5B C2 7A D4 19 80 E2 D0 86 71 51 11 9A 56 14 9F 94 46 BA D4 EA 3F C0 3C 38 F5 27 90 2D A1 00 41 0F 6F A8 B7 5A 57 D8 E1 67 63 DE 62 AE EC AF 52 2F 6E D6 8D FB 31 40 3C 48 71 2C 8C B8 78 00 40 3D F2 BA C0 23 21 08 97 47 10 11 D6 1F 29 F3 4E 97 6A F0 8C 1F 74 C0 3C 70 F5 63 8B B7 60 10 80 52 57 FF 3D 82 44 26 86 03 44 19 87 72 21 86 FC DF 7E C7 1A CB DB C0 3C 5E F8 7A 96 B2 AC 0C 20 53 A1 15 0C A8 4D 82 9A CB 3A 75 EE E3 1F 33 B9 D8 77 8B 02 1F 10 C0 3C 38 71 25 B2 A7 A1 40 80 1F E2 CF 01 33 CF 91 9C 2E 08 73 F1 D0 16 D9 53 1C 12 D5 B3 3E 87 80 3C 60 EC 5F AA E6 70 01 81 06 E3 DA 35 50 49 00 C1 06 64 C9 36 75 6F 00 DC 8C B6 BF D0 B9 27 20 3C 54 6E 7A 8B E6 38 06 80 3C 0F 3A A0 0A C0 46 F7 9D 2D 20 F0 B6 0B 36 C2 CD E8 33 FE CA 11 D0 3C 6A 7F 67 B7 57 98 01 60 0E DD 88 C8 00 FD A0 34 F4 88 98 AC 60 77 AF 95 9A 07 F8 95 D8 EE 50 3C 44 78 8A 8C 2D B6 00 40 1E F2 DA 90 A2 F4 D2 F6 B2 02 0D 8C 6E 44 C0 5E 7C 19 3B B7 4F E9 C0 3C 96 F5 71 8D A6 C0 41 00 1F 93 7A 40 08 FE 71 D0 E6 29 E8 86 86 69 60 6B 5F 7A 9F 7E 2C C0 50 3C 44 ED 26 8C 6D E8 01 40 1F A4 29 F0 60 F2 2C DD CC 30 02 CC 31 42 00 16 36 9F D6 7A 3C B4 90 3C 88 70 7F 92 18 E0 12 40 5B A4 7A 40 92 C3 79 E4 D4 88 A9 B7 38 0F F5 34 83 6E 7E A0 EE AF 00 3C 3F 04 7B 8F 42 CC 00 C0 16 B5 2A ED F7 E3 E0 84 54 53 E8 2A C0 AC E5 E2 FE 08 61 98 C4 03 90 3C 8A F4 74 95 F0 9E 00 40 59 B0 3A 11 84 54 48 C1 61 78 31 02 A1 B1 DD 54 76 E8 44 79 8C 7E 10 3C 36 70 7D B0 45 B4 08 C0 1E 43 BA C2 25 E4 44 55 B0 8F D6 29 96 DA 84 C9 6C 52 2F A8 57 00 D0 3C 60 83 6B 3D 5D 34 10 80 93 A6 AB 12 60 32 73 B6 E5 C4 22 C4 DD 8D 0A F8 07 F5 78 D1 EF 04 00 3C 68 70 A3 8F E4 80 02 C1 43 CD AA 85 28 40 09 C2 C9 E7 F8 A2 5D CD 49 C8 73 00 00 00 06 65 21 0D 0A</p> <p>53 53 00 0F 43 4B 01 00 00 00 06 2A EF 0D 0A</p>

1、One recording data can be upload in different packet, every data packet has the same time stamp,

as the mark to combine the data together. The format of time define as below:

	format	length(Byte)	Remarks
Time content	Year/month/date/ hour/minute/ second	6	hexadecimal data

2、Voice data will upload in sever packet, and voice content is define as below:

	format	length(Byte)	Remarks
Voice content	Voice data size	2	Total bytes of voice data
	Quantity of voice data packet	1	
	Serial number of present voice data packet	1	Start count from 1
	Voice content	M	The length of the content calculated on data size M<=1024

Voice data will be divided by 1024 byte on the device, quantity of voice data packet is how many packet it has been divided, serial number of present voice data packet count from 1. Server will sent the serial number of received voice data packet, device will sent the next packet after confirmation.

Big data agreement of Subcontract extension

Appendix 1:format of position data

Position data is shown on ASCII, formation define as:<GPS data;LBS data >

- 1、GPS, LBS data, use ";" to divide, it cannot be omit even the data is empty.
- 2、LBS data include main base station and nearby plot information. The nearby plot number from 0 to 6. The GPS data integrity depends on environment, could be empty like GPS not located.
- 3、complete field define as below:

yyyymmddHHMMSS,<A|V>,N,<N|S>, xx.dddddd, <E|W>, yy.dddddd,speed, HDOP, Altitude;MCC,MNC,LAC,cellID,RSSI,LAC-1, cellID-1, RSSI-1,LAC-2, cellID-2, RSSI-2...;

- 4、Format as below:

Field		Description	Remarks
GPS data	yyyymmddHHMMSS	UTCYY/MM/DD/HH/MM/SS	0 timezone
	<A V>	GPS packet already located	A = valid V = invalid
	N	Available satellite	
	<N S>	Direction of latitude	N = North S = South
	xx.dddddd	latitude (degree)	
	<E W>	Direction of longitude	E = East W=West
	yy.dddddd	longitude (degree)	
	speed	speed (km/h)	1 digit decimals float point number type
	HDOP		
	Altitude	altitude (km)	
separator	;		0x3B
Base station data	MCC	Main plot information (plot code, base station code and signal strength)	Integer type
	MNC		
	LAC		
	cellID		
	RSSI		
	LAC-1	Multi base station expansion	
	cellID-1		

RSSI-1	(0~6)	
LAC-2		
cellID-2		
RSSI-2		
LAC-3		
cellID-3		
RSSI-3		
... ..		

- Appendix 2: synchronization parameters format

This field show on ASCII, parameter all in decimal character string. Parameter content include instructions and parameter. Instruction use capital word, use "=" between instruction and parameter. Use "," to divide parameters. Parameter can be empty. Use ";" to separate multi instructions. Use "#" at the end. For example:

CENTER=123456; FAMILYNUM =654321,,; TIMEZONE=E,8#

No sequence between instructions, all in capital words. All parameter convert to character string and at most 1024. Exceed use another packet to send. "0/1" means function switch.

Instruction	Description	Remarks/e.g.	Association
VERSION	Software version	B520_V1.0	\
CENTER	Center number or SOS number	13800000000	0x0006 0x0009
FAMILYNUM	Relative number	Multi number divided	0x0006 0x0009
MONITOR	Monitor number	15800000000	0x0006 0x0007 0x0009
TIMEZONE	timezone	W/E,<minute of present timezone>	0x0008
PEDOMETER	pedometer	0/1,<present steps>,<task steps>	0x0081 0x0082 0x008C
WORKMODE	Working mode	1/2/3/4	0x0085
ALARM	Alarm clock	<serial number 1-8>,<mode>,<hour(use 2 decimalism digit)>,<minute>(<next alarm clock, altogether 8>)	0x0086
BT	bluetooth	0/1	0x0088
FIREWALL	Incoming firewall	0/1	0x0089
RDID	RFID attendance	0/1,<attendance notice type>	0x008A 0x008B
PWD	password	123456	\
APN	APN	APN,<use name>,<password>	\

SPOF	Time setting	0/1,<switch on time>,<switch off time>	0x008D

Appendix 3: CRC Verification

```

/*****
* Function    - city_com_get_crc
*
* Purpose     - CRC data verify
*
* Description - CRC-CCITT (Kermit)
*
* modification history
* -----
* v1.0 , 2014-09-12, chengjun  written
* -----
*****/
kal_uint16 city_com_get_crc(const kal_uint8* pData, kal_uint16 length)
{
    kal_uint16 crc = 0, q;
    kal_uint16 c, i;

    for(i = 0; i < length; i++)
    {
        c = pData[i];
        q = (crc ^ c) & 0x0F;
        crc = (crc >> 4) ^ (q * 0x1081);
        q = (crc ^ (c >> 4)) & 0xF0;
        crc = (crc >> 4) ^ (q * 0x1081);
    }
    return (((crc << 8) & 0xFF00) | ((crc >> 8) & 0xFF));
}

```