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# GPRS Communication Protocol Between GPS Tracker and Server

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Version 1.47

VT400

<b>Change Version</b>	<b>Reason of Change</b>	<b>Date</b>
V1.00	Initial Document	2005-6-25
V1.01	Addition of Alarms	2006-10-8
V1.02	Addition of Output Control Addition of Stats in GPRS String	2007-1-26
V1.03	Add command 4107/4207/4126/4130/4131/4132/9016 VT310 integrated Change 4116 Delete 9014	2008-7-10
V1.04	Add 5114 Add AD of VT310	2008-12-2
V1.05	Add Power-cut Alarm Add Buzzer Control for GT60	2009-02-04
V1.06	Add 9001 to get SN and IMEI Add 5101/5115/5199	2009-3-18
V1.07	Add 4136	2009-08-03
V1.45	Change 4136 Add 4902/5503	2009-09-15
V1.46	Delete 5101/5115/5199 Add GPS Antenna Disconnection Alarm Extended to 7 AD External Power Voltage Detection 1 X Relay Output (250VAC/3A) 1 X OC Output 1 X RS232 Output 2 X Digital Input (Positive Triggering)	2009-09-29
V1.47	Wording Correction	2010-06-03

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## I Command Format

Command format of GPRS packets are as follows:

From server to tracker:

@@<L (2 bytes)><ID (7 bytes)><command (2 bytes)><parameter><checksum (2 bytes)>\r\n

From tracker to server:

\$\$<L (2 bytes)><ID (7 bytes)><command (2 bytes)><data><checksum (2 bytes)>\r\n

Note:

Do NOT input '<' and '>' when writing a command.

All multi-byte data complies with the following sequence: High byte prior to low byte.

The size of a GPRS packet (including data) is about 100 bytes

Item	Specification
@@	2 bytes. It means the header of packet from server to tracker. It is in ASCII code (Hex code: 0x40)
\$\$	2 bytes. It is the header of packet from tracker to server, It is in ASCII code (Hex code: 0x24)
L	2 bytes. It means the length of the whole packet including the header and ending character and it is in hex code
ID	7 bytes, ID must be digit and not over 14 digits, the unused byte will be stuffed by 'f' or '0xff'. It is in the format of hex code. For example, if ID is 13612345678, then it will be shown as follows: 0x13, 0x61, 0x23, 0x45, 0x67, 0x8f, 0xff. If all 7 bytes are 0xff, it is a broadcasting command. ID is in hex code
command	2 bytes. The command code is in hex code. Please refer to the command list below.
data	Min 0 byte and max 100 bytes. See Annex 1 for description of 'data'.
checksum	2 bytes. It indicates CRC-CCITT (default is 0xffff) checksum of all data (not including CRC itself and the ending character). It is in hex code. For example: 24 24 00 11 13 61 23 45 67 8f ff 50 00 05 d8 0d 0a 0x05d8 = CRC-CCITT (24 24 00 11 13 61 23 45 67 8f ff 50 00)
\r\n	2 bytes. It is the ending character and in hex code (0x0d,0x0a in hex code)

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### III Command Details

#### 1. Login – 0x5000

Command:	\$\$<L><ID><0x5000><checksum><\r\n>
Description:	After tracker is properly setup, it will apply for a GPRS connection by sending this login command every 30 seconds to the server until the server confirms its login.
Example:	24 24 00 11 12 34 56 FF FF FF FF 50 00 8B 9B 0D 0A
Note:	Tracker ID here is 123456 and same for the following examples.

#### 2. Login Confirmation – 0x4000

Command:	@@<L><ID><0x4000><Flag><checksum>\r\n
Description:	Server sends this command back to the tracker to confirm tracker's login.
Note:	Flag (1 byte) = 0x00, login fails and will try again. = 0x01, login succeeded.
Example:	40 40 00 12 12 34 56 FF FF FF FF 40 00 01 A9 9B 0D 0A

#### 3. Track on Demand – 0x4101

Command:	@@<L><ID><0x4101><checksum>\r\n
Description:	Get the current location of the tracker
Example:	40 40 00 11 12 34 56 FF FF FF FF 41 01 67 D9 0D 0A
Response:	\$\$<L><ID><0x9955><data><checksum>\r\n
Example:	24 24 00 7E 12 34 56 FF FF FF FF 99 55 30 30 30 30 30 30 2E 30 30 30 2C 56 2C 30 30 30 2E 30 30 30 30 2C 53 2C 30 30 30 30 30 2E 30 30 30 30 2C 57 2C 30 2E 30 30 2C 30 2E 30 30 2C 32 32 30 38 39 39 2C 2C 2C 41 2A 37 45 7C 7C 30 7C 30 30 30 31 7C 30 30 30 30 2C 30 30 30 30 2C 30 30 30 30 2C 30 30 30 30 2C 30 30 30 30 2C 30 30 30 30 2C 30 30 30 30 77 0E 0D 0A
Note:	See Annex 1 for description of 'data'.

#### 4. Track by Interval – 0x4102

Command:	@@<L><ID><0x4102><Interval(2 bytes in hex code)><checksum>\r\n
Description:	Set time interval for automatic timed report (GPRS tracking).
Note:	Interval is in unit of 10 seconds. =0x00 0x00, stop tracking by interval. Max time interval = 65535*10 seconds.
Example:	40 40 00 13 12 34 56 FF FF FF FF 41 02 00 0A 36 19 0D 0A Above command will set 10 (0x00 0x0A)*10=100s as tracking interval.
Response:	\$\$<L><ID><0x5100><Flag (1byte)> <Interval (2 bytes)><checksum>\r\n

Note:	<p>Flag</p> <p>=0x00, failure response.</p> <p>=0x01, success response.</p> <p>Once the interval successfully set, the tracker will send the following position report to the server at the interval specified:</p> <p>\$\$&lt;L&gt;&lt;ID&gt;&lt;0x9955&gt;&lt;data&gt;&lt;checksum&gt;\r\n</p>
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## 5. Authorization – 0x4103

Command:	@@<L><ID><0x4103><input no (1 byte)><phone no for SMS><phone no for call><checksum>\r\n
Description:	Set authorized phone number for inputs
Note:	<p><b>input no</b> is in hex code. It supports up to 3 inputs.</p> <p>If button no</p> <p>= 0x01, set authorized phone number for input1;</p> <p>= 0x02, set authorized phone number for input2;</p> <p>= 0x03, set authorized phone number for input3.</p> <p><b>phone no for SMS:</b> Authorized phone number for receiving SMS.</p> <p><b>phone no for call:</b> Authorized phone number for receiving phone call.</p> <p><b>phone no</b> is 16 bytes in ASCII. If the phone number is less than 16 bytes, the blank byte(s) should be stuffed by '0x00'. For example:</p> <p>If the authorized number is 1234567890, then it should be written as follows:</p> <p>0x31 0x32 0x33 0x34 0x35 0x36 0x37 0x38 0x39 0x30 0x00 0x00 0x00 0x00 0x00 0x00</p> <p>If all 16 bytes data are 0x00, the authorized number is invalid.</p>
Example:	<p>40 40 00 32 12 34 56 FF FF FF FF 41 03 01 38 38 38 38 38 38 38 38 38 00 00 00 00</p> <p>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 99 68 0D 0A</p> <p>Above command will set '8888888888' as authorized phone number for input1.</p>
Response:	\$\$<L><ID><0x4103><Flag><checksum>\r\n
Note:	<p>Flag</p> <p>=0x00, failure response.</p> <p>=0x01, success response.</p>

## 6. Speeding Alarm – 0x4105

Command:	@@<L><ID><0x4105><speed (1 byte in hex code)><checksum>\r\n
Description:	Set speeding alarm for the tracker. When the tracker is over this preset speed limit, SMS alarms will be sent to the authorized phone number for SOS button and GPRS alarms will be sent to the server every 30 seconds until the tracker' speed is lower than this speed limit.
Note:	<p>speed</p> <p>=0x00, cancel speeding alarm;</p> <p>=0x01, speed limit is set to 10km/h;</p> <p>=0x02, speed limit is set to 20km/h;</p>

	<p>.....</p> <p>=0x0A, speed limit is set to 100km/h;</p> <p>.....</p> <p>=0x14, speed limit is set to 200km/h;</p> <p>Max speed limit is 200km/h.</p>
Example:	<p>40 40 00 12 12 34 56 FF FF FF FF 41 05 0B C0 14 0D 0A</p> <p>Above command will set speed limit: 110km/h.</p>
Response:	<p>\$\$&lt;L&gt;&lt;ID&gt;&lt;0x4105&gt;&lt;Flag&gt;&lt;checksum&gt;\r\n</p>
Note:	<p>If Flag</p> <p>=0x00, failure response.</p> <p>=0x01, success response.</p>

## 7. Movement Alarm – 0x4106

Command:	<p>@@&lt;L&gt;&lt;ID&gt;&lt;0x4106&gt;&lt;area (1byte in hex code)&gt;&lt;checksum&gt;\r\n</p>
Description:	<p>When the tracker moves out of a preset square scope, three SMS alarms and three GPRS alarms will be sent to the authorized phone number for SOS button and the server every 30 seconds.</p>
Note:	<p>area</p> <p>=0x00, cancel movement alarm function</p> <p>=0x01, it is set in a square with current location as center and with side length=2x30m;</p> <p>=0x02, it is set in a square with current location as center and with side length=2x50m;</p> <p>=0x03, it is set in a square with current location as center and with side length=2x100m;</p> <p>=0x04, it is set in a square with current location as center and with side length=2x200m;</p> <p>=0x05, it is set in a square with current location as center and with side length=2x300m;</p> <p>=0x06, it is set in a square with current location as center and with side length=2x500m;</p> <p>=0x07, it is set in a square with current location as center and with side length=2x1000m;</p> <p>=0x08, it is set in a square with current location as center and with side length=2x2000m.</p>
Example:	<p>40 40 00 12 12 34 56 FF FF FF FF 41 06 04 64 A8 0D 0A</p> <p>Above command will set a square with current location as center and with side length=2x200m.</p>
Response:	<p>\$\$&lt;L&gt;&lt;ID&gt;&lt;0x4106&gt;&lt;Flag&gt;&lt;checksum&gt;\r\n</p>
Note:	<p>Flag</p> <p>=0x00, failure response;</p> <p>=0x01, success response.</p>

## 8. Geo-fence Alarm - 0x4107, 0x4207

Command:	<p>@@&lt;L&gt;&lt;ID&gt;&lt;0x4107 or 0x4207&gt;&lt;coordinates&gt;&lt;checksum&gt;\r\n</p>
Description:	<p>Sets geo-fence alarm. When the tracker moves out of (in) a preset scope, three SMS alarms and three GPRS alarms will be sent to the authorized phone number for SOS button and the server every 30 seconds.</p>

Note:	<p>0x4107 is the command for exiting the geo-fencing area (Out). 0x4207 is the command for entering the geo-fencing area (In).</p> <p><b>Coordinates</b> includes: Lower-left X,Lower-left Y,Upper-right X,Upper-right Y Lower-left X should be less than Upper-right X; All longitudes and latitudes should be in ASCII format as follows:- Longitude: DDDFF.FFFF,E/W. 4 places of decimal. '0' is needed to be stuffed if no value available. Latitude: DDFF.FFFF,N/S. 4 places of decimal. '0' is needed to be stuffed if no value available</p> <p>Only one alarm can be set in either In or Out. Only one alarm can be set in either Movement Alarm or Geo-fence Alarm. The latest setting will overwrite the previous one.</p>
Example	<pre>40 40 00 42 12 34 56 FF FF FF FF 41 07 31 31 34 30 34 2E 30 30 30 30 2C 45 2C 32 32 33 32 2E 30 30 31 30 2C 4E 2C 31 31 35 30 35 2E 31 32 33 34 2C 45 2C 32 33 33 33 2E 35 36 37 38 2C 4E E5 90 0D 0A</pre> <p>Above command will set Geo-fence: 11404.0000,E,2232.0010,N,11505.1234,E,2333.5678,N</p>
Response:	\$\$<L><ID><0x4107 or 0x4207><Flag><checksum>\r\n
Note:	<p>Flag =0x00, failure response; =0x01, success response.</p>
Cancel Geo-fence	@@<L><ID><0x4107 or 0x4207><checksum>\r\n
Example:	40 40 00 11 12 34 56 FF FF FF FF 41 07 07 1F 0D 0A

## 9. Extended Settings – 0x4108

Command:	@@<L><ID><0x4108><ABCDEFGHJIJ><checksum>\r\n
Description:	<p>Set extended functions with details as follows: ABCDEFGHJIJ (defaulted as 0x01 0x00 0x00 0x00 0x01 0x00 0x00 0x00 0x00 0x01): A=0x00, turn off the function of replying with an SMS position report after a call is made to the tracker. A=0x01, turn on the function of replying an SMS position report after a call is made to the tracker. B=0x00, location data of NMEA 0183 GPRMC will be interpreted into normal text for easy reading. B=0x01, location data complies with NMEA 0183 GPRMC protocol. C=0x00, turn off the function to automatically hang up an incoming call. C=0x01, turn on the function to automatically hang up an incoming call after 5 rings. D=0x00, turn off the function of sending alarms when the tracker is turned on.</p>

	<p>D=0x01, turn on the function of sending an SMS alarm to the authorized phone number for SOS and a GPRS alarm to the server when the tracker is turned on.</p> <p>E: reserved and defaulted as 0x01.</p> <p>F=0x00, turn off the function of sending alarms when the tracker enters GPS blind area.</p> <p>F=0x01, turn on the function of sending an SMS alarm to the authorized phone number for SOS and a GPRS alarm to the server when the tracker enters GPS blind area.</p> <p>G=0x00, all LED lights work normally.</p> <p>G=0x01, all LED lights stop flashing when the tracker is working.</p> <p>H: reserved and defaulted as 0x00.</p> <p>I=0x00, turn off the function of sending an SMS alarm when the extra power of the vehicle tracker is cut.</p> <p>I=0x01, turn on the function of sending an SMS alarm to the authorized phone number for SOS when the extra power of the vehicle tracker is cut.</p> <p>J: reserved.</p>
Example:	40 40 00 1B 12 34 56 FF FF FF FF 41 08 01 00 00 00 01 00 00 00 00 01 B0 78 0D 0A
Response:	\$\$<L><ID><0x4108><Flag><checksum>\r\n
Note:	<p>Flag</p> <p>=0x00, failure response;</p> <p>=0x01, success response.</p>

## 10. Initialization – 0x4110

Command:	@@<L><ID><0x4110><checksum>\r\n
Description:	Make all settings (except for the password, IP, Port, APN, ID and GPRS interval) back to factory default.
Example:	40 40 00 11 12 34 56 FF FF FF FF 41 10 65 C9 0D 0A
Response:	\$\$<L><ID><0x4110><Flag><checksum>\r\n
Note:	<p>Flag</p> <p>=0x00, failure response;</p> <p>=0x01, success response.</p>

## 11. Sleep Mode – 0x4113

Command:	@@<L><ID><0x4113><power-saving level (1 byte in hex code)><checksum>\r\n
Description:	Set sleep mode for power saving.
Note:	<p>If power-saving level</p> <p>=0x00, to close sleep function;</p> <p>=0x01, level 1;</p> <p>=0x02, level 2.</p> <p>Description of power-saving level:</p> <p>Assume that the GPS acquisition time is ONE minute.</p> <p>In level 1, the GPS module will be working for the first three minutes and then shut down</p>



	for ONE minute, and then work again for another three minutes..... In level 2, the GPS module will be working for the first two minutes and then shut down for ONE minute, and then work again for another two minutes.....
Example:	40 40 00 12 12 34 56 FF FF FF FF 41 13 01 C8 8B 0D 0A Above command will set sleep mode to level 1.
Response:	\$\$<L><ID><0x4113><Flag><checksum>\r\n
Note:	Flag =0x00, failure response; =0x01, success response.

## 12. Output Control (Conditional) – 0x4114 or 0x5114

Description:	This command is to control the outputs of the trackers with a speed limit. Advised Caution in Using this Function
Note:	This function is only achievable when the speed is below 10km/h (0x4114) or 20km/h (0x5114) and meantime GPS is available.
Command:	@@<L><ID><0x4114 or 0x5114><AB><checksum>\r\n
Note:	A=0x00, close output (OUT1) - COM connected with NC A=0x01, open output (OUT1) - COM connected with NO A=0x02, remain previous status. B=0x00, close output (OUT2) -open drain B=0x01, open output (OUT2) -connect to GND B=0x02, remain previous status.
Example:	40 40 00 13 12 34 56 FF FF FF FF 41 14 01 00 89 2E 0D 0A Above command will open output1 and close output2.
Response:	\$\$<L><ID><0x4114 or 0x5114><Flag><checksum>\r\n
Note:	Flag =0x00, failure response; =0x01, success response.

## 13. Output Control (Immediate) – 0x4115

Description:	This command is to control the outputs of the trackers with speed limit. Advised Caution in Using this Function
Command:	@@<L><ID><0x4115><AB><checksum>\r\n
Note:	A=0x00, close output (OUT1) - COM connected with NC A=0x01, open output (OUT1) - COM connected with NO A=0x02, remain previous status. B=0x00, close output (OUT2) -open drain B=0x01, open output (OUT2) -connect to GND B=0x02, remain previous status.
Example:	40 40 00 13 12 34 56 FF FF FF FF 41 15 01 00 CC 8E 0D 0A

Response:	\$\$<L><ID><0x4115><Flag><checksum>\r\n
Note:	Flag =0x00, failure response; =0x01, success response.

#### 14. Triggered Alarms – 0x4116

Description:	This command is to get alarms when tracker's input is triggered.
Command:	@@<L><ID><0x4116><AB><checksum>\r\n
Note:	A=Input1 B=Input2  When A or B(in ASCII) =1 (0x31), to enable alarm when input is active =2 (0x32), to enable alarm when input is inactive =3 (0x33), to enable alarm when input is either active or inactive SOS button only alarms when it is pressed (active alarm)
Example:	40 40 00 13 12 34 56 FF FF FF FF 41 16 31 31 18 26 0D 0A Above command will enable alarms when Input1 and Input2 are active.
Response:	\$\$<L><ID><0x4116><Flag><checksum> \r\n
Note:	Flag =0x00, failure response; =0x01, success response.

#### 15. Power Down – 0x4126

Command:	@@<L><ID><0x4126><data><checksum>\r\n
Description:	Makes the tracker into power down mode (for power-saving purpose) when it is inactive or stationary for a period of time. In Power Down states, GPS stops working and GSM enters sleep and stop sending out message until it is activated by message, incoming calls, movement or any input changes.
Note:	data is in ASCII code and in unit of minute. = 00 (0x30 0x30), to turn off this function; = [01,99], to set Power Down mode.
Example:	40 40 00 13 12 34 56 FF FF FF FF 41 26 31 35 9D 07 0D 0A Above command will set the tracker to enter Power Down mode after it is inactive for 15 (0x31 0x35) minutes.
Response:	\$\$<L><ID><0x4126><Flag><checksum> \r\n
Note:	Flag =0x00, failure response; =0x01, success response.

## 16. Time Zone – 0x4132

Command:	@@<L><ID><0x4132><data><checksum>\r\n
Description:	Corrects time into your local time
Note:	Default GPS time is GMT. data is to set time difference in minutes to GMT data = [-32768,32767]. In ASCII code and in unit of minute This correction is applied to location reports by SMS and SMS alarms, NOT GPRS.
Example:	40 40 00 14 12 34 56 FF FF FF FF 41 32 34 38 30 E5 B5 0D 0A Above command will set 480 minutes as time difference; 40 40 00 15 12 34 56 FF FF FF FF 41 32 2D 34 38 30 41 A1 0D 0A Above command will set -480 minutes as time difference.
Response:	\$\$<L><ID><0x4132><Flag><checksum> \r\n
Note:	Flag =0x00, failure response; =0x01, success response.

## 17. Heading Change Report – 0x4136

Command:	@@<L><ID><0x4136><data><checksum>\r\n
Description:	When the heading direction of the tracker changes over the preset degree, a message with location data will be sent back to the server by GPRS. This is to enhance the accuracy and continuous trace when the tracker makes a direction change.
Note:	data=[0,359],in ASCII code;
Example:	40 40 00 13 12 34 56 FF FF FF FF 41 36 31 30 A4 BE 0D 0A Above data is 10 degree. When the tracker turns over 10 degree, a message will be sent back to the server.
Response:	\$\$<L><ID><0x4136><Flag><checksum> \r\n
Note:	Flag =0x00, failure response; =0x01, success response.

## 18. GPS Antenna Disconnection Alarm – 0x4150

Command:	@@<L><ID><0x4150><A><checksum>\r\n
Description:	When the GPS antenna is disconnected, a message with location data will be sent back to the server by GPRS.
Note:	A=0x00, turns off this function; A=0x01, turns on this function.
Example:	40 40 00 12 12 34 56 FF FF FF FF 41 50 01 90 14 0D 0A

Response:	\$\$<L><ID><0x4150><Flag><checksum> \r\n
Note:	Flag =0x00, failure response; =0x01, success response.

## 19. Reboot GPS – 0x4902

Command:	@@<L><ID><0x4902> <checksum>\r\n
Description:	Reboot the GPS module of the tracker.
Example:	40 40 00 11 12 34 56 FF FF FF FF 49 02 71 AC 0D 0A
Response:	\$\$<L><ID><0x4902><Flag><checksum> \r\n
Note:	Flag =0x00, failure response; =0x01, success response.

## 20. Heartbeat – 0x5199

Command:	@@<L><ID><0x5199><data><checksum> \r\n
Description:	Set time interval for heartbeat
Note:	data=[0,65535], in ASCII code and in unit of minute
Example:	40 40 00 13 12 34 56 FF FF FF FF 51 99 31 32 24 89 0D 0A Above command will set interval as 12 minutes and the tracker will send heartbeat (0x00) data to the server at every 12 minutes.
Response:	\$\$<L><ID><0x5199><Flag><checksum> \r\n
Note:	Flag =0x00, failure response; =0x01, success response.

## 21. Get SN & IMEI – 0x9001

Command:	@@<L><ID><0x9001><checksum> \r\n
Description:	Get tracker's Serial Number, IMEI and firmware version.
Example:	40 40 00 11 12 34 56 FF FF FF FF 90 01 41 CF 0D 0A
Response	24 24 00 33 12 34 56 FF FF FF FF 90 01 33 30 33 37 38 31 35 30 35 39 2C 33 35 33 33 35 38 30 31 31 30 31 38 31 34 35 2C 56 31 2E 34 35 2D 4E FE D0 0D 0A Here we can see: SN=3037815059 IMEI=353358011018145 Firmware Version= V1.45-N

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## 22. Read Interval – 0x9002

Command:	@@<L><ID><0x9002><checksum>\r\n
Description:	Read preset time interval of automatic timed report (GPRS tracking).
Example	40 40 00 11 12 34 56 FF FF FF FF 90 02 71 AC 0D 0A
Response:	\$\$<L><ID><0x9002><preset time interval (2 bytes in hex code)><checksum> \r\n
Example:	24 24 00 13 12 34 56 FF FF FF FF 90 02 00 0A 8F D4 0D 0A The preset time interval is 10 (0x00 0x0A)*10=100 seconds.

## 23. Read Authorization – 0x9003

Command:	@@<L><ID><0x9003><input no (1 byte in hex code)><checksum>\r\n
Description:	To get the authorized phone number.
Note:	input no should be 0x01, 0x02 or 0x03. If input no is 0xff, it is to read all authorized numbers.
Example:	40 40 00 12 12 34 56 FF FF FF FF 90 03 01 99 5C 0D 0A
Response:	\$\$<L><ID><0x9003><phone no for SMS><phone no for call><checksum>\r\n
Example:	24 24 00 31 12 34 56 FF FF FF FF 90 03 38 38 38 38 38 38 38 38 38 38 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 C8 8A 0D 0A
Note:	phone no is 16 bytes in ASCII. If the phone no is less than 16 bytes, the blank byte(s) read as '0x00'.

## 24. Alarms – 0x9999

Command:	\$\$<L><ID><0x9999><Alarm><data><checksum>\r\n
Description:	When there is an alarm detected described as below, this command will be sent from the tracker to the server
Alarms	1 byte in Hex code and details as follows
<b>Alarm</b>	<b>Definition</b>
=0x01	Input 1 active
=0x02	Input 2 active
=0x03	Input 3 active
=0x04	Input 4 active
=0x05	Input 5 active
=0x06	Input 6 active
=0x07	Input 7 active
=0x10	Low battery alarm
=0x11	Speeding alarm
=0x12	Movement alarm
=0x13	Geo-fence alarm
=0x14	Alarm of tracker being turned on
=0x15	Alarm of tracker entering GPS blind area

=0x16	Alarm of tracker exiting GPS blind area
=0x31	Input 1 inactive
=0x32	Input 2 inactive
=0x33	Input 3 inactive
=0x34	Input 4 inactive
=0x35	Input 5 inactive
=0x36	Input 6 inactive
=0x37	Input 7 inactive
=0x50	External power cut alarm
=0x52	Veer report
=0x53	Antenna Disconnection Alarm
Example:	24 24 00 61 12 34 56 FF FF FF FF 99 99 03 30 33 35 39 30 31 2E 30 30 30 2C 41 2C 32 32 33 32 2E 36 30 38 33 2C 4E 2C 31 31 34 30 34 2E 38 31 33 37 2C 45 2C 30 2E 30 30 2C 2C 30 31 30 38 30 39 2C 2C 2A 31 32 7C 31 32 2E 32 7C 31 39 34 7C 30 34 30 30 7C 30 30 30 30 2C 30 30 30 30 83 4B 0D 0A It means Input 3 is active.
Note:	See Annex 1 for description of 'data'.

## Annex 1: Description of data

Data Format: GPRMC | HDOP | Altitude | State | AD1,AD2,AD3,AD4,AD5,AD6,AD7,AD8

Example: 094506.000,A,2232.5412,N,11404.6919,E,0.00,,290709,,\*12|1.7|110|0000|00AA,0267

(1) GPRMC includes:

hhmmss.dd,S,xxmm.dddd,<N|S>,yyymm.dddd,<E|W>,s.s,h.h,ddmmyy,d.d,D\*HH

Example: 134829.486,A,2232.6083,N,11404.8137,E, 58.31,309.62,010809,,\*1A

Note:

Parameter	Description	Example
hhmmss.dd	UTC time hh = hours; mm = minutes; ss = seconds; dd = decimal part of seconds	13:48:29.486
S	GPS status indicator, A = valid, V = invalid	A=Valid
xxmm.dddd	Latitude xx = degrees; mm = minutes; dddd = decimal part of minutes	22 deg. 32.6083 min.
<N S>	Either character N or character S N = North, S = South	N = North
yyymm.dddd	Longitude yyy = degrees;	114 deg. 04.8137 min.

	mm = minutes; dddd = decimal part of minutes	
<E W>	Either character E or character W E = East, W = West	E = East
s.s	Speed, in unit of knot. (1 knot = 1.852 km)	58.31 Knots
h.h	Heading, in unit of degree	309.62 deg.
ddmmyy	Date dd = date; mm = month' yy = year	01,08,09
d.d	Magnetic variation	Normally blank
D	Either character W or character E W = West ,E=East	Normally blank
*	checksum delimiter:	In case there would be one more comma (,) prior to *, GPRMC is still to be ended by '**'.
HH	Checksum	1A

(2) '|' is list separator in ASCII (0x7c)

(3) HDOP, in ASCII code, 0.5-99.9. HDOP is blank when the tracker has no GPS fix.

(4) Altitude, in algorism.

(5) State: Status of inputs and outputs:

Bit0: Status of Output1

If Bit0=0: Output1 is closed; Bit0=1:Output1 is open.

Bit1: Status of Output2

If Bit1=0: Output2 is closed; Bit1=1:Output2 is open.

Bit2: Status of Output3

If Bit2=0: Output3 is closed; Bit2=1:Output3 is open.

Bit3: Status of Output4

If Bit3=0: Output4 is closed; Bit3=1:Output4 is open.

Bit4: Status of Output5

If Bit4=0: Output5 is closed; Bit4=1:Output5 is open.

Bit5: Status of Output6

If Bit5=0: Output6 is closed; Bit5=1:Output6 is open.

Bit6: Status of Output7

If Bit6=0: Output7 is closed; Bit6=1:Output7 is open.

Bit7: Status of Output8

If Bit7=0: Output8 is closed; Bit7=1:Output8 is open.

Bit8: Status of Input1

If Bit8=0: Input1 is inactive; Bit8=1: Input1 is active.

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Bit9: Status of Input2

If Bit9=0: Input2 is inactive; Bit9=1: Input2 is active.

Bit10: Status of Input3

If Bit10=0: Input3 is inactive; Bit10=1: Input3 is active.

Bit11: Status of Input4

If Bit11=0: Input4 is inactive; Bit11=1: Input4 is active.

Bit12: Status of Input5

If Bit12=0: Input5 is inactive; Bit12=1: Input5 is active.

Bit13: Status of Input6

If Bit13=0: Input6 is inactive; Bit13=1: Input6 is active.

Bit14: Status of Input7

If Bit14=0: Input7 is inactive; Bit14=1: Input7 is active.

Bit15: Status of Input8 (GPS Antenna Connection)

If Bit15=0: GPS antenna disconnected; Bit15=1: GPS antenna connected.

(6) AD1, AD2.....AD8: 12 bit analog input, 0x0000~0x03ff in HEX, separated by ',' (comma).

Note: AD1 is the value of external power.

Example:

094506.000,A,2232.5412,N,11404.6919,E,0.00,,290709,,\*12|1.7|110|0000|00AA,0267,0fff,0801,0ab0,0068,0776,0986

AD1 is 0x00AA and AD2 is 0x0267.

Max input voltage 50 V

Voltage Formula:  $\text{Input Voltage} = (\text{AD} * 4.6 * 11) / 4096$

0x00AA => 170(decimal) =>  $(170 * 4.6 * 11) / 4096 = 2.1001\text{V}(\text{voltage})$

0x0267 => 615(decimal) =>  $(615 * 4.6 * 11) / 4096 = 7.59741\text{V}(\text{voltage})$