GSM/GPRS/GPS Tracker **GL500**

@Track Air Interface Protocol

Application Notes: TRACGL500AN002

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0. Revision history

Revision	Date	Author	Description of change
V1.01	2012-09-18	Andy Wang	@Tracker Air Interface Protocol Initial
V1.02	2012-11-19	Andy Wang	1) Add the temperature alarm report function and the alarm report message **+RESP:GTTEM**. 2) Change the definition of <*Report destination mode*> at **AT+GTGBC.**
V1.03	2013-3-9	Andy Wang	1) Change the length of <*device name*> to10. 2) Modify the expression of <*Report destination mode*> 3) Add three parameters < *APN* >,<*APN user name* >,< *APN password* > to BSR command. 4) Change the Simple SMS Message Format, in order to limit the SMS message length less than 160.
V1.04	2013-5-7	Andy Wang	1) Add new command AT+GTPIN to configure the auto-unlock PIN function.
V1.05	2013-6-17	Arthur Li	1) Modify the send interval minimum value to 1 in **GTCTN**.
V1.06	2013-8-30	Arthur Li	1) Add the AGPS online in **GTGBC**.

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1. Overview

1.1. Scope

The @Track Air Interface Protocol is a digital communication interface based on printable ASCII characters over SMS or GPRS which is used for all communication between the backend server and the terminal. The backend server sends a command to the terminal and then the terminal confirms with an acknowledgement message. If necessary, the terminal also sends report messages to the backend server.

The purpose of this document is to describe how to build up the backend server based on the @Track Air Interface Protocol.

1.2. Terms and Abbreviations

Table 1: Terms and abbreviations

Abbreviation	Description
APN	Access Point Network
ASCII	American National Standard Code for Information Interchange
GPRS	General Packet Radio Service
GSM	Global System for Mobile Communications
HDOP	Horizontal Dilution of Precision
ICCID	Integrated Circuit Card Identity
IP	Internet Protocol
SMS	Short Message Service
TCP	Transmission Control Protocol
UDP	User Datagram Protocol
UTC	Coordinated Universal Time

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2. System Architecture

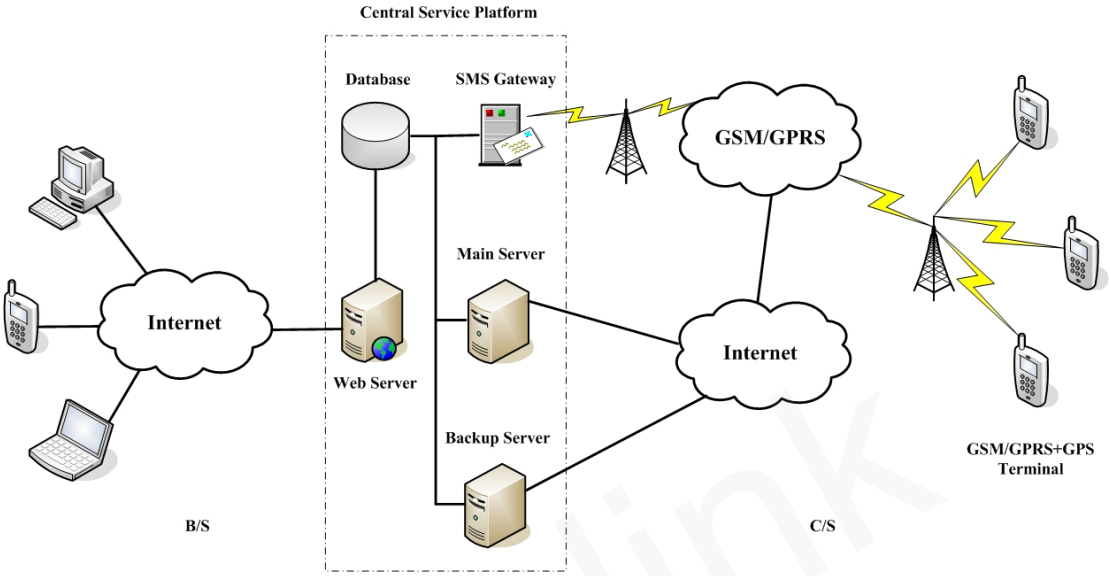

Figure 1: System architecture

The backend server can be accessed by many terminals and should have the following abilities:

- ✧ The backend server should be able to access the internet and listen to the connection originating from the terminal.
- ✧ The backend server should be able to support a TCP or UDP connection with the terminal. It should be able to receive data from the terminal and send data to the terminal.
- ✧ The backend server should be able to receive and send SMS.

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3. Message Description

3.1. Message Format

All of the @Track Air Interface Protocol messages are composed of printable ASCII characters. Each message has the following format:

Message format	Message type
AT+GTXXX=<parameter1>,<parameter2>,…$	Command
+ACK:GTXXX,<parameter1>,<parameter2>,…$	Acknowledgement
+RESP:GTXXX,<parameter1>,<parameter2>,…$	Report

The entire message string ends with character '$'.

The characters 'XXX' identify the deferent message.

The "<parameter1>,<parameter2>,…" carry the message's parameters. The number of parameters is different in different messages. The ASCII character ',' is used to separate the neighbouring parameter characters. The parameter string may contain the ASCII characters: '0'-'9', 'a'-'z', 'A'-'Z'.

Detailed descriptions of each message format are located in the specific message sections.

By sending Commands to the terminal, the backend server can either configure and query the parameters of the terminal or control the terminal to perform specific actions. When the terminal receives Commands over the air, it will reply with a corresponding Acknowledgement message.

According to the configuration of the parameters, the terminal can send Report messages to the backend server. Please see the following figure:

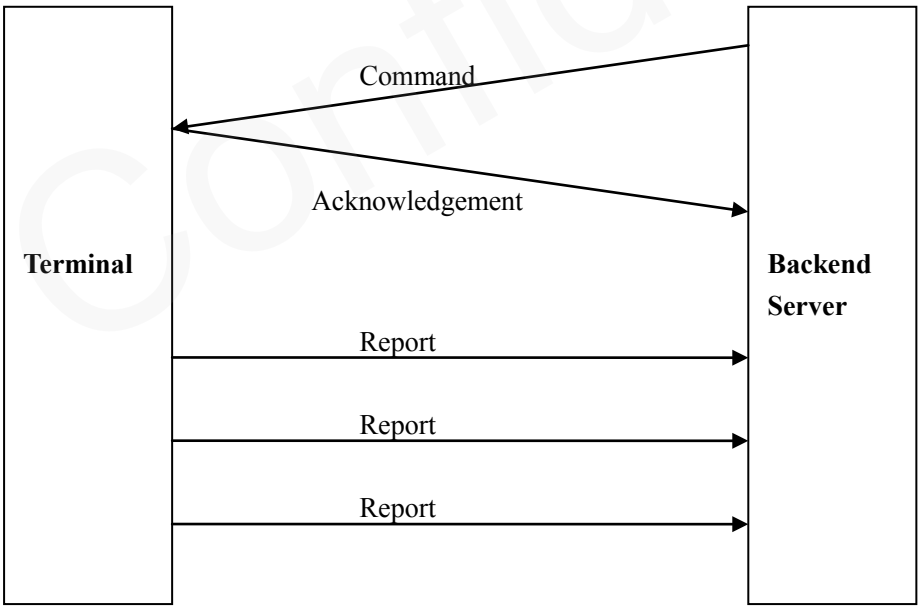

Figure 2: @Tracker protocol messages flow

When the device receives commands over the air, it supports several commands in one SMS or GPRS packet without separate symbol between two close commands. But it is necessary to make sure the total size of the several commands is not longer than 160 if the commands are sent via SMS. Here is an example to send three commands in one SMS.

AT+GTGBC=gl500,,,,,,,,10111111111110,,,,1,15,,,,,1,,,,,0005$AT+GTGEO=gl500,0,3,101.412248,21.187891,,15,,,,,,,,0008$AT+GTWLT=gl500,0,1,1,13813888888,,,,,000C$

It includes three commands (**AT+GTGBC**, **AT+GTGEO** and **AT+GTWLT**) in the above message. And the terminal will handle the three commands one by one after it received the message via SMS and it will report the following three acknowledgement message to the backend server one by one.

+ACK:GTGBC,110102,135790246811220,,0,0005,20100310172900,1152$

+ACK:GTGEO,110102,135790246811220,,0,0008,20100310172900,1153$

+ACK:GTWLT,110102,135790246811220,,0,000C,20100310172900,1154$

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3.2. Command and Acknowledgement

3.2.1. Quick Start Setting

The command **AT+GTQSS** is used to set the GPRS parameter and backend server information in one command if all these settings are within 160 bytes, otherwise use **AT+GTBSI** and **AT+GTSRI** in two steps.

➢ **AT+GTQSS=**

Example: **AT+GTQSS=gl500,cmnet,,,3,,,116.226.44.17,9001,116.226.44.16,9002,,0,1,,,0001$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4 – 6	'0' – '9', 'a' – 'z', 'A' – 'Z'	gl500
APN	<=40		
APN user name	<=30		
APN password	<=30		
Report mode	1	0 – 5	5
Reserved	0		
Buffer enable	1	0|1	1
Main server IP/domain name	<=60		
Main server port	<=5	0 – 65535	0
Backup server IP	<=15		0.0.0.0
Backup server port	<=5	0 – 65535	0
SMS Gateway	<=20		
Heartbeat interval	<=3	0|5 – 360min	5
SACK enable	1	0|1	0
Reserved	0		
Reserved	0		
Serial number	4	0000 – FFFF	
Tail character	1	$	$

✧ <*Password*>: The valid character of password is '0'-9', 'a'-'z', 'A'-'Z'. The default value is "gl500".

✧ <*APN*>: Access point name (APN).

✧ <*APN user name*>: the GPRS APN user name. If the parameter field is empty, the parameter will be cleared.

✧ <*APN password*>: the GPRS APN password. If the parameter field is empty, the parameter will be cleared.

✧ <*Report mode*>: Supports report modes as following:

0: Stop reporting.

1: TCP short-connect preferred mode. The connection is based on TCP protocol. The terminal connects to the backend server every time it needs to send data and will shut down the connection when the terminal finishes sending data. And if it is failed to

establish a TCP connection with the backend server (including Main Server and Backup Server), it will try to send data via SMS.

2: TCP short-connect forced mode. The connection is based on TCP protocol. The terminal connects to the backend server every time it needs to send data and will shut down the connection when the terminal finishes sending data. And if it is failed to establish a TCP connection with the backend server (including Main Server and Backup Server), it will be stored in the BUFFER (if BUFFER function is enabled, please refer to <*Buffer enable*>) or discarded (if the BUFFER function is disabled).

3: TCP long-connect mode. The connection is based on TCP protocol. The terminal connects to the backend server and maintains the connection using the heart beat data. Please note that in this mode the backend server should respond to the heart beat data from the terminals.

4. UDP mode. The terminal will send data to the backend server by UDP protocol. It supports to receive protocol command via UDP. But it is recommended to make sure the IP address and UDP port of the device can be visited in the internet, and this is generally realized by heart beat package and the message **+RESP:GTPDP**.

5: Force on SMS. Only use the SMS for transmitting

- <*Reserved*>: Not used at present. Please keep empty.
- <*Buffer enable*>: Enable or disable BUFFER function. Please refer to 3.4.5 for the details about BUFFER function.
  0 Disable the BUFFER function.
  1 Enable the BUFFER function.
- <*Main server IP/domain name*>: The IP address or the domain name of the main server.
- <*Main server port*>: The port of the main server.
- <*Backup server IP*>: The IP address of the backup backend server.
- <*Backup server port*>: The port of the backup server.
- <*SMS Gateway*>: Maximum 20 characters including the optional national code starting with "+" for SMS messages sending. Short code (for example: 10086) is also supported.
- <*Heartbeat interval*>: the interval for the terminal to send heartbeat package message to the backend server. If set to 0, no heartbeat package is sent.
- <*SACK enable*>: A numeric to indicate whether the backend server should reply SACK message to the device.
  0: the backend server does not reply SACK message after receiving a message from the device.
  1: the backend server should reply SACK message after receiving a message from the device.
- <*Serial number*>: the serial number for the command. It will be invoked in the ACK message of the command.
- <*Tail character*>: a character to indicate the end of the command. And it should be "$".

Note:

If <*Report mode*> is set as 4 (UDP mode), it is strongly recommended to enable SACK or heart beat mechanism (<*Heartbeat interval*> doesn't equal to 0).

The acknowledgement message of **AT+GTQSS** command:

➢ **+ACK:GTQSS,**

Example: **+ACK:GTQSS,110102,135790246811220,,0001,20100310172830,11F0$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Protocol version	6	XX0000 – XXFFFF, X∈{'A'-'Z','0'-'9'}	
Unique ID	15	IMEI	
Device name	10		
Serial number	4	0000 – FFFF	
Send time	14	YYYYMMDDHHMMSS	
Count number	4	0000 – FFFF	
Tail character	1	$	$

✧ <*Protocol version*>: The combination of the device type and the version number of the applied protocol. The first two characters 'XX' indicate the device type. '11' represents GL500. The middle two characters are the main version number and the last two characters are the minimum version number. Both the main version and the minimum version are hex digital. For example, '020A' means version 2.10.

✧ <*Unique ID*>: ID of the device, use the IMEI of the current SIM card inside the terminal.

✧ <*Device name*>: Please refer to the parameter <*Device name*> in the command **AT+GTGBC**.

✧ <*Serial number*>: The same serial number which is sent to the device with the corresponding command. The backend server could use it to distinguish which command the ACK message is for.

✧ <*Send time*>: The local time to send the ACK message.

✧ <*Count number*>: The self-increasing count number will be put into every acknowledgment message and report message. The count is beginning from 0000 and increases by 1 every time. It will roll back after "FFFF".

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3.2.2. Bearer Setting Information

The command **AT+GTBSI** is used to set the GPRS parameter.

- **AT+GTBSI=**

Example: **AT+GTBSI=gl500,cmnet,,,,,,,0002$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4 – 6	'0' – '9', 'a' – 'z', 'A' – 'Z'	gl500
APN	<=40		
APN user name	<=30		
APN password	<=30		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Serial number	4	0000 – FFFF	
Tail character	1	$	$

The acknowledgement message of **AT+GTBSI** command:

- **+ACK:GTBSI,**

Example: **+ACK:GTBSI,110102,135790246811220,,0002,20100310172830,11F0$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Protocol version	6	XX0000 – XXFFFF, X∈{'A'-'Z','0'-'9'}	
Unique ID	15	IMEI	
Device name	10		
Serial number	4	0000 – FFFF	
Send time	14	YYYYMMDDHHMMSS	
Count number	4	0000 – FFFF	
Tail character	1	$	$

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3.2.3. Backend Server Register Information

The command **AT+GTSRI** is used to configure the backend server information that the terminal reports to and the report mode that defines the communication method between the backend server and the terminal.

➢ **AT+GTSRI=**

Example: **AT+GTSRI=gl500,3,,,116.226.44.17,9001,116.226.44.16,9002,,0,1,,,,,0003$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4 – 6	'0' – '9', 'a' – 'z', 'A' – 'Z'	gl500
Report mode	1	0 – 5	5
Reserved	0		
Buffer enable	1	0|1	1
Main server IP/domain name	<=60		
Main server port	<=5	0 – 65535	0
Backup server IP	<=15		0.0.0.0
Backup server port	<=5	0 – 65535	0
SMS Gateway	<=20		
Heartbeat interval	<=3	0|5 – 360min	5
SACK enable	1	0|1	0
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Serial number	4	0000 – FFFF	
Tail character	1	$	$

The acknowledgement message of **AT+GTSRI** command:

➢ **+ACK:GTSRI,**

Example: **+ACK:GTSRI,110102,135790246811220,,0003,20100310172830,11F0$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Protocol version	6	XX0000 – XXFFFF, X∈{'A'-'Z','0'-'9'}	
Unique ID	15	IMEI	
Device name	10		
Serial number	4	0000 – FFFF	
Send time	14	YYYYMMDDHHMMSS	
Count number	4	0000 – FFFF	
Tail character	1	$	$

3.2.4. Global Basic Configuration

The **GBC** command is used to configure the global basic parameters for terminal.

➢ **AT+GTGBC**

Example: **AT+GTGBC=gl500,+8613585715149,GL500,,,003F,,,10101010101010,1400,12,2,1,15,10,1,1,1,1,,2,,,00A5$**			
Parameter	**Length(byte)**	**Range/Format**	**Default**
Password	4~8	‘0’-‘9’,’a’-‘z’,’A’-‘Z’	gl500
Mobile Number	<=20	‘0’-‘9’	
Device Name	<=10	'0' – '9' 'a' – 'z' 'A' – 'Z"	GL500
New Password	4~8	‘0’-‘9’,’a’-‘z’,’A’-‘Z’	
New Password	4~8	‘0’-‘9’,’a’-‘z’,’A’-‘Z’	
Event mask	<=4	0000-1FFF	000F
Reserved	0		
Reserved	0		
Week Report Selection	14		10101010101010
Specified time of day	4	HHMM	1200
Interval hours wakeup	<=2	1|2|3|4|6|8|12|24	24
Report frequency	<=2	1 – 24	1
Continuous Mode	1	0|1	0
Continuous Send interval	<=4	0|1 – 1440min	5
Battery Low Percent	<=2	0|5 - 20	5
Sensor enable	1	0|1	0
GSM Report	1	0|1|2|3	0
Report destination mode	1	0|1	0
Temperature report mode	1	0|1|2|3	0
Temperature range	6	(‘+’or’-‘) LL (‘+’ or’-‘) HH	
AGPS Mode	1	0|2	0
Reserved			
Reserved			
Serial Number	4	0000 – FFFF	
Tail Character	1	$	$

✧ <*Reserved*>: The parameter field is reserved.

✧ <*Mobile Number*>*:* This mobile numbers can receive the simple SMS format message sent from the terminal and monitor the terminal.

✧ <*Device Name*>: An ASCII string to represent the name of the device.

✧ <*New Password*>,<*New Password*>*:* New password for the terminal, two <*New Password*> must be identical . NOTE: If the parameter is valid, next time your command must use this

password replace the old password, this is very important. The valid character of password is '0'-9', 'a'- 'z', 'A'-'Z'. The default value is "gl500".

✧ <*Event mask*>: A Hex value to configure which event reports can be sent to the backend server: Each bit corresponds to a report message. And if the bit is set as 1, the corresponding report message can be sent to the backend server. Otherwise, it can not be sent to the backend server. Here is the mapping between each bit and each report message.

bit0(0001): **+RESP:GTPNA**
bit2(0002): **+RESP:GTBPL**
bit4(0004): **+RESP:GTTEM**
bit5(0008): **+RESP:GTPDP**

✧ <*Week Report Selection*>*:* The selection of report mode for each day in one week, there are total seven groups as one group combination with two characters orderly, seven groups represent seven days of one week separately. The first two characters represent Sunday, and last two characters represent Saturday.

The first character of one group define whether the terminal report message to your mobile phone in this day of week, and the second character define whether the reported message contains GPS information when the first character set to 1.

Format the configuration 14 digits, zeros should be added.

E.g:11000000101011. Sunday and Saturday will report the message with GPS information, Monday, Tuesday and Wednesday will not report the message , Thursday and Friday report message without GPS information.

✧ <*Specified Time of Day*>*:* The start time for terminal to wake up. The value range of "HH" is "00"-"23". The value range of "MM" is "00"-"59".

✧ <*Interval hour wakeup*>*:* A numeric to determine the interval hour to wake up the terminal from the <*Specified Time of Day*> beginning, '24' means report once one day. **NOTE:** The first report time is <*Specified Time of Day*>*,* if the local time is 18:30, but the <*Specified Time of Day*> is 16:30, the first report message is tomorrow 16:30.

✧ <*Report frequency*>: A numeric multiply the <interval hour wakeup> to get the frequency(Unit: hour) to report the message **+RESP:GTSTR. NOTE:** <*Interval hour wakeup*>∗ <*Report frequency*> should less than 24**.** E.g**.** If the <report frequency> set as '2'and <interval hour wakeup> is '2', the terminal will wake up every 2 hours and report the **+RESP:GTSTR** every 4 hours.

✧ <*Continuous Mode*>*:* Mode for terminal works:

Power saving mode: The terminal is activated at specified time and last 5 minutes, then it will into deep sleep mode.

Continuous mode: The terminal is always active. This allows you at any time to control the device and immediately receive ACK information from terminal.

- 0: power saving mode.
- 1: Continuous mode, fix GPS and report the message **+RESP:GTCTN** periodically with <Continuous send interval>.

✧ <Continuous *send interval*>: The period to send the message **+RESP:GTCTN** when the < *Continuous Mode*> is set as 1. The value range is :1-1440 and the unit is minute. If the value is set as '0', it will not report the message.

- *<Battery Low Percent>:* If the battery percentage lower than this numeric, the terminal will report the message **+RESP:GTBPL**.
- *<Sensor enable>:* Enable/Disable the sensor function. If the sensor enable, the terminal will enters the continuous mode and fix GPS and report the message **+RESP:GTCTN** periodically with <Continuous send interval> when it detects movement.
- *<GSM Report>*: Control how or when to report cells' information(including +RESP:GTSTR,+RESP:GTCTN,+RESP:GTNMR and +RESP:GTRTL). The message +RESP:GTGSM only sends via TCP short connect even if the report mode is force on SMS.
  - 0: Not allow the cells' information report.
  - 1: Report the message **+RESP: GTGSM** after failed to get GPS position if cell's information available.
  - 2: Report the message **+RESP: GTGSM** after getting GPS position successfully every time if cell's information available.
  - 3: Report the message **+RESP:GTGSM** no matter what result of getting GPS position every time if cell's information available.
- *<Report destination mode>*: Select which destination the SMS message should report to. The mode is valid only when the <Report mode> in AT+GTQSS set as 5.
  - 0: Report the SMS message to *< SMS Gateway>* define by **AT+GTQSS.**
  - 1: Report the SMS message to *<mobile number>* defined in AT+GTGBC and the CTN|GEO|NMR|STR|RTL|TEM|BPL will change to simple SMS report format.
- *<Temperature report mode >*: The mode to report temperature alarm message +RESP:GTTEM. The terminal check the temperature one time when wake up in power saving mode, and with <Continuous send interval> in the continuous mode.
  - 0: Disable this function.
  - 1: Report the alarm message **+RESP:GTTEM** when the current temperature lower than the low temperature threshold defined by *<temperature range >*.
  - 2: Report the alarm message **+RESP:GTTEM** when the current temperature at the temperature range.
  - 3: Report the alarm message **+RESP:GTTEM** when the current temperature higher than the high temperature threshold defined by *<temperature range >*..
- *<temperature range >*: The first 3 characters is means low temperature in the range, last 3 characters means high temperature, format is signal ('+' or'-') LL('+'or'-')HH. The low temperature must be lower than the high temperature, limit of lowest temperature is -20, highest temperature is +60. E.g. -05+10, means that low temperature is -5℃, the high temperature is 10℃.
- *<AGPS Mode>*: A numeric to indicate whether to enable AGPS online. AGPS is helpful to improve the ratio to get GPS position successfully and reduce the time to get GPS position.
  - 0: Disable the AGPS function.
  - 2: Enable the AGPS function.
- *<Serial Number>*: the serial number for the command. It will be invoked in the ACK message of the command.
- *<Tail Character>*: a character to indicate the end of the command. And it must be "$".

The acknowledgement message of **AT+GTGBC** command:

➢ **+ACK:GTGBC,**

Example: **+ACK:GTGBC,110102,135790246811220,,0,0008,20100310172830,11F0$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Protocol version	6	XX0000 – XXFFFF, X∈{'A'-'Z','0'-'9'}	
Unique ID	15	IMEI	
Device name	10		
GEO ID	1	0 – 4	
Serial number	4	0000 – FFFF	
Send time	14	YYYYMMDDHHMMSS	
Count number	4	0000 – FFFF	
Tail character	1	$	$

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3.2.5. Time Adjustment

The command **AT+GTTMA** is used to adjust local time. If the GPS fixing is successful, the local time will be automatically adjusted according to the GPS UTC time.

➢ **AT+GTTMA=**

Example: **AT+GTTMA=gl500,-,3,30,0,20090917203500,,,,,0006$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4 – 6	'0' – '9', 'a' – 'z', 'A' – 'Z'	gl500
Sign	1	+|-	+
Hour Offset	<=2	0 - 23	00
Minute Offset	<=2	0 - 59	00
Daylight Saving	1	0|1	0
UTC Time	14	YYYYMMDDHHMMSS	
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Serial number	4	0000 – FFFF	
Tail character	1	$	$

✧ <*Sign*>: Indicate the positive or negative of the local time offset to UTC
✧ <*Hour Offset*>: UTC offset in hours
✧ <*Minute Offset*>: UTC offset in minutes
✧ <*Daylight Saving*>: Enable/disable daylight saving time.
0: Disable daylight saving
1: Enable daylight saving
✧ <*UTC time*>: The configuration UTC time.

The acknowledgement message of **AT+GTTMA** command:

➢ **+ACK:GTTMA,**

Example: **+ACK:GTTMA,110102,135790246811220,,0007,20100310172830,11F0$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Protocol version	6	XX0000 – XXFFFF, X∈{'A'-'Z','0'-'9'}	
Unique ID	15	IMEI	
Device name	10		

Serial number	4	0000 – FFFF	
Send time	14	YYYYMMDDHHMMSS	
Count number	4	0000 – FFFF	
Tail character	1	$	$

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3.2.6. Non movement detection

The **AT+GTNMD** command is used to configure the parameters for non movement detection. This function works only when the <sensor enable> of AT+GTGBC is set as '1'.

➢ **AT+GTNMD=**

Example: **AT+GTNMD=gl500,F,2,4,15,10,,,,0005$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4 – 6	'0' – '9', 'a' – 'z', 'A' – 'Z'	gl500
mode	1	0-F	0
Non-movement duration	<=3	1 – 200(×15sec)	2
Movement duration	<=2	3 – 50(×256ms)	4
Movement threshold	2	5 – 25	10
Rest send interval	<=4	0|1 – 1440min	10
Reserved	0		
Reserved	0		
Reserved	0		
Serial number	4	0000 – FFFF	
Tail character	1	$	$

✧ <*mode*>: A hex numeric to determine how the function works. Each bit of the hex numeric indicate different behavior that device could do. If the corresponding bit is 1, the device will behave as the description. Otherwise, it won't behave as the description.

Bit0(1): The terminal enter power saving mode and suspend the report of **+RESP:GTCTN** and Geo-Fence when it detects non-movement, then power off 5-minutes later.

Bit1(2): Report the message **+RESP:GTNMR** to the backend server when it detects non-movement.

Bit2(4): Report the message **+RESP:GTNMR** to the backend server when it detects movement.

Bit3(8): The terminal enter continuous mode and change the fix GPS and report the **+RSEP:GTCTN** interval to <Rest send interval> when it detects non-movement. When the <rest send interval> is set as '0', it will not report the message. In the case, it will disable the function of Bit0 even if Bit0 is 1.

✧ <*Non-movement duration*>: A time parameter to determine whether the device enters non-movement status, i.e. if the motion sensor detects that the device keeps in non-movement for a period of time defined by <*Non-movement duration*>, the device will be considered as in non-movement status.

✧ <*Movement duration*>: A time parameter to determine whether the device enters movement status. If the motion sensor detects that the device keeps in movement for a period of time defined by <*Movement duration*>, the device will be considered as in movement status.

- ✧ <*Movement threshold*>: The threshold for the motion sensor to determine whether the device is in movement. The less, the more likely to be treated as movement.
- ✧ <*Rest send interval*>: the send interval for the report of CTN when the device is in rest state if Bit3 of <*mode*> is 1.

The acknowledgement message of **AT+GTNMD** command:

- ➢ **+ACK:GTNMD,**

Example: **+ACK:GTNMD,110102,135790246811220,,0005,20100310172830,11F0$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Protocol version	6	XX0000 – XXFFFF, X∈{'A'-'Z','0'-'9'}	
Unique ID	15	IMEI	
Device name	10		
Serial number	4	0000 – FFFF	
Send time	14	YYYYMMDDHHMMSS	
Count number	4	0000 – FFFF	
Tail character	1	$	$

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3.2.7. White Call List Configuration

The **AT+GTWLT** command is used to set white call list table.

➢ **AT+GTWLT=**

Example: **AT+GTWLT=gl500,0,1,2,13813888888,13913999999,,,,,000C$**			
Parameter	**Length(byte)**	**Range/format**	**Default**
password	4~8	'0'-'9','a'-'z','A'-'Z'	gl500
call filter	1	0|1|2	0
mobile start	1	1-10	
mobile end	1	1-10	
white number list	<=20*10		
reserved	0		
reserved	0		
reserved	0		
reserved	0		
Serial number	4	0000 – FFFF	
Tail character	1	$	

✧ <*call filter*>: A numeric to indicate whether to filter the incoming call.

0: Only the <*Mobile Number*> predefined at **AT+GTGBC** can be connected by the terminal.

1: Both the <*Mobile Number*> defined by **AT+GTGBC** and phone number list in GTWLT can be connected by the terminal.

2: The terminal will reject all incoming mobile number.

✧ <*mobile start*>: A numeric to indicate the first index of the white call number to input. For example, if it is **1**, it will update the white call list from the **1**st one. If it is empty, it should not include <*white number list*> later.

✧ <*mobile end*>: A numeric to indicate the last index of the white call number to input. For example, if it is **2**, it will update the white call list until the **2**nd one. If it is empty, it should not include <*white number list*> later.

✧ <*white number list*>: A phone number list. It could include several phone numbers. And two close phone numbers are separated with "**,**". The number of the phone number in the list is up to the parameter <*mobile start*> and <*mobile end*>. For example, if <*mobile start*> is **1** and is <*mobile end*> **2**, the <*white number list*> should include **2** phone numbers and the two numbers are separated by with "**,**".

The acknowledgment message of the **AT+GTWLT** command:

➢ **+ACK:GTWLT,**

Example: **+ACK:GTWLT,020102, 135790246811220,,000C,20101029085505,0025$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**

Protocol version	6	XX0000 – XXFFFF, X∈{'A'-'Z','0'-'9'}	
Unique ID	15	IMEI	
Device name	10		
Serial number	4	0000 – FFFF	
Send time	14	YYYYMMDDHHMMSS	
Count number	4	0000 – FFFF	
Tail character	1	$	$

***Note*:**

It is necessary to make sure the total size of the command is not greater than 160 if it is sent via SMS.

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3.2.8. Geo-Fence Information

The command **AT+GTGEO** is used to configure the parameters of Geo-Fence. Geo-Fence is a virtual perimeter on a geographic area using a location-based service, so that when the geo-fencing terminal enters or exits the area a notification is generated. The notification can contain information about the location of the terminal and may be sent to the backend server.

➢ **AT+GTGEO=**

Example: **AT+GTGEO=gl500,0,3,101.412248,21.187891,1000,15,,,,,,,,0008$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4 – 6	'0' – '9', 'a' – 'z', 'A' – 'Z'	gl500
GEO ID	1	0 – 4	
Report Mode	1	0 – 3	0
Longitude	<=11	(-)xxx.xxxxxx	
Latitude	<=10	(-)xx.xxxxxx	
Radius	<=7	50 – 6000000m	50
Check interval	<=4	0|5 – 1440 min	0
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Serial number	4	0000 – FFFF	
Tail character	1	$	$

✧ <*GEO ID*>: A numeric to identify the Geo-Fence.

✧ <*Report Mode*>: A numeric which indicates when to report the notification to the backend server based on the following:

0: Disable the Geo-Fence on the specified GEO ID.

1: Reports when enters qthe Geo-Fence.

2: Reports when leaves the Geo-Fence.

3: Reports when enters or leaves the Geo-Fence

✧ <*Longitude*>: The longitude of a point which is defined as the center of the Geo-Fence circular region. The format is "(-)xxx.xxxxxx" and the value range is from "-180.000000" to "180.000000". The unit is degree. West longitude is defined as negative starting with minus "-" and east longitude is defined as positive without "+".

✧ <*Latitude*>: The latitude of a point which is defined as the centre of the Geo-Fence circular region. The format is "(-)xx.xxxxxx" and the value range is from "-90.000000" to "90.000000". The unit is degree. South Latitude is defined as negative starting with minus "-" and north Latitude is defined as positive without "+".

- ✧ <*Radius*>: The radius of the Geo-Fence circular region. The value range is (50-6000000) and the unit is meter.
- ✧ <*Check interval*>: The interval of GPS checking for the Geo-Fence alarm.

***Note*:**

If the parameter <*Check interval*> is set as 0, <*Mode*> will be set as 0 automatically.

The acknowledgement message of **AT+GTGEO** command:

- ➢ **+ACK:GTGEO,**

Example: **+ACK:GTGEO,110102,135790246811220,,0,0008,20100310172830,11F0$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Protocol version	6	XX0000 – XXFFFF, X∈{'A'-'Z','0'-'9'}	
Unique ID	15	IMEI	
Device name	10		
GEO ID	1	0 – 4	
Serial number	4	0000 – FFFF	
Send time	14	YYYYMMDDHHMMSS	
Count number	4	0000 – FFFF	
Tail character	1	$	$

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3.2.9. Real Time Operation

The **AT+GTRTO** command is used to retrieve information from the terminal or control the terminal.

➢ **AT+GTRTO=**

Example: **AT+GTRTO=gl500,1,,,,,,000B$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4 – 6	'0' – '9', 'a' – 'z', 'A' – 'Z'	gl500
Sub command	1	0 – F	
Single Configuration Command	3		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Serial number	4	0000 – FFFF	
Tail character	1	$	$

✧ <*Sub command*>: A numeric to indicate the sub command to execute.

1 (**RTL**): Request the device to report its current position.

2 (**READ**): Request the device to report its entire configuration.

3 (**REBOOT**): Reboot the device remotely.

4 (**RESET**): Reset all parameters to factory default except parameter of **AT+GTBSI**, **AT+GTSRI, AT+GTTMA**.

5 (**PWROFF**): Power off the device remotely.

6 (**CID**): Request the device to report the ICCID of the installed SIM card.

7 (**CSQ**): Request the device to report the current GSM signal level.

8 (**TMZ**): Get the time zone settings via message +RESP:GTTMZ.

9 (**DIF**): Request the device to report device information.

A **(MON)**: Monitor function. The terminal will call the <mobile number> defined by **AT+GTGBC** when receiving this command.

✧ <*Single Configuration Command*>: Get the specified command configuration of the terminal via message **+RESP:GTALL**. I.e. You can get the configuration of **AT+GTNMD** by send the command "**AT+GTRTO=gl500,2,NMD,,,,,000F$**". **NOTE:** This parameter is available only when <*Sub Command*> is set to 2.

The acknowledgement message of **AT+GTRTO** command:

➢ **+ACK:GTRTO,**

Example: **+ACK:GTRTO,110102,135790246811220,,GPS,000B,20100310172830,11F0$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**

Protocol version	6	XX0000 – XXFFFF, X∈{'A'-'Z','0'-'9'}	
Unique ID	15	IMEI	
Device name	10		
Sub command	<=6	Sub command string	
Serial number	4	0000 – FFFF	
Send time	14	YYYYMMDDHHMMSS	
Count number	4	0000 – FFFF	
Tail character	1	$	$

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3.2.10. Auto-unlock PIN

The command **AT+GTPIN** is used to configure the auto-unlock PIN function of the device. Some operators offer SIM card with PIN code protection by default. To make the device work with the PIN-protected SIM card, use this command to let the device auto-unlock the SIM PIN with the pre-set PIN code.

➢ **AT+GTPIN=**

Example: **AT+GTPIN=gl500,1,0000,,,,,,0010$**			
Parameter	**Length(byte)**	**Range/Format**	**Default**
Password	4 – 6	'0' – '9' 'a' – 'z' 'A' – 'Z'	gl500
Enable Auto-unlock PIN	1	0|1	0
PIN	4 – 8	'0' – '9'	
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Serial Number	4	0000 – FFFF	
Tail Character	1	$	$

✧ <*Enable Auto-unlock PIN*>: 1 to enable the auto-unlock PIN function, 0 to disable.
✧ <*PIN*>: Code used to unlock the SIM PIN.

The acknowledgment message of **AT+GTPIN** command:

➢ **+ACK:GTPIN,**

Example: **+ACK:GTPIN,110104,135790246811220,,0010,20090214093254,11F0$**			
Parameter	**Length(byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_' '?'	
Serial Number	4	0000 – FFFF	

Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

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3.3. Simple SMS Command and Acknowledgement

All the following commands is a part of AT+GTXXX protocol command both function and parameters which only be sent with SMS. All simple SMS command has same format, which differ from AT+GTXXX protocol format, as following:

Format: Password,XXX,Parameter1,…

NOTE: If the command you send to terminal with wrong password, the terminal will not respond acknowledge to the mobile number.

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3.3.1. CFG

This simple SMS command is a part of **AT+GTGBC** and **AT+GTTMA** command, you can modify the parameters: <Mobile Number>, <Device Name>,< New Password>, <Offset time> and < UTC Time >.

➢ **CFG**

Example: **gl500,CFG,+8613502148756,MYGL500,123456,123456,+0800,20120315152500**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password			gl500
Mobile Number	<=20	‘0’-‘9’	
Device Name	<=10	'0' – '9' 'a' – 'z' 'A' – 'Z"	
New Password	4~8	‘0’-‘9’,’a’-‘z’,’A’-‘Z’	
New Password	4~8	‘0’-‘9’,’a’-‘z’,’A’-‘Z’	
Offset time	5	-|+HHMM	
UTC Time	14	YYYYMMDDHHMMSS	

✧ <*Offset time* >: The offset time compares with UTC time.

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3.3.2. REP

This simple SMS command is a part of **AT+GTGBC** command, you can modify the parameters: < Week Report Selection >, < Specified time of day > and < Interval hours report >.

- **REP**

Example: **gl500,REP,10101010101111,0930,2,3**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password			gl500
Week Report Selection	14		10101010101010
Specified time of day	4	HHMM	1200
Interval hours wakeup	<=2	1|2|3|4|6|8|12|24	24
Report frequency	<=2	1 – 24	1

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3.3.3. EME

This simple SMS command is a part of **AT+GTGBC** command, you can modify the parameters: < Continuous Mode > and <Send interval>.

Example: **gl500,EME,1,5**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password			gl500
Continuous Mode	1	0|1	0
Send interval	<=4	0|1 – 1440min	5

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3.3.4. TOW

This simple SMS command is a part of **AT+GTNMD** command, you can modify the parameters: < Sensor enable >, < Report mode > and < Rest report interval>.

Example: **gl500,TOW,1,F,5**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password			gl500
Sensor enable	1	0|1	0
Report mode	1	0-F	0
Rest report interval	<=4	0|1 -1440min	10

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3.3.5. BSR

This simple SMS command is a part of **AT+GTSRI** command, you can modify the parameters: < Report mode >, < APN >,< APN user name >,< APN password >,< Main server IP/domain name >,< Main server port > and < Heartbeat interval >.

Example: **gl500,BSR,3,cmet,,,116.228.146.250,8029,8**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password			gl500
Report mode	1	0 – 5	0
APN	<=40		
APN user name	<=30		
APN password	<=30		
Main server IP/domain name	<=60		
Main server port	<=5	0 – 65535	0
Heartbeat interval	<=3	0|1 – 360min	0

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3.3.6. Acknowledgment For Simple SMS Command

After the terminal received a simple SMS command, it will send the acknowledgment with following format:

Example1: **Command Format Right:gl500,REP,10101010101111,0930,4** **Example2:** **Command Format Wrong, Please Check Again:gl500,TOW,1,5**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Command result			
Command string			

- < *Command result*>*:* The string to explain the result of your command :
  - "Command Format Right:"
  - "Command Format Wrong, Please Check Again:"
- < *Command String* >*:* The command string that you sent to the terminal, you should check the command string carefully if you receive "Command Format Wrong, Please Check Again:"

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3.4. Report

3.4.1. Position Related Report

- **+RESP:GTCTN**: report message of continuous mode.
- **+RESP:GTGEO**: report of **AT+GTGEO**
- **+RESP:GTRTL:** report of **AT+GTRTO-RTL**
- **+RESP:GTSTR**: report message for specified time of day.
- **+RESP:GTNMR**: non movement is detected by motion sensor, according to the setting of **AT+GTNMD**

Example:
+RESP:GTCTN,110103,135790246811220,GL500,0,0,0,25.0,81,0,0.1,0,0.3,121.390875,31.164600,20130312183936,0460,0000,1877,0873,,,,20130312190551,0304$

+RESP:GTGEO,110103,135790246811220,GL500,3,1,0,25.1,100,2,0.1,0,5.7,121.390839,31.164621,20130311080111,0460,0000,1877,0873,,,,20130311080112,00A7$

+RESP:GTNMR,110102,135790246811220,GL500,0,1,0,25.5,100,0,0.0,0,-3.3,121.391070,31.164352,20130311124937,0460,0000,1877,0873,,,,20130311130615,00F7$

Parameter	Length (byte)	Range/Format	Default
Protocol version	6	XX0000 – XXFFFF, X∈{'A'-'Z','0'-'9' '-' '_'}	
Unique ID	15	IMEI	
Device name	10		
Report ID	1	0 – 4	
Report type	1	0|1	
Movement status	1	0|1|2	
Temperature	4	XX.X	
Battery percentage	3	0-100	
GPS accuracy	<=2	0|1 – 50	
Speed	<=5	0.0 – 999.9km/h	
Azimuth	<=3	0 – 359	
Altitude	<=8	(-)xxxxx.x m	
Longitude	<=11	(-)xxx.xxxxxx	
Latitude	<=10	(-)xx.xxxxxx	
GPS UTC time	14	YYYYMMDDHHMMSS	
MCC	4	0XXX	
MNC	4	0XXX	
LAC	4	XXXX	
Cell ID	4	XXXX	
Reserved	0		
Reserved	0		

Reserved	0		
Send time	14	YYYYMMDDHHMMSS	
Count number	4	0000 – FFFF	
Tail character	1	$	$

- <*Report ID*>: ID of Geo-Fence in **+RESP:GTGEO**.
- <*Report type*>: type of the report for **+RESP:GTCTN, +RESP:GTSTR, +RESP:GTGEO** and **+RESP:GTNMR**, 0 for other reports.
  - For **+RESP:GTCTN**
    0: Triggered by command.
    1: Triggered by movement.
  - For **+RESP:GTGEO**
    0: exit the corresponding Geo-Fence.
    1: enter the corresponding Geo-Fence.
  - For **+RESP:GTNMR**
    0: The state of the device changed from motion to rest.
    1: The state of the device changed from rest to motion.
  - For **+RESP:GTSTR**
    0: Need to fix.
    1: Not need to fix.

- <*Movement status*>: The terminal movement status.
  - 0:stillness
  - 1:move
  - 2:the sensor disable
- <*Temperature*>: The terminal real time temperature.
- <*battery percentage*>: The current volume of the battery in percentage.
- <*GPS accuracy*>: The HDOP defined in NMEA0183. The range of value is 1 – 50. The smaller the value, the higher the precision. Different from NMEA0183, 0 here means no fix, while GPS accuracy between 0 and 1 is set to 1.
- <*Speed*>: The speed from GPS.
- <*Azimuth*> The azimuth from GPS.
- <*Altitude*>: The height above sea level from GPS.
- <*Longitude*>: The longitude of the current position. The format is "(-)xxx.xxx" and the value range is from "-180.000000" to "180.000000". The unit is degree. West longitude is defined as negative starting with minus "-" and east longitude is defined as positive without "+".
- <*Latitude*>: The latitude of the current position. The format is "(-)xx.xxx" and the value range is from "-90.000000" to "90.000000". The unit is degree. South Latitude is defined as negative starting with minus "-" and north Latitude is defined as positive without "+".
- <*GPS UTC time*>: UTC time from GPS.
- <*MCC*>: Mobile country code. It is 3 digits in length and ranges from 000-999.
- <*MNC*>: Mobile network code. It is 3 digits in length and ranges from 000-999.
- <*LAC*>: Location area code in hex format.
- <*Cell ID*>: Cell ID in hex format.

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3.4.2. Report Simple SMS Message Format

This section defines the formats of the report simple SMS messages.
The following report message's format and message header will be changed:

- **+RESP:GTCTN Change to CTN**
- **+RESP:GTGEO Change to GEO**
- **+RESP:GTRTL Change to RTL**
- **+RESP:GTSTR Change to STR**
- **+RESP:GTNMR Change to NMR**
- **+RESP:GTTEM Change to TEM**
- **+RESP:GTBPL Change to BPL**

In order to reduce the length of one SMS message, we don't report GPS information and Cell-ID at the same time. If the report SMS message with GPS information, it will report with the format of Example1. If the current report SMS message without GPS information, it will report with the format of Example2, which predefined without GPS information report or GPS information need to report but there is no GPS fixing.

Example1:
GEO
GL500
31
99%
28.3C
UN
FX:1
LO:117.198705
LA:31.845209
55.8M
0.0KM/H
CN:2565
20120914185035
http://maps.google.com/maps?q=31.845209,117.198705

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Example2:

STR
GL500
91%
29.3C
MOV
FX:0
MCC:0460
MNC:0001
LAC:1877
CID:2B55
CN:2560
20120914185035

Parameter	**ABB**	**Format**	**Example**
Report Type	**STR|CTN|NMR|GEO|RTL|TEM|BPL**		STR
Device Name			GL500
<ID><State>			
Battery Voltage		%	80%
Temperature		C	29.5C
Movement Status		MOV / STI / UN	MOV
Fixed result	FX:	0|1|2	1
MCC	MCC	0XXX	MCC:0460
MNC	MNC	0XXX	MNC:0000
LAC	LAC	XXXX	LAC:18d8
Cell ID	CID	XXXX	CID:6141
Longitude	LO:		LO:121.412248
Latitude	LA:		LA:31.222073
Altitude			70.0M
Speed		KM/H	60.5 KM/H
Count number	CN:	0000 – FFFF	CN:F36D
Send time		YYYYMMDDHHMMSS	

Google Link Message			http://maps.google.com/maps?q=31.222073,121.354335

✧ <*Fixed result*>: A numeric to indicate the GPS fixed result.

- 0:Need to fix, but fixed failed.
- 1:Need to fix, and fixed succeeded.
- 2:Not need to fix.

✧ < *ID*>< State>: Only for GEO.

- <ID>: ID of Geo-Fence
- <State>:

  0: exit the corresponding Geo-Fence.

  1: enter the corresponding Geo-Fence.

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3.4.3. Report for Querying

These are the report of real time querying by command **AT+GTRTO**.

➢ **+RESP:GTDIF:** The report for real time operation DIF

Example: **+RESP:GTDIF,020102,135790246811220,,GL500,0100,0101,20100214093254,11F0$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Protocol version	6	XX0000 – XXFFFF, X∈{'A'-'Z','0'-'9'}	
Unique ID	15	IMEI	
Device name	10		
Device type	10	'0' – '9', 'a' – 'z', 'A' – 'Z'	GL500
Movement status	1	0|1|2	
Temperature	4	XX.X	
Battery percentage	3	0-100	
Firmware version	4	0000 – FFFF	
Hardware version	4	0000 – FFFF	
MCU version	4		
Last GPS fix UTC time	14	YYYYMMDDHHMMSS	
Send time	14	YYYYMMDDHHMMSS	
Count number	4	0000 – FFFF	
Tail character	1	$	$

✧ <*Device type*>: A string represents the type of the device.

✧ <*Firmware version*>: The firmware version. The first two characters point out the main version and the last two characters point out the subsidiary version. For example: 010A means the version 1.10

✧ <*Hardware version*>: The hardware version. The first two characters point out the main version and the last two characters point out the subsidiary version. For example: 010A means the version 1.10

✧ <*MCU version*>: The MCU version. The first two characters point out the main version and the last two characters point out the subsidiary version. For example: 0103 means the version 1.03

✧ <*Last GPS fix UTC time*>: The UTC time of the latest successful GPS fixing.

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➢ **+RESP:GTALL:** The report for real time operation READ

Example:
+RESP:GTALL,110102,868487002001121,MYGL500,BSI,cmnet,,,,,,,SRI,3,,1,116.228.146.250,8085,192.0.0.0,0,18019992863,5,1,,,,,GBC,+8618019992863,MYGL500,000F,,,10101010101111,0930,2,3,1,7,20,1,3,0,3,+20+20,2,,,TMA,+0800,0,,,,,NMD,F,2,4,10,5,,,,WLT,2,18055169615,18019992863,18356001361,,,,,,,,,,,GEO,0,2,117.200895,31.833078,50,5,,,,,,,,,1,1,117.200895,31.833078,50,5,,,,,,,,,2,1,117.200895,31.833078,50,5,,,,,,,,,3,1,117.200895,31.833078,50,5,,,,,,,,,4,1,117.200895,31.833078,50,5,,,,,,,,,PIN,1,1234,,,,,,20000101000105,0025$

Parameter	Length (byte)	Range/Format	Default
Protocol version	6	XX0000 – XXFFFF, X∈{'A'-'Z','0'-'9'}	
Unique ID	15	IMEI	
Device name	10		
BSI	3	BSI	BSI
APN	<=40		
APN user name	<=30		
APN password	<=30		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
SRI	3	SRI	SRI
Report mode	1	0 – 5	
Reserved	0		
Buffer enable	1	0|1	
Main server IP/domain name	<=60		
Main server port	<=5	0 – 65535	
Backup server IP	<=15		
Backup server port	<=5	0 – 65535	
SMS Gateway	<=20		
Heartbeat interval	<=3	0|10 – 360min	
SACK enable	1	0|1	
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
GBC	3	GBC	GBC
Mobile Number	<=20	'0'-'9'	
Device Name	<=10	'0' – '9' 'a' – 'z' 'A' – 'Z"	GL500
Event mask	<=4	0000-1FFF	
Reserved	0		

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Reserved	0		
Week Report Selection	14		
Specified time of day	4	HHMM	
Interval hours wakeup	<=2	1|2|3|4|6|8|12|24	
Report frequency	<=2	1 – 24	
Continuous Mode	1	0|1	
Continuous Send interval	<=4	0|5 – 1440min	
Battery Low Percent	<=2	0|5 - 20	
Sensor enable	1	0|1	
GSM Report	1	0|1|2|3	
Report destination mode	1	0|1	
Temperature report mode	1	0|1|2|3	
Temperature range	6	(‘+’or’-‘) LL (‘+’ or’-‘) HH	
AGPS Mode	1	0|2	
Reserved			
Reserved			
TMA	3	TMA	TMA
Time Zone	5	-|+HHMM	
Daylight Saving	1	0|1	
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
NMD	3	NMD	NMD
mode	1	0-F	
Non-movement duration	<=3	3 – 200(×30sec)	
Movement duration	<=2	3 – 50(×512ms)	
Movement threshold	<=2	5– 25	
Move report interval	<=3	0|5 -360min	
Reserved	0		
Reserved	0		
Reserved	0		
WLT	3	WLT	WLT
call filter	1	0|1|2	
white number	20*10		
Reserved	0		
Reserved	0		
Reserved	0		

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Reserved	0		
GEO	3	GEO	GEO
GEO ID0	1	0	0
Report mode	1	0 – 3	
Longitude	<=11	±xxx.xxxxxx	
Latitude	<=10	±xx.xxxxxx	
Radius	<=7	50 – 6000000m	
Check interval	<=5	5 – 1440min	
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved			
Reserved			
Reserved			
Reserved			
GEO ID1	1	1	1
Report mode	1	0 – 3	
Longitude	<=11	±xxx.xxxxxx	
Latitude	<=10	±xx.xxxxxx	
Radius	<=7	50 – 6000000m	
Check interval	<=4	5 – 1440min	
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved			
Reserved			
Reserved			
Reserved			
GEO ID2	1	2	2
Report mode	1	0 – 3	
Longitude	<=11	±xxx.xxxxxx	
Latitude	<=10	±xx.xxxxxx	
Radius	<=7	50 – 6000000m	
Check interval	<=4	5 – 1440min	
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved			
Reserved			

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Reserved			
Reserved			
GEO ID3	1	3	3
Report mode	1	0 – 3	
Longitude	<=11	±xxx.xxxxxx	
Latitude	<=10	±xx.xxxxxx	
Radius	<=7	50 – 6000000m	
Check interval	<=4	5 – 1440min	
Reserved			
Reserved			
Reserved			
Reserved			
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
GEO ID4	1	4	4
Report mode	1	0 – 3	
Longitude	<=11	±xxx.xxxxxx	
Latitude	<=10	±xx.xxxxxx	
Radius	<=7	50 – 6000000m	
Check interval	<=4	5 – 1440min	
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved			
Reserved			
Reserved			
Reserved			
PIN	3	PIN	PIN
Enable Auto-unlock PIN	1	0|1	
PIN	4 – 8	'0' – '9'	
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Send time	14	YYYYMMDDHHMMSS	
Count number	4	0000 – FFFF	
Tail character	1	$	$

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✧ No matter what report mode is set, **+RESP:GTALL** is only reported through GPRS. If the current report mode is forcing on SMS, **+RESP:GTALL** will be reported via TCP short connection.

➢ **+RESP:GTCID:** The report for real time operation CID

Example: **+RESP:GTCID,020102,135790246811220,,898600810906F8048812,20100214093254,11F0$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Protocol version	6	XX0000 – XXFFFF, X∈{'A'-'Z','0'-'9'}	
Unique ID	15	IMEI	
Device name	10		
ICCID	20		
Send time	14	YYYYMMDDHHMMSS	
Count number	4	0000 – FFFF	
Tail character	1	$	$

➢ **+RESP:GTCSQ:** The report for real time operation CSQ

Example: **+RESP:GTCSQ,020102,135790246811220,,16,0,20100214093254,11F0$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Protocol version	6	XX0000 – XXFFFF, X∈{'A'-'Z','0'-'9'}	
Unique ID	15	IMEI	
Device name	10		
CSQ RSSI	<=2	0 – 31 | 99	
CSQ BER	<=2	0 – 7 | 99	
Send time	14	YYYYMMDDHHMMSS	
Count number	4	0000 – FFFF	
Tail character	1	$	$

➢ **+RESP:GTTMZ:** The report for real time operation TMZ

Example: **+RESP:GTTMZ,020102,135790246811220,-0330,0,20100214093254,11F0$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**

Protocol version	6	XX0000 – XXFFFF, X∈{'A'-'Z','0'-'9'}	
Unique ID	15	IMEI	
Device name	10		
Time zone offset	5	±HHMM	
Daylight saving	1	0|1	
Send time	14	YYYYMMDDHHMMSS	
Count number	4	0000 – FFFF	
Tail character	1	$	$

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3.4.4. Event Report

The following event reports are triggered when certain event occurs.
+RESP:GTPNA: The terminal is activated.
+RESP:GTBPL: Battery low report
+RESP:GTTEM: Temperature alarm report.
+RESP:GTPDP: GPRS PDP connection report
+RESP:GTGSM: The report for the information of the service cell and the neighbour cells.

In **+RESP:GTBPL** and **+RESP:GTTEM** event reports, the last known GPS information and the current GSM network information are involved.

➢ **+RESP:GTPNA:**

Example: **+RESP:GTPNA,020102,135790246811220,,20100214093254,11F0$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Protocol version	6	XX0000 – XXFFFF, X∈{'A'-'Z','0'-'9'}	
Unique ID	15	IMEI	
Device name	10		
Power On Type	1	1|2|4|5	
Send time	14	YYYYMMDDHHMMSS	
Count number	4	0000 – FFFF	
Tail character	1	$	$

✧ *<Power On Type>*: The type for terminal is activated:

- 1: The terminal detects movement to activate the terminal.
- 2: Specified time to activate the terminal..
- 4: First power on by manual.
- 5:Power on by RTO reboot command.

➢ **+RESP:GTPDP:**

Example: **+RESP:GTPDP,110202,135790246811220,,20100214093254,11F0$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Protocol version	6	XX0000 – XXFFFF, X∈{'A'-'Z','0'-'9'}	
Unique ID	15	IMEI	
Device name	10		
Send time	14	YYYYMMDDHHMMSS	
Count number	4	0000 – FFFF	
Tail character	1	$	$

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- **+RESP:GTBPL:**
- **+RESP:GTTEM**

Example:
+RESP:GTBPL,110102,135790246811220,GL500,2,25.0,4,0,0.5,0,0.1,121.390978,31.164529,20130228202357,0460,0000,1877,0873,,,,20130228202742,018B$+RESP:GTTEM,110102,868487002001782,GL500,2,29.4,100,0,0.4,0,-0.5,121.390989,31.164601,20130225082440,0460,0000,1877,0873,,,,20130225082536,009A$

Parameter	Length (byte)	Range/Format	Default
Protocol version	6	XX0000 – XXFFFF, X∈{'A'-'Z','0'-'9'}	
Unique ID	15	IMEI	
Device name	10		
Movement status	1	0|1|2	
Temperature	4	XX.X	
Battery voltage percent	<=3	0 - 100	
GPS accuracy	1	0	
Speed	<=5	0.0 – 999.9km/h	
Azimuth	<=3	0 – 359	
Altitude	<=8	±XXXXX.X m	
Last longitude	<=11	±XXX.XXXXXX	
Last latitude	<=10	±XX.XXXXXX	
GPS UTC time	14	YYYYMMDDHHMMSS	
MCC	4	0XXX	
MNC	4	0XXX	
LAC	4	XXXX	
Cell ID	4	XXXX	
Reserved	0		
Reserved	0		
Reserved	0		
Send time	14	YYYYMMDDHHMMSS	
Count number	4	0000 – FFFF	
Tail character	1	$	$

- <*Last longitude*>: The longitude of the last position. The format is "(-)xxx.xxxxxx" and the value range is from "-180.000000" to "180.000000". The unit is degree. West longitude is defined as negative starting with minus "-" and east longitude is defined as positive without "+".
- <*Last latitude*>: The latitude of the last position. The format is "(-)xx.xxxxxx" and the value range is from "-90.000000" to "90.000000". The unit is degree. South Latitude is defined as negative starting with minus "-" and north Latitude is defined as positive without "+".

➢ **+RESP:GTGSM**

Example: **+RESP:GTGSM,110102,135790246811220,CTN,0460,0000,1877,0871,27,,0460,0000,1806,3152,27,,0460,0000,1806,2152,17,,0460,0000,1877,03A3,13,,,,,,,,,,,,0460,0000,1877,0873,31,,20130316013544,034B$**			
Parameter	**Length(byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A'-'Z','0'-'9'}	
Unique ID	15	IMEI	
Fix Type	3	STR|CTN |NMR| RTL	
MCC1	4	0XXX	
MNC1	4	0XXX	
LAC1	4		
Cell ID1	4		
RX Level1	2	0-63	
Reserved	0		
MCC2	4	0XXX	
MNC2	4	0XXX	
LAC2	4		
Cell ID2	4		
RX Level2	2	0-63	
Reserved	0		
MCC3	4	0XXX	
MNC3	4	0XXX	
LAC3	4		
Cell ID3	4		
RX Level3	2	0-63	
Reserved	0		
MCC4	4	0XXX	
MNC4	4	0XXX	
LAC4	4		

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Cell ID4	4		
RX Level4	2	0-63	
Reserved	0		
MCC5	4	0XXX	
MNC5	4	0XXX	
LAC5	4		
Cell ID5	4		
RX Level5	2	0-63	
Reserved	0		
MCC6	4	0XXX	
MNC6	4	0XXX	
LAC6	4		
Cell ID6	4		
RX Level6	2	0-63	
Reserved	0		
MCC	4	0XXX	
MNC	4	0XXX	
LAC	4		
Cell ID	4		
RX Level	2	0-63	
Reserved	0		
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

- <*Fix Type*> : A string to indicate what kind of GPS fixing this cell information is for.
  "STR" This cell information is for STR requirement.
  "CTN" This cell information is for CTN requirement.
  "NMR" This cell information is for NMR requirement.
  "RTL" This cell information is for RTL requirement.
- <*MCC(i)*> : MCC of the neighbor cell *i* (*i* is the index of the neighbor cell).
- <*MNC(i)*> : MNC of the neighbor cell *i*.
- <*LAC(i)*> : LAC in hex format of the neighbor cell *i*.
- <*Cell ID(i)*> : Cell ID in hex format of the neighbor cell *i*.

- ✧ <*RX Level(i)*> : The signal strength of the neighbor cell *i*. This parameter is a 6-bit coded in 1 dB steps:
  0: -110 dBm
  1 to 62: -109 to -48 dBm
  63: -47 dBm
- ✧ <*MCC*>: MCC of the service cell.
- ✧ <*MNC*>: MNC of the service cell.
- ✧ <*LAC*>: LAC in hex format of the service cell.
- ✧ <*Cell ID*>: Cell ID in hex format of the service cell.
- ✧ <*RX Level*>: The signal strength of the service cell.

Note:

1. It probably includes only several neighbor cells' (even no neighbor cell) information. If some neighbor cell wasn't find, all the fields of the neighbor cell will be empty.
2. "ffff" in the field of <*LAC(i)*>, <*Cell ID(i)*> means the terminal doesn't know the value.
3. This message cannot be sent via SMS.

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3.4.5. Buffer Report

If BUFFER function is enabled, the terminal will save the message into the BUFFER in the following circumstances.

- ✧ No GSM signal.
- ✧ Failed to activate GPRS context for the TCP or UDP connection.
- ✧ Failed to establish the TCP connection with the backend server.

These messages will be sent to the backend server after the message can be sent to the backend server.. The device can save up to 3000 messages at most.

- ✧ Only **+RESP** messages can be buffered except **+RESP:GTALL**
- ✧ In the buffer report, the original header string "**+RESP"** is replaced by "**+BUFF**" while keeps the other content untouched including the original sending time and count number.
- ✧ Buffered messages will be sent only via GPRS by TCP or UDP protocol. They cannot be sent via SMS. If the current report mode is forcing on SMS, the buffered messages will be sent via TCP short connection.
- ✧ The buffered messages will be sent after the other normal messages sending if <*Buffer Mode*> in **AT+GTSRI** is set to 1

Example:

The following is an example of the buffered message:

+BUFF:GTCTN,110103,135790246811220,GL500,0,0,0,25.0,81,0,0.1,0,0.3,121.390875,31.164600,20130312183936,0460,0000,1877,0873,,,,20130312190551,0304$

3.5. Heartbeat

Heartbeat is used to maintain the contact between the device and the backend server if communicating via GPRS. The heartbeat package is sent to the backend server at the interval defined by <*Heartbeat interval*> in **AT+GTQSS** or **AT+GTSRI** command.

➢ **+ACK:GTHBD:**

Example: **+ACK:GTHBD,110102,135790246811220,,20100214093254,11F0$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Protocol version	6	XX0000 – XXFFFF, X∈{'A'-'Z','0'-'9'}	
Unique ID	15	IMEI	
Device name	10		
Send time	14	YYYYMMDDHHMMSS	
Count number	4	0000 – FFFF	
Tail character	1	$	$

Whenever the backend server receives a heartbeat package, it should reply an acknowledgement to the device.

➢ **+SACK:GTHBD:**

Example: **+SACK:GTHBD,110102,11F0$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Protocol version	6	XX0000 – XXFFFF, X∈{'A'-'Z','0'-'9'}	
Count number	4	0000 – FFFF	
Tail character	1	$	$

✧ <*Count number*>: The backend server uses the <*Count number*> extracted from the heartbeat package from the device as the <*Count number*> in the server acknowledgement of the heartbeat.

3.6. Sever Acknowledgement

If server acknowledgement is enabled by AT+GTQSS or AT+GTSRI command, the backend server should reply to the device whenever it receives a message from the device.

➢ **+SACK:**

Example: **+SACK:11F0$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Count number	4	0000 – FFFF	
Tail character	1	$	$

✧ <*Count number*>: The backend server uses the <*Count number*> extracted from the received message as the <*Count number*> in the server acknowledgement.

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✧ **Command and ACK**

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+ACK:GTBSI
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+ACK:GTGBC
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+ACK:GTTMA
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+ACK:GTNMD
AT+GTGEO
+ACK:GTGEO
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+ACK:GTRTO
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+ACK:GTWLT

✧ **Position Related Report**

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✧ **Report for Querying**

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✧ **Event Report**

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✧ **Heartbeat**

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+SACK:GTHBD

✧ **Server Acknowledgement**

+SACK

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