# GTR-388
# Development Document



**Version: 0.3**

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# 1 Introduction

GTR-388 is designed as durable and multi-functional 3G GPS tracker. It integrates highly sensitive GPS module and 3G communication module with a powerful microcontroller that fits into a compact enclosure. The device is capable of waterproof and ideal for use in motorcycle, golf cars and general car. It is small size for covert and efficient tracking device. It provides real-time GPS positions anytime and anywhere with an open view to the sky, and offers precise positioning, and reports vehicle status to the server with necessary information shown on the map. Benefits such as enhanced fleet management, improved vehicle safety, emergency response, are all accomplished through the implementation of the GTR-388 system. The built-in 3G and GPS antennas are for easy installation without hassle.

**The key functions of GTR-388 are listed below.**

- Support communication protocols- SMS/TCP/UDP.
- Multiple I/Os support: 1 Digital Input for custom function, 1 Digital input for optional Emergency button, 1 Analog Input for fuel sensor, 1 Digital Output for Relay, 1 Digital Input for ACC detection.
- Over-The-Air Device Firmware update
- Alert functions including Power low/ Over speed/ Movement alarms
- Tracking in preferred interval, scheduling and Geo-fence
- No any button and plug-in then power on for simple use

**This document describes the communication protocol between GTR-388 and application server, the built-in behavior modes of GTR-388, and the function of each parameter.**

# 2 Protocol Summary

## 2.1 General Format

**The general format of message is**

**GSx,IMEI,[T,S,]Field1,Field2,……,FieldN*Checksum!**

| Format | Description | Note |
|---|---|---|
| GSx | "GSS" :Write setting<br>"GSs" :Report setting<br>"GSG" :Write Geo-fence parameter<br>"GSg" :Report Geo-fence parameter<br>"GSC" :Action command<br>"GSr" :Position and status report<br>"GSb": Data buffered reports | Command head |
| IMEI | (The IMEI number) | GSM device ID |
| T | '0' : Middle of sequential message<br>'1' : Start of sequential message<br>'2' : End of sequential message<br>'3' : Start and End of sequential message, i.e., only one packet for message | Message packet sequence control flag |
| S | '0','1','2','3',…,'9','10','11',…,'99' | Sequence number |
| Field | Field1 ~ Field N, separated by ',', contain command and/or configuration parameters | Refer to "GTR-388 configure parameters" for detail definition |
| * | * | End of field |
| Checksum | The checksum value is calculated by 'exclusive OR' the 8 data bits of each byte before '*' in the sentence, but excluding '*'. The hexadecimal value of the most significant and least significant 4 bits of the result are converted to two ASCII characters (0-9, A-F) for transmission. The most significant character is transmitted first. | |
| ! | ! | Message delimiter |

| | | |
|---|---|---|
| \r\n | Used as a new line character | |

# 2.2 Format of configuration message

## 2.2.1 Server -> Device

**This message is used to configure GTR-388 device. Each message could contain as many parameters as required. If the message is too long to be sent in one package, it would be separated into several packets in sequence. The size of each packet is 250 bytes.**

**The format is**
**GSS,IMEI,T,S,x1=y1,x2=y2,x3=y3,……*Checksum!**
**Where T field is message packet sequence control flag.**
**S field is message packet sequence number.**
**x1,x2,x3… are code words for configuration parameters.**
**y1,y2,y3… are their respective settings.**

**For example:**
**GSS,123456789012345,1,0,A0=1,C1=90,C2=20*03!**
**GSS,123456789012345,0,1,D1=internet,E0=123.234.168.1,E1=5000*04!**
**GSS,123456789012345,2,2,O3=TSPRXAB27GHKLMmnaictuvw*U!*1e!**

## 2.2.2 Device -> Server

**The message is generated by the GTR-388 in accordance with a reading configuration command. If the message is too long, it will be separated into several packets in sequence.**

**The format is**
**GSs,IMEI,T,S,x1=y1,x2=y2,x3=y3,……*Check Sum!**

**For example:**
**GSs,123456789012345,1,0,O5=test,O7=F-GTR-388STD-16050972.5.1.0.0*32!**
**GSs,123456789012345,2,1,OD=02,OS=120*5e!**

# 2.3 Format of Geo-fence Message

## 2.3.1 Server -> Device

**This message is used to configure geo-fence setting. Each message contains as many parameters as desired. If the message to be sent is too long, it would be separated to several packets in sequence. The maximum length of each packet is 250 bytes.**

**The format is**
**GSG,IMEI,T,S,1=(type,upper_left_Lon,upper_left_Lat,right_bottom_Lon,right_bottom_Lat[,startTime,endTime,weekday]),2=(…),3=(…),…*Check sum!**
**Where T field is message packet sequence control flag.**
**S field is message packet sequence number.**
**1,2,3,… are geo-fence area ID.**
**Setting of each area is enclosed by (…). Please refer to 2.3.3 & 7.3 for detail.**

## 2.3.2 Device -> Server

**The message is generated by GTR-388 in accordance with a reading geo-fence setting command. If the message is too long, it will be separated into several packets in sequence.**

**The format is**
**GSg,IMEI,T,S,1=(type,upper_left_Lon,upper_left_Lat,right_bottom_Lon,right_bottom_Lat[,startTime,endTime,weekday]),2=(…),3=(…),…*Check sum!**

## 2.3.3 Geo-fence area definition format

***Each geo-fence area is a rectangle represented by the following parameters.***
***(type,upper_left_Lon,upper_left_Lat,right_bottom_Lon,right_bottom_Lat[,startTime,endTime,weekday])***

| | |
|---|---|
| **type** | **1=get in area** |

| | |
|---|---|
| | 2=get out of area<br>3=cross over the boundary<br>4=stay in area<br>5=stay out of area |
| upper_left_Lon<br>upper_left_Lat | The upper left coordinate of specified area. |
| right_bottom_Lon<br>right_bottom_Lat | The right-bottom coordinate of specified area. |
| startTime<br>endTime<br>weekday | Optional field for specifying the effective time frame of this geo-fence area. Start Time and end Time are in seconds. Weekday is in hex-digit format which specifies applicable day in a week, where bit 0 represents Sunday, bit1 represents Monday, etc. |

## 2.4 Format of Command Message

**A command message is used to set the working mode or control the device activity. A command codeword can combine with configuration setting for best transmission efficiency.**

**The format is**
**GSC,IMEI,c1(option1),c2(option2),…….*checksum!**

**Where**
**c1,c2…are code words of command.**
**option1, option2… are configuration parameters and setting. Please refer to section 2.7 for detail.**

**For example:**
**GSC,123456789012345,Na,Nk(K1=1,K2=100,K7=c9)*58!**

# 2.5 Format of Report Message

**Report message is generated by the GTR-388 to inform the application server of its location and status.**
**They are composed of report prefix and report parameters which are described in section 2.6. Please refer to “Chapter 12. Report” for detailed definitions.**

**For example:**

**GTR-388 -> Server**
**If configuration parameter O3=TSPRXAB27GHKLMmnaictuvw*U! then the report is**
**GSr,Device_ID,IMEI,Alarm_status,Report_Type,Variable_field,GPS_Fix,UTC_Date,UTC_Time,Longitude,Latitude,Altitude,Speed,Heading,Number_of_Satellites,HDOP,main_battery_voltage,backup_battery_voltage,analog_input_value,odometer_value,GSM_signal_strength,cell_ID_MCC,cell_ID_MNC,cell_ID_LAC,cell_ID_CID*checksum!**

## 2.6 Parameters of Report Messages

| Parameters of Report Message | | |
|---|---|---|
| Codeword | Parameters | Description |
| A | GPS fix status | 1=not fix<br>2=2D fix<br>3=3D fix |
| B | UTC Date, Time | ddmmyy,hhmmss |
| C | Local Date, Time | ddmmyy,hhmmss |
| 1 | Longitude | (E or W)ddd.dddddd |
| 2 | Longitude | (E or W)dddmm.mmmm |
| 3 | Longitude | (+ or -)ddddddddd<br>unit: 0.000001 degree |
| 6 | Latitude | (N or S)dd.dddddd |
| 7 | Latitude | (N or S)ddmm.mmmm |
| 8 | Latitude | (+ or -)ddddddddd<br>unit: 0.000001 degree |
| G | Altitude | xxxxx<br>Unit: meter |
| H | Speed | xxx.xx<br>unit: knots (1.852km/hr) |
| I | Speed | xxx<br>unit: km/hr |
| J | Speed | xxx<br>unit: mile/hr |
| K | Heading | xxx<br>unit: degree |
| L | Number of satellite in use | xx |
| M | HDOP | xx.x |
| P | Alarm status | xxxx(hex digits)<br>bit0= Emergency alarm<br>bit1=Parking alarm status<br>bit3=Autonomous geo-fence alarm<br>bit4=Geo-fence alarm<br>bit5=Speed alarm<br>bit6=Main battery disconnection alarm<br>bit7=Main battery low alarm |

| | | |
|---|---|---|
| | | bit8=Fuel low alarm (analog input) |
| Z | Geo-fence status | Empty field: no geo-fence alarm<br>Ixx: get in area xx<br>Oxx: get out area xx |
| Q | Report Media | xx(hex digits)<br>bit0=SMS<br>bit1=TCP<br>bit2=UDP |
| R | Report type | 1=Ping report<br>4=Motion mode static report<br>5=Motion mode moving report<br>6=Motion mode static to moving report<br>7=Motion mode moving to static report<br>8=Angle change report<br>E=Error report<br>G=Geo-fence alarm report<br>H=Autonomous Geo-fence alarm report<br>I= Emergency alarm report<br>K=Speed alarm report<br>L=Timer 0 report<br>M=Timer 1 report<br>N=Timer 2 report<br>P=Link report<br>Q=Stopwatch 0 report<br>R=Stopwatch 1 report<br>V= Digital input report<br>a=Analog input report<br>e=Counter 0 report<br>f=Counter 1 report<br>i=Odometer report<br>j= ACC report<br>l=Main battery disconnected<br>m=Main battery low alarm report<br>n=Request EPO download report<br>o=OTA download complete<br>p=OTA download fail<br>q=parking alarm report |
| S | IMEI | |

| | | |
|---|---|---|
| T | Device ID | |
| U | Checksum | The checksum value is calculated by 'exclusive OR' the 8 data bits of each character before "*" in the sentence, but excluding "*". The hexadecimal value of the most significant and least significant 4 bits of the result are converted to two ASCII characters (0-9, A-F) for transmission. The most significant character is transmitted first. |
| V | Digital input status (1=Active, 0=Inactive) | xx (hex digits)<br>bit1=Input 1 |
| W | Digital output status (1=Active, 0=Inactive) | xx (hex digits)<br>bit1=Output 1 |
| X | Variable field, depends on report type | Please refer to the table of X field. |
| Y | Joint I/O status (1=Active, 0=Inactive) | xxxx (hex digits)<br>bit1=Input 1<br>bit7=Motion status, 0=static, 1=moving<br>bit9=Output 1<br>bit13=ACC<br>bit15=Main battery connected |
| a | Fuel sensor input | decimal, in mV |
| c | GSM signal strength | decimal |
| e | Counter 0 value | decimal |
| f | Counter 1 value | decimal |
| i | Odometer | Decimal, in meters |
| m | Main battery voltage | Decimal, in mV |
| n | Backup battery voltage | Decimal, in mV |
| o | Autonomous geo-fence distance | Decimal, in meters |
| s | IMSI | |
| t | Cell ID-MCC | mobile country code, 3 digits |
| u | Cell ID-MNC | mobile network code, 2 or 3 digits |
| v | Cell ID-LAC | location area code, 4 hexadecimal digits |
| w | Cell ID-CID | cell identifier, 4 hexadecimal digits |
| # | | |

| | | |
|---|---|---|
| * | | |
| ? | | |
| ! | ! | Message delimiter |

**Report parameter 'X' is variable depending the report type. The relationship is described in the following table.**

| Report type | Value of X field |
|---|---|
| **1**=Ping report | Y: Joint I/O status |
| **4**=Motion mode static report | Y: Joint I/O status |
| **5**=Motion mode moving report | Y: Joint I/O status |
| **6**=Motion mode static to motion report | Y: Joint I/O status |
| **7**=Motion mode moving to static report | Y: Joint I/O status |
| **G**=Geo-fence alarm report | Z: geo-fence status |
| **E**=Error report | Specific error message |
| **H**=Autonomous geo-fence alarm report | o: autonomous geo-fence distance |
| **I**= Emergency alarm report | Y: Joint I/O status |
| **K**=Speed alarm report | I: speed (in Km/H) |
| **L**=Timer 0 report | Y: Joint I/O status |
| **M**=Timer 1 report | Y: Joint I/O status |
| **N**=Timer 2 report | Y: Joint I/O status |
| **P**=Link report | Y: Joint I/O status |
| **Q**=Stopwatch 0 report | Y: Joint I/O status |
| **R**=Stopwatch 1 report | Y: Joint I/O status |
| **V**=Digital input report | Y: Joint I/O status |
| **a**=Fuel low report | a: analog input value |
| **e**=Counter 0 report | e: counter 0 value |
| **f**=Counter 1 report | f: counter 0 value |
| **i**=Odometer | i: Odometer value |
| **j**=ACC report | Y: Joint I/O status |
| **l**=Main battery disconnected | Y: Joint I/O status |
| **m**=Main battery low alarm report | m: main battery voltage |
| **o**=OTA download complete | Y: Joint I/O status |
| **p**=OTA download fail | Y: Joint I/O status |
| **q**=Parking alarm report | Y: Joint I/O status |

## 2.6.1 Close the Cell ID information

**You could decide which information to be shown in the report message by changing the default value of O3. The default of O3 is TSPRXAB27GHKLMmnaictuvw*U! The parameter of Cell ID is t, u, v, w. So you could close showing Cell ID by removing "t,u,v,w" in O3 to be TSPRXAB27GHKLMmnaic*U!**

# 2.7 Code word of Configuration Parameter

**Most behaviors of GTR-388 could be changed by Configuration Parameters. You could change the setting of configuration parameters by the following methods.**

1. **Change the settings by "GTR388ConfigTool_DEV.exe**
2. **Send the "GSS,….!" setting with the configuration parameters to GTR-388**
3. **Send the "GSC,….!" command with the configuration parameters to GTR-388**

**All the settings or commands could be sent by SMS or TCP or UDP.**
**You could also send L1 command to read the present setting of GTR-388 by TCP or UDP.**

| Configuration Parameters | | | | | |
|---|---|---|---|---|---|
| | | Code words | Parameters | Type | Description |
| Main | Device | O5 | Device ID | char(16) | Default=GTR-388 |
| | | O7 | Firmware Version | char(28) | Read only |
| | | O6 | Time Zone Offset | s32, in seconds | -43200 ~ 46800<br>Default=0 |
| | | B2 | IMEI number | char(16) | Read only |
| | | | | | |
| | SIM | B0 | PIN code | char(8) | |
| | | B1 | Phone number of SIM card | char(20) | |
| | | B3 | IMSI number | char(16) | Read only |
| | | | | | |
| | Battery | J6 | Battery alarm report Media | Media type | bit0=SMS<br>bit1=TCP<br>bit2=UDP<br>Default=02, TCP |
| | | J9 | The voltage for device to send main battery power low alarm | u16, in mV | Range: 3000~12,000<br>12V Default=11,500<br>5V Default=3,800<br>Note: GTR-388 is installed with surge protection on PCBA. And |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | **there would be a gap up to 0.3V between real voltage of main battery and measured voltage.** |
| | | **JA** | The action for main battery disconnection alarm | Action type | Please refer to section 2.10 for detail.<br>Default= 0000000000 |
| | | **JB** | The action for mail battery power low alarm | Action type | Please refer to section 2.10 for detail.<br>Default= 0000000000 |
| | | | | | |
| | Other setting | **O3** | Report format | char(32) | Default=TSPRXAB27GHKLMmnaictuvw*U! |
| | | **OG** | Enable/ disable data buffer function | 1/0 | 0=Disable<br>1=Enable<br>Default=1 |
| | | **OB** | Debug message output media | u8 | 1=debug port<br>2=in device<br>Default=2 |
| | | **OC** | Debug message level | u8 | 1=all message<br>4=NEMA only<br>Default=1 |
| | | **OO** | Report media for reading configuration | Media type | bit1=TCP<br>bit2=UDP<br>bit6=debug port<br>Default=20, debug port |
| | | **Oa** | Password of simple command | Char(8) | |
| | | **S7** | Numbers of buffered reports to be concatenated as a string | u8 | Range=1~30<br>Default=1 |
| | | **S9** | Enable/disable indicator LED | 0/1/2 | 0= disable LED<br>1= enable LED<br>2=disable LED in power saving mode<br>Default=1 |
| | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| GPS | GPS | C1 | The time for starting to get GPS fix before the next report time if GTR-388 does not get GPS fix in last report, or got a GPS fix 1 hour ago | u16, in seconds | 60 ~ 600<br>Default=180<br>**Note: GTR-388 will send out the report whether it gets GPS fix or not when C1 time ends.** |
| | | C2 | The time for starting to get GPS fix before the next report time if GTR-388 got a GPS fix within 1 hour | u16, in seconds | 10 ~ 120<br>Default=60<br>**Note: GTR-388 will send out the report whether it gets GPS fix or not when C2 time ends.** |
| | | C3 | GPS fix time before sending out the first report | u16, in seconds | 0 ~ 600<br>Default=5<br>If "C3"=0, disable first report message. |
| | | C5 | Enable NMEA output message | 1/0 | 0=disable<br>1=enable<br>Default=0 |
| | | CB | EPO download request interval when EPO update fails | u32, in seconds | Range:>=60,0<br>Default=0 |
| | | | | | |
| Communication | SMS | F0 | SMS report phone number | char(20) | |
| | 3G/GPRS | D1 | APN | char(32) | |
| | | D2 | User Name | char(32) | |
| | | D3 | Password | char(32) | |
| | | D4 | DNS | char(32) | |
| | | D8 | 3G/GPRS mode for Link command | Media type | 02=TCP<br>04=UDP<br>Default=02 |
| | | E0 | Host IP or | char(32) | |

| | | | | | |
|---|---|---|---|---|---|
| | | | domain name | | |
| | | E1 | Host Port number | u16 | |
| | | E4 | Interval in on-line state for disconnecting and then re-connecting | u16, in seconds | 0,60~65535<br>0=disable<br>Default=0 |
| | | E5 | Interval for checking if 3G/GPRS connection is on-line. If 3G/GPRS connection is cut, GTR-388 will try to connect to server for one time. | u16, in seconds | 0=disable<br>Default=60 |
| | | E6 | Enable/disable GTR-388 to send “IMEI,OK” to server after 3G/GPRS connection is re-built. | 1/0 | 0=disable<br>1=enable<br>Default=0<br>Available when E5 is not 0 |
| | | E7 | Timeout of Link report connection | u16, in seconds | >=2, default=30 |
| | | EA | Time for keeping 3G/GPRS connection after sending report | u8, in seconds | >=2, default=2 |
| | | | | | |
| | Acknowledgement | A0 | Send confirmation to server after receiving | 1/0 | 0=disable<br>1=enable<br>Confirmation message="ACK\r"<br>Default=1 |

| | | | | | |
|---|---|---|---|---|---|
| | | | command from server | | |
| | | A1 | Wait confirmation from server after sending message to server | 1/0 | 0=disable<br>1=enable<br>Confirmation message="ACK\r"<br>Default=0 |
| | | A2 | Timeout of waiting confirmation from server | u8 | 1~255<br>Default=5 |
| | | A3 | Device ACK with ID string | 1/0 | 0=without ID string<br>1=with ID string<br>Default=0 |
| | | A4 | ID string is IMEI or device ID | 1/0 | 0=Device ID<br>1=IMEI<br>Default=1<br>Available when A3=1 |
| | | A5 | Enable Simple Command | 1/0 | 0=disable<br>1=enable<br>Default=1 |
| | | | | | |
| Security | Emergency | G0 | SMS Phone number 1 | char(20) | |
| | | G1 | SMS Phone number 2 | char(20) | |
| | | G2 | SMS Phone number 3 | char(20) | |
| | | G3 | SMS Phone number 4 | char(20) | |
| | | G4 | SMS Phone number 5 | char(20) | |
| | | G5 | SMS Phone number 6 | char(20) | |
| | | H0 | Report media of Emergency | Media Type | 00=Disable<br>01=SMS<br>02=TCP |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | 04=UDP<br>Default=03, SMS+TCP |
| | | H1 | Max number of SMS report for each phone number | u16 | 1~65535<br>Default=1 |
| | | H2 | report interval | u16, in seconds | 3 ~ 65535<br>Default=30 |
| | | H3 | Number of 3G/GPRS report | u8 | 0=continuous<br>Default=0 |
| | | | | | |
| | Speed Limit | SA | Upper limit of speed alarm | u8, in Km/h | 0 ~ 255<br>0=disable, default=0 |
| | | SB | Lower limit of speed alarm | u8, in Km/h | 0 ~ 255<br>0=disable, default=0 |
| | | SC | Hysteresis for speed alarm | u8, in Km/h | 0 ~ 255, default=5 |
| | | SD | Report Media for speed alarm | Media type | bit0=SMS<br>bit1=TCP<br>bit2=UDP<br>Default=02, TCP |
| | | SE | Action for high speed alarm | Action type | Please refer to section 2.10 for detail.<br>Default=0000000000 |
| | | SF | Action for low speed alarm | Action type | Please refer to section 2.10 for detail.<br>Default=0000000000 |
| | | | | | |
| | Parking Alarm | SI | Enable parking alert | 1/0 | 0=disable<br>1=enable<br>Default=0 |
| | | SJ | Triggering source of parking alarm | xxxx (hex digits) | Bit 1=Din1<br>Bit 7=Motion Sensor<br>Bit 13=ACC<br>Default=2080 |
| | | SK | Report media of parking alarm | Media type | Please refer to 2.9 report media<br>Default=02, TCP |
| | | SL | Action type of | Action | Please refer to 2.10 action type |

| | | | | | |
|---|---|---|---|---|---|
| | | | parking alarm | type | Default=0000000000 |
| | | | | | |
| | Geo-fence | K0 | Geo-fence enable | 1/0 | 0=disable<br>1=enable<br>Default=0 |
| | | K1 | Enable/disable autonomous geo-fence | 1/0 | 0=disable<br>1=enable<br>Default=0 |
| | | K2 | Autonomous geo-fence radius | u32, in meter | 30~4Giga<br>Default=100 |
| | | K3 | Geo-fence alarm report Media | Media type | bit0=SMS<br>bit1=TCP<br>bit2=UDP<br>Default=02, TCP |
| | | K4 | Report media for reading Geo-fence data | Media type | bit1=TCP<br>bit2=UDP<br>bit6=debug port<br>Default=20, debug port |
| | | K6 | Action for geo-fence alarm | Action type | Please refer to section 2.10 for detail.<br>Default= 0000000000 |
| | | K7 | Action for autonomous geo-fence alarm | Action type | Please refer to section 2.10 for detail.<br>Default= 0000000000 |
| | | | | | |
| Tracking | Ping | OD | Report media for ping | Media type | bit0=SMS<br>bit1=TCP<br>bit2=UDP<br>Default=02 |
| | | OS | GPS fix time between receiving ping command and sending out ping report | u16, in seconds | For N1 & L4 command. If OS=0, GPS fix time=C3 |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |
| | Tracking (Static state) | Ra | Report interval in static state | u32, in seconds | 0, 3 ~ 4Giga<br>0=disable<br>Default=3,600 |
| | | Rb | Report media in static state | Media type | bit0=SMS<br>bit1=TCP<br>bit2=UDP<br>Default=02, TCP |
| | | Rc | Action for static report | Action type | Please refer to section 2.10 for detail.<br>Default=0000000000 |
| | | Rd | GPS always on in static state | 1/0 | 0=disable<br>1=enable<br>Default=0 |
| | | Re | Turn off 3G in static state | 1/0 | 0=turn on 3G module<br>1=turn off 3G module<br>Default=0 |
| | | Rf | Keep 3G/GPRS on-line in static state | 1/0 | Available when Re=0<br>0=disable<br>1=enable<br>Default=0 |
| | | | | | |
| | Tracking (Moving state) | Qe | Enable ACC on as moving state | 1/0 | 0=disable<br>1=enable<br>Default=0 |
| | | Ri | Report interval in moving state | u32, in seconds | 0, 3 ~ 4 Giga<br>0=disable<br>Default=30 |
| | | Rj | Report media in moving state | Media type | bit0=SMS<br>bit1=TCP<br>bit2=UDP<br>Default=02, TCP |
| | | Rk | Action for moving report | Action type | Please refer to section 2.10 for detail.<br>Default=0000000000 |
| | | Rl | GPS always on in | 1/0 | 0=disable |

| | | | | | |
|---|---|---|---|---|---|
| | | | moving state | | 1=enable<br>Default=1 |
| | | Rn | Keep 3G/GPRS on-line in moving state | 1/0 | 0=disable<br>1=enable<br>Default=0 |
| | | Ro | Traveled distance for sending report | u32, in meters | 0, 50 ~ 4 Giga<br>0=disable<br>Default=0 |
| | | Rp | Traveled distance to be judged as keep in moving state | u16, in meter | 0, 50 ~ 4 Giga<br>0=disable<br>Default=0 |
| | | S8 | Angle Change | u8, in degree | 0~180 degree<br>Default=30<br>0=disable angle change |
| | | | | | |
| | Tracking (Switching state) | Rs | Report Media for switching from static to moving state | Media type | bit0=SMS<br>bit1=TCP<br>bit2=UDP<br>Default=02, TCP |
| | | Rt | Report Media for switching from moving to static state | Media type | bit0=SMS<br>bit1=TCP<br>bit2=UDP<br>Default=02, TCP |
| | | Ru | Action for switching from static to moving state | Action type | Please refer to section 2.10 for detail.<br>Default=0000000000 |
| | | Rv | Action for switching from moving to static state | Action type | Please refer to section 2.10 for detail.<br>Default=0 |
| | | Rw | Minimum distance to be judged as moving state | u16, in meters | 0, 30 ~ 65535<br>0=disable<br>Default=0 |
| | | Rx | Interval for switching from | u16, in seconds | 0=Interval is the same with Ri<br>3~65535 |

| | | | | | |
|---|---|---|---|---|---|
| | | | validation to static state if no motion detected | | Default=0 |
| | | Ry | Interval for switching from moving to static state if no motion detected | u16, in seconds | 0=Interval is the same with Ri<br>3~65535<br>Default=0 |
| | | Rz | Interval for triggering G-sensor | u16, in seconds | 0=disable<br>Default=5 |
| | | Gt | G-sensor sensitivity | u8 | 5=high, 10=medium, 25=low<br>Default=5 |
| | | | | | |
| Timer | Timer 0 | W0 | Start time | u32, in seconds | 0 ~ 86399<br>Default=0 |
| | | W1 | End time | u32, in seconds | 1 ~ 86400<br>Default=86400 |
| | | W2 | Report interval of Timer 0 | u16, in seconds | 1 ~ 65535<br>Default=3,600 |
| | | W3 | Weekday mask | u8, xx(hex digits) | 00 ~ 7f<br>Weekday is in hex-digit format which specifies applicable day in a week, where bit 0 represents Sunday, bit1 represents Monday, etc.<br>Default=00 |
| | | W4 | Report Media of Timer 0 | Media type | bit0=SMS<br>bit1=TCP<br>bit2=UDP<br>Default=02 |
| | | W5 | Action of Timer 0 | Action type | Please refer to section 2.10 for detail.<br>Default=0000000000 |
| | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| | Timer 1 | X0 | Start time | u32, in seconds | 0 ~ 86399<br>Default=0 |
| | | X1 | End time | u32, in seconds | 1 ~ 86400<br>Default=86400 |
| | | X2 | Report interval of Timer 1 | u16, in seconds | 1 ~ 65535<br>Default=3600 |
| | | X3 | Weekday mask | u8, xx(hex digits) | 00 ~ 7f<br>Weekday is in hex-digit format which specifies applicable day in a week, where bit 0 represents Sunday, bit1 represents Monday, etc.<br>Default=00 |
| | | X4 | Report Media of Timer 1 | Media type | bit0=SMS<br>bit1=TCP<br>bit2=UDP<br>Default=02, TCP |
| | | X5 | Action of Timer 1 | Action type | Please refer to section 2.10 for detail. |
| | | | | | |
| | Timer 2 | Y0 | Start time | u32, in seconds | 0 ~ 86399<br>Default=0 |
| | | Y1 | End time | u32, in seconds | 1 ~ 86400<br>Default=86400 |
| | | Y2 | Report interval of Timer 2 | u16, in seconds | 1 ~ 65535<br>Default=3600 |
| | | Y3 | Weekday mask | u8, xx(hex digits) | 00 ~ 7f<br>Weekday is in hex-digit format which specifies applicable day in a week, where bit 0 represents Sunday, bit1 represents Monday, etc. |
| | | Y4 | Report Media of Timer 2 | Media type | bit0=SMS<br>bit1=TCP<br>bit2=UDP |
| | | Y5 | Action of Timer 2 | Action type | Please refer to section 2.10 for detail. |
| | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Stopwatch | Stopwatch 0 | WA | Report interval of stopwatch 0 | u32, in seconds | 0, 3~4Giga<br>Default=60 |
| | | WB | Number of stopwatch 0 report | u8 | 0=continuous<br>Default=1 |
| | | WC | Report media of stopwatch 0 | Media type | bit0=SMS<br>bit1=TCP<br>bit2=UDP<br>Default=02, TCP |
| | | WD | Action of stopwatch 0 | Action type | Please refer to section 2.10 for detail.<br>Default=0000000000 |
| | | WE | Enable/disable stopwatch 0 | 1/0 | 0=disable stopwatch<br>1=enable stopwatch<br>Default=0 |
| | | | | | |
| | Stopwatch 1 | XA | Report interval of stopwatch 1 | u32, in seconds | 0, 3~4Giga<br>Default=60 |
| | | XB | Number of stopwatch 1 report | u8 | 0=continuous<br>Default=1 |
| | | XC | Report media of stopwatch 1 | Media type | bit0=SMS<br>bit1=TCP<br>bit2=UDP<br>Default=02, TCP |
| | | XD | Action of stopwatch 1 | Action type | Please refer to section 2.10 for detail.<br>Default=0000000000 |
| | | XE | Enable/disable stopwatch 1 | 1/0 | 0=disable stopwatch<br>1=enable stopwatch<br>Default=0 |
| | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Counter | Counter 0 | Pa | Occurring frequency for counter 0 to report/ make action | u32, | 0=no action/ report<br>Default=0 |
| | | Pb | Automatically reset counter | 1/0 | 1=enable<br>0=disable<br>Default=0 |
| | | Pc | Report media of counter | Media type | bit0=SMS<br>bit1=TCP<br>bit2=UDP<br>Default=02, TCP |
| | | Pd | Action for counter | Action type | Please refer to section 2.10 for detail.<br>Default=0000000000 |
| | | | | | |
| | Counter 1 | Pg | Occurring frequency for counter 1 to report/ make action | u32, | 0=no action/ report<br>Default=0 |
| | | Ph | Automatically reset counter | 1/0 | 1=enable<br>0=disable<br>Default=0 |
| | | Pi | Report media of counter | Media type | bit0=SMS<br>bit1=TCP<br>bit2=UDP<br>Default=02, TCP |
| | | Pj | Action for counter | Action type | Please refer to section 2.10 for detail.<br>Default=0000000000 |
| | | | | | |
| Odometer | | PA | Traveled GPS distance for odometer to report / make | u32, in meters | 0, 50~4Giga<br>Default=0 |

| | | | | | |
|---|---|---|---|---|---|
| | | | action. | | |
| | | PC | Report media of odometer | Media type | bit0=SMS<br>bit1=TCP<br>bit2=UDP<br>Default=02, TCP |
| | | PD | Action for odometer | Action type | Please refer to section 2.10 for detail.<br>Default=0000000000 |
| | | PE | Enable/ disable odometer | 1/0 | 0=disable<br>1=enable<br>Default=1 |
| | | | | | |
| IO Port | Analog Input | QA | Upper threshold of analog input | u16, in mV | 0=no trigger<br>Default=0 |
| | | QB | Lower threshold of analog input | u16, In mV | 0=no trigger<br>Default=0 |
| | | QC | Report media of analog input | Media type | bit0=SMS<br>bit1=TCP<br>bit2=UDP<br>Default=02, TCP |
| | | QD | Action for analog input | Action type | Please refer to section 2.10 for detail.<br>Default=0000000000 |
| | | QE | Check interval | u16, in seconds | 0=disable<br>Default=0 |
| | | | | | |
| | ACC Input | Qa | Report media when ACC input is activated | Media type | bit0=SMS<br>bit1=TCP<br>bit2=UDP<br>Default=02, TCP |
| | | Qb | Report media when ACC input goes inactive | Media type | bit0=SMS<br>bit1=TCP<br>bit2=UDP<br>Default=02, TCP |
| | | Qc | Action when ACC input is | Action type | Please refer to section 2.10 for detail. |

| | | | | | |
|---|---|---|---|---|---|
| | | | activated | | Default=0000000000 |
| | | Qd | Action when ACC input goes inactive | Action type | Please refer to section 2.10 for detail.<br>Default=0000000000 |
| | | | | | |
| | Digital Input | Qg | Report media when digital input is activated | Media type | bit0=SMS<br>bit1=TCP<br>bit2=UDP<br>Default=02, TCP |
| | | Qh | Report media when digital input goes inactive | Media type | bit0=SMS<br>bit1=TCP<br>bit2=UDP<br>Default=02, TCP |
| | | Qi | Action when digital input is activated | Action type | Please refer to section 2.10 for detail.<br>Default=0000000000 |
| | | Qj | Action when digital input goes inactive | Action type | Please refer to section 2.10 for detail.<br>Default=0000000000 |
| | | | | | |
| | Digital input all | Qy | Digital input status | xx(hex digit) | Read only |
| | Digital output all | Qz | Digital output status | xx(hex digit) | (0=inactive, 1=active)<br>Default=00 |

## 2.8 Code word of Command

**Commands are used to control the device activity. A command message is composed of one or several command code word. Each command codeword can incorporate configuration parameter setting. Please refer to section 2.4 for message format. Command message could be sent by SMS or TCP or UDP.**

| Command's Codeword | | |
|---|---|---|
| **Codeword** | **Parameters** | **Description** |
| **M4** | Restart motion sensor activity | |
| | | |
| **N1** | Ping device | |
| **N6** | Enable Geo-fence | |
| **N7** | Disable Geo-fence | |
| **Na** | Dismiss Emergency alarm | |
| **Ne** | Dismiss geo-fence alarm | |
| **Nk** | Enable autonomous geo-fence | |
| **Nl** | Disable autonomous geo-fence | |
| **Nm** | Dismiss autonomous geo-fence alarm | |
| | | |
| **L1** | Read Configuration | Adding up to 1-5 parameters.<br>If parameter=(ALL), then all user configuration data will be reported. |
| **L3** | Read Geo-fence | |
| **L4** | Make GTR-388 connect to Server | |
| **L5** | Disconnect from Server | |
| **LA** | Restore default configuration | No argument: Restore all parameters to default setting. |
| **LH** | Reset device | |

| | | |
|---|---|---|
| LJ | Send SMS message | (Phone number,“00SMS content”) |
| LN | Download file | (IP, port, user name, user password, type, file name, size)<br>Type:1=firmware |
| Lc | Counter control | (n,0/1), n=0~1, 0=clear, 1=increment |
| Ld | Odometer control | (C)=clear, (D)=disable, (E)=enable |
| Lo | Digital output control | (n,0/1),<br>n=digital output,<br>0=deactivate, 1=activate |

**Example: Ask GTR-388 to send configuration parameters.**
**GSC,123456789012345,L1(Ra,Rb,Rc,Ri,Rj)*2a!**

**Example: Ask GTR-388 to restore default configuration.**
**GSC,123456789012345,LA*6a!**

**Example: Ask GTR-388 to send SMS message to 0918518518.**
**GSC,123456789012345,LJ(0918518518,”Please call service center ASAP.”)*3b!**

**Example: Ask GTR-388 to clear counter 0 & counter 1.**
**GSC,123456789012345,Lc(0,0),Lc(1,0)*4a!**

**Example: Ask GTR-388 to enable odometer and connect to server immediately.**
**GSC,123456789012345,Ld(E),L4*5f!**

**Example: Ask GTR-388 to activate digital output.**
**GSC,123456789012345,Lo(1,1)*69!**

# 2.9 Report Media

**Report media is the method that GTR-388 sends report. No matter how you send the command by SMS or TCP or UDP, GTR-388 will send the report according to the appropriate report media setting.**

| | | |
|---|---|---|
| **Report Media** | **Media type** | **bit0=SMS**<br>**bit1=TCP**<br>**bit2=UDP** |

**Bit 0: 1=send by SMS, 0=disable SMS report**
**Bit 1: 1=send by TCP, 0=disable TCP report**
**Bit 2: 1=send by UDP, 0=disable UDP report**
**A report media byte is represented by 2 hex digits. Unused bits must be set to 0.**

| | | Report Media Type | | | | | |
|---|---|---|---|---|---|---|---|
| **bit** | **6** | **5** | **4** | **3** | **2=UDP** | **1=TCP** | **0=SMS** |
| **Ex 1**<br>**TCP by format 0** | **0** | **0** | **0** | **0** | **0** | **1** | **0** |
| **Ex 2**<br>**UDP by format 1** | **0** | **0** | **0** | **0** | **1** | **0** | **0** |
| **Ex 3**<br>**UDP by format 0** | **0** | **0** | **0** | **0** | **1** | **0** | **0** |

**Example 1: Ask GTR-388 to send motion report with report static interval of 5 minutes (Ra=300) and report format 0 to TCP server (Rb=02).**
**GSC,011412000010789,M4(Ra=300,Rb=02)*01!**

**Example 2: Ask GTR-388 to send static report with report interval of 7 minutes (Ra=420) by format 1 (Rb=84) and moving report with interval of 20 seconds (Ri=20) with format 0(Rj=04), to UDP server.**
**GSC,011412000010789,M4(Ra=420,Rb=84,Ri=20,Rj=04)*2f!**

# 2.10 Action type

**There are several events that will trigger defined actions. Those events include digital input transition, analog input exceeding a threshold, detecting motion, high speed alarm, geo-fence alarm, battery low alarm, etc. Please refer to configuration parameters that are of action type.**

**Action type is used to define the activity when the event happens. Please refer to the following table for possible activities. Action type is represented by 2 hex digits.**

**For example, if you want to measure the occurring frequency of high speed alarm, you could set the action type of high speed alarm to be increment counter0. The parameter could be set as SE=A8. (SE is the configuration parameter of high speed alarm. A8 is the code of increment counter0).**

| Action type | Code |
|---|---|
| Disable stopwatch 0~1 | 84H~85H |
| Enable stopwatch 0~1 | 8CH~8DH |
| Clear counter 0~1 | A0H~A1H |
| Increment counter 0~1 | A8H~A9H |
| Reset digital output | C1H |
| Set digital output | C9H |
| Clear odometer | 40H |
| Disable odometer | 42H |
| Enable odometer | 43H |
| Turn off tracker | 44H |
| Turn on tracker | 45H |
| Disable autonomous geo-fence | 48H |
| Enable autonomous geo-fence | 49H |
| Reset 3G module | 4AH |
| Reset Device | 4BH |

**Example 1: Ask GTR-388 to increment counter 0 (SE=A8) when the speed is over 70 km/hr (SA=70).**
**GSS,10339376540375,3,0,SA=70,SE=A8*18!**

## 2.11 Checksum

**The checksum value is derived by the same method of NMEA standard. It is calculated by 'exclusive OR' the 8 data bits of each character before "*" in the sentence, but excluding "*". The hexadecimal value of the most significant and least significant 4 bits of the result are converted to two ASCII characters (0-9, A-F) for transmission. The most significant character is transmitted first.**

**Example1:** set the device whose IMEI is 011412000011274, the APN is internet, the user name and password are not necessary, the server type is TCP, the server IP is 220.128.207.75, the server port number 3000.
The setup command is
**GSS,011412000011274,3,1,D1=internet,D2=,D3=,D8=02,E0=220.128.207.75,E1=3000*5E!**
**The checksum is 5E.**

**Example2:** Set GTR-388 periodic report and ask it to report based on traveled distance (Ro) of 500 meters
The setup command is
**GSC,011412000010789,M4(Ro=500)*2a!**
**The checksum is 2a.**

# 3 Configuration

**GTR-388 has a very flexible platform. Its behavior is totally configurable. Please refer to section 2.7 for the list of configuration parameters.**

# 3.1 Read parameters of configuration

**The PC tool "GTR-388ConfigTool_DEV.exe" is used to configure the device by RS-232 interface. You could also send L1 command to remotely read back the setting by TCP or UDP protocol.**

**Please note GTR-388 could NOT send back the configuration parameter by SMS.**

**Command's format:**

**GSC,IMEI,L1(x1,x2,x3,x4,x5)*Checksum!**

**GSC,IMEI,L1(ALL)*Checksum!**

**Add up to 1-5 parameters.**

**If parameter =(ALL), then all user configuration data will be generated.**

**Report format:**

**GSs,IMEI,T,S,x1=y1,x2=y2,x3=y3,……*Checksum!**

**x1,x2,x3… are code words for configuration parameters.**

**y1,y2,y3… are their respective settings.**

**Example 1:**

**Ask GTR-388 report parameters of speed limits(SA, SB, SC, SD, SE)**

**GSC,136489586301578,L1(SA,SB,SC,SD,SE)*0b!**

**Report parameters SA,SB,SC,SD,SE, from GTR-388**

**GSs,136489586301578,3,0,SA=100,SB=40,SC=5,SD=02,SE=A8*3f!**

# 3.2 Set parameters of configuration

**The setting of configuration parameters could be changed by the following methods.**

- **Connect GTR-388 to personal computer via RS-232 cable and then set the configuration parameters by configuration tool.**
- **Send the "GSS,….!" setting with the configuration parameters to GTR-388**
- **Send the "GSC,….!" command with the configuration parameters to GTR-388**

**All the settings or commands could be sent by SMS or TCP or UDP.**

**Command format:**

**GSS,IMEI,T,S,x1=y1,x2=y2,x3=y3,……,*Checksum!**

**x1,x2,x3… are code words for configuration parameters.**
**y1,y2,y3… are their respective settings.**
**Example 1:**

**Set parameters of 3G/GPRS setting (D1,E0,E1)**

| Codeword | Parameters | Value |
|---|---|---|
| D1 | APN | Internet |
| E0 | Host IP | 201.89.56.207 |
| E1 | Host Port number | 5000 |

**GSS,138785469589531,3,0,D1=internet,E0=201.89.56.207,E1=5000*01!**

**Example 2:**
**Ping GTR-388 and set parameters of Timer 1: Start time: 09:00 AM (X0=32400), End time: 06:00 PM (X1=64800), Report interval: 1 hour (X2=3600), Report day: from Monday ~Friday (X3=3E)**

**GSC,011412000012789,N1(X0=32400,X1=64800,X2=3600,X3=3E)*4b!**

# 4. 3G & GPRS

## 4.1 3G/GPRS Setting

**In order to activate the communication between server and device, the 3G/GPRS parameter is necessary to be set at the beginning. The 3G/GPRS parameters are listed as the table below. Please contact with your telecom operator for the APN, user name, and password.**
**Please contact your ISP provider for DNS.**

| | | | | |
|---|---|---|---|---|
| 3G/GPRS | D1 | APN | char(32) | |
| | D2 | User Name | char(32) | |
| | D3 | Password | char(32) | |
| | D4 | DNS | char(32) | |
| | E0 | Host IP or domain name | char(32) | Fixed IP or domain name |
| | E1 | Host Port number | u16 | |

***Note:***
1. If user name and password are not necessary for your telecom operator, please keep D2 and D3 blank.
2. If the value of E0 is an IP, then you do not have to set D4. Please skip the fields.

The setup format of 3G/GPRS setting is
"**GSS,IMEI,T,S,D1=y1,D2=y2,D3=y3,D4=y4,D8=y6,E0=y7,E1=y8,*Checksum!"**

For example, set the device whose IMEI is 011412000010789, the APN is internet, the user name and password are not necessary, the server type is TCP, the server IP is 220.128.207.75, the server port number is 5000.
The setup command is
**GSS,011412000010789,3,0,D1=internet,D2=,D3=,D8=02,E0=220.128.207.75,E1=5000*5f!**

# 4.2 Acknowledgement

**Acknowledgement is the acknowledge receipt used to confirm if server or device receives the command or report from each other.**

| Code word | Parameters | Value | Description |
|---|---|---|---|
| A0 | Send confirmation to server after receiving command from server | 1/0 | 1=Enable<br>0=Disable<br>Default=1 |
| A1 | Wait confirmation from server after sending message to server | 1/0 | 1=Enable<br>0=Disable<br>Confirmation message="ACK\r"<br>Default=0 |
| A2 | Timeout of waiting confirmation from server | u8 | 1~255<br>Default=5 |
| A3 | Device ACK with ID string | 1/0 | 0=without ID string<br>1=with ID string<br>Default=0 |
| A4 | ID string is IMEI or device ID | 1/0 | 1=IMEI, 0=Device ID<br>Default=1<br>Available when A3=1 |

**The confirmation message from the device is defined in the table below.**

| A0 | A3 | A4 | Confirmation message |
|---|---|---|---|
| 0 | x | x | No confirmation required |
| 1 | 0 | x | “ACK\r” |
| 1 | 1 | 0 | ”Device ID, ACK\r” |
| 1 | 1 | 1 | ”IMEI, ACK\r” |

**Note: “Device ID” is defined by O5.**

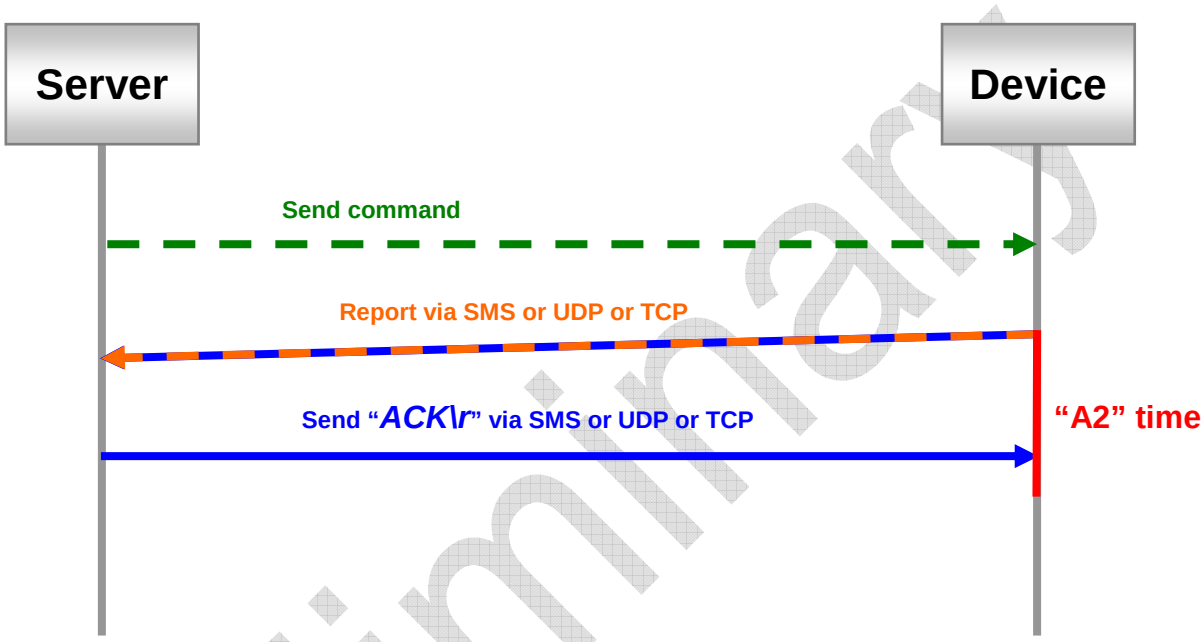
**For example, set A0=1, A1=1, A3=1, A4=1, server sends command to GTR-388 whose IMEI is 011412000010789. After receiving command, GTR-388 will send acknowledgement receipt as “011412000010789,ACK\r”**

**For example, set A0=1, A1=1, A3=1, A4=0 and O5=”Globalsat” (device ID). After receiving command, GTR-388 will send acknowledgement receipt as “Globalsat,ACK\r”**

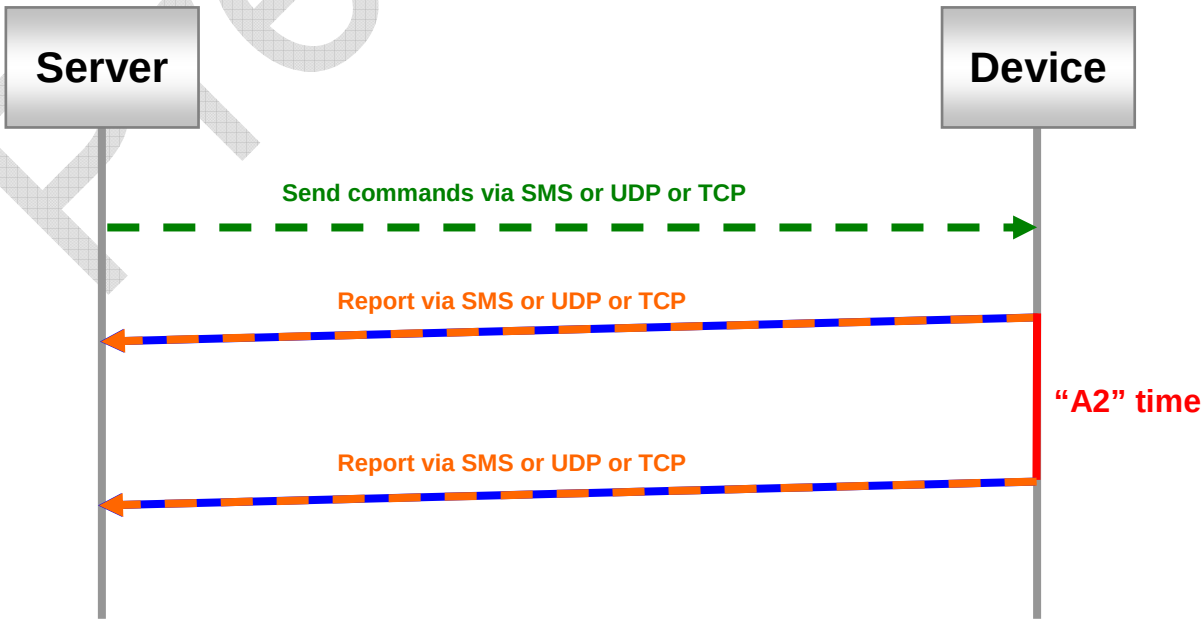
**For example, set A0=1, A1=1, A3=0. After receiving the command, GTR-388 will send acknowledgement receipt as "ACK\r"**

### 4.2.1 Receive Acknowledgement from Server

**Received ACK from server during "A2" time:**

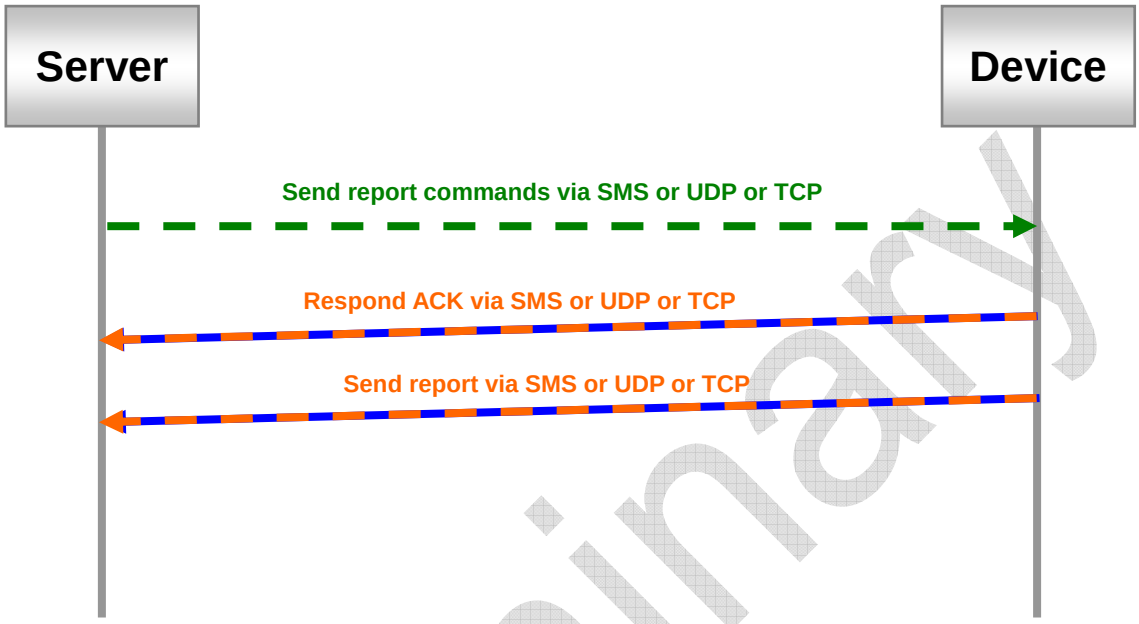



**Didn't receive ACK from server during "A2" time:**

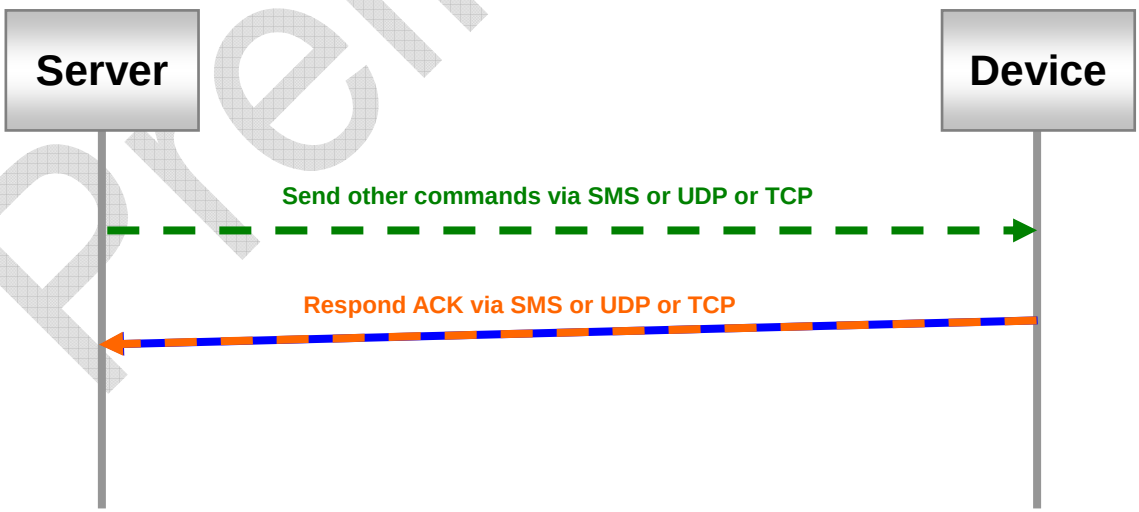


## 4.2.2 Respond Acknowledgement to Server

**Receive report command from server:**




**Receive other command from server:**



# 4.3 3G/GPRS connection

**If 'Rn' is set in moving state or 'Rf' is set in static state, then GTR-388 will try to keep 3G/GPRS always on-line. The device will check the connection periodically. The period is defined by 'E5'. If the connection is lost, the device will try to connect again. If 'E6' is set, device will send "OK" message when connection is recovered.**

**If the connection is kept for a long time without sending any message, telecom carrier may terminate the connection intentionally. In some worst conditions, the carrier may even reject further request for connection. Setting of 'E4' is used to overcome this issue. GTR-388 will disconnect and then re-connect after it has been on-line for the time defined by 'E4'.**

**If the "always on-line" setting is not set, GTR-388 will establish 3G/GPRS connection when it wants to send UDP or TCP reports. After the report has been sent out, the device will keep 3G/GPRS connected for the interval defined by 'EA'. Server can send message to device in the interval and the connection will be extended further for 'EA' time.**

**In certain circumstance the server may want the device to setup3G/GPRS connection for receiving command or configuration messages. 'L4' command is used to achieve the purpose. GTR-388 will connect to server immediately when getting L4 command. After the connection is established, GTR-388 will keep on-line for an interval defined by E7. Server can send commands or configure the device during the interval. If there's no message received during the interval, the connection will be terminated. If there is a message received in the interval, the connection will be extended for another E7 time. Server can send L5 command to terminate the connection immediately.**

**The related configuration parameters are listed in the table below.**

| Code word | Parameters | Value | Description |
|---|---|---|---|
| D8 | Report Media for link to server command (L4) | 02=TCP<br>04=UDP | Connection protocol for always on-line and "L4" command.<br>Default=02 |
| E4 | Interval in on-line state for | u16, in | 0=disable |

| | | | |
|---|---|---|---|
| | disconnecting and then re-connecting | seconds | Default=0 |
| E5 | Interval for checking if 3G/GPRS connection is on-line. If 3G/GPRS connection is cut, GTR-388/ will try to connect to server for one time. | u16, in seconds | 0=disable<br>Default=60 |
| E6 | Enable/disable GTR-388 to send “IMEI,OK” to server after 3G/GPRS connection is re-built. | 1/0 | 0=disable<br>1=enable<br>Available when E5 is not 0<br>Default=0 |
| E7 | Timeout of L4 connection | u16, in seconds | >=2, default=30 |
| EA | Time for keeping 3G/GPRS connection after sending report | u8, in seconds | >=2, default=2 |
| Rf | Keep 3G/GPRS on-line in static state | 0/1 | 0=disable<br>1=enable<br>Default=0 |
| Rn | Keep 3G/GPRS on-line in moving state | 0/1 | 0=disable<br>1=enable<br>Default=0 |

**Command format:**

**GSC,IMEI,L4*Checksum!**

| Command Codeword | Parameters |
|---|---|
| L4 | Connect to server |

**Example: Ask GTR-388 to connect to server by TCP.**

**GSC,123456789012345,L4(D8=02)*5d!**

# 5 GPS

**In the general tracking modes, GTR-388 will turn on GPS when it needs to generate a report. The pre-on time is controlled by C1 or C2, depending on last GPS fix is available or not. Since GPS is most power consuming module, the device will automatically turn off GPS when its information is not needed. You may set GPS always on if power consumption is not a critical issue.**

**There are some functions that depend on GPS information to work, such as**

1. **Report based on traveled distance in the motion report, sleeping report**
2. **Speed limit**
3. **Geo-fence**
4. **Odometer**

**For those functions to work properly, GPS has to be turned on intentionally.**

| Code word | Parameter | Value | Description |
|---|---|---|---|
| C1 | The time for starting to get GPS fix before the next report time if GTR-388 does not get GPS fix in last report, or got GPS fix for 1 hour ago | u16, in seconds | 60 ~ 600<br>Default=180<br>Note: GTR-388 will send out the report whether it gets GPS fix or not when C1 time ends. |
| C2 | The time for starting to get GPS fix before the next report time if GTR-388 got GPS fix within 1 hour | u16, in seconds | 10 ~ 120<br>Default=60<br>Note: GTR-388 will send out the report whether it gets GPS fix or not when C2 time ends. |
| C3 | GPS fix time before sending out the first report | u16, in seconds | 0 ~ 600<br>Default=5<br>If "C3"=0, disable first report message. |
| Rd | GPS always on in static state | 1/0 | 0=disable<br>1=enable<br>Default=0 |
| Rl | GPS always on in moving | 1/0 | 0=disable |

| | | | |
|---|---|---|---|
| | state | | 1=enable<br>Default=1 |

**C1 example, the next report time is 10:00:00 and GTR-388 does not get GPS fix in last report, C1 is 180 seconds. GTR-388 will start to get GPS fix at 9:57:00 and send out report at 10:00:00.**

**C2 example, the next report time is 10:00:00 and GTR-388 got GPS fix within 1 hour, C2 is 20 seconds. GTR-388 will start to get GPS fix at 9:59:40 and send out report at 10:00:00.**

**C3 example, If C3=10 seconds and GTR-388 is in the static state. When GTR-388 is moved, it will switch to moving state and try to get GPS fix for 10 seconds. Then it sends motion moving report to notify the motion event.**

# 6 Tracking

## 6.1 Ping Report

**Ping function is for getting the present location and status of GTR-388. The command is N1. Please set the tolerance time for GTR-388 to get fixed before sending out the report by the parameter OS. GTR-388 will turn on GPS once N1 command is received. If GTR-388 gets GPS fix within OS time, it will send ping report as soon as it gets GPS fix. If it cannot get GPS fix within the allowed time, it will send out the report at the end of OS time. The report type of ping is '1'.**

| Code word | Parameters | Value | Description |
|---|---|---|---|
| OD | Report media for ping (N1) report | Media type | Please refer to section 2.9 Report media<br>Default=02 TCP |
| OS | Longest time for GPS fix between receiving ping command and sending out ping (N1) report | u16, in seconds | If OS=0, GPS fix time=C3<br>Default=30 |

**Command format:**

**GSC,IMEI,N1*Checksum!**

| Command Code word | Parameters |
|---|---|
| N1 | Ping device |

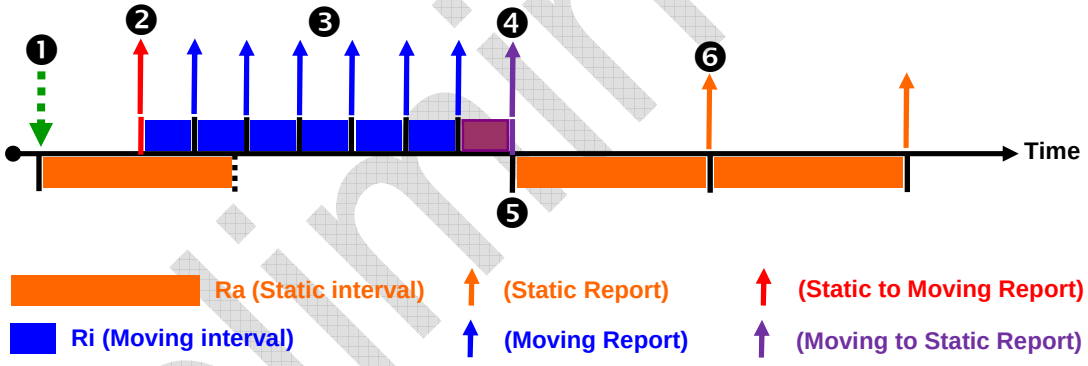
**Example 1: Ping GTR-388 location and ask it to report via SMS no later than 20 seconds.**

**GSC,135785412249986,N1(OD=01,OS=20)*23!**

# 6.2 Motion Report

GTR-388 has built in a motion sensor to detect the movement or vibration. Using this feature, the device can work in moving state or static state. In addition to G-sensor, GTR-388 can also switch to moving state when ACC is on. You could enable ACC on as moving state by setting parameter Qe=1. When Qe=1, GTR-388 would send report and trigger action periodically according to the parameter Ri. Each state has independent parameters to control the behavior.

Basically, GTR-388 will send report and trigger action periodically according to the interval defined for the working state. You may set a short interval for moving state and a long interval for static state to save transmission fee.




| | |
|---|---|
| ❶ | Static state report. |
| ❷ | When GTR-388 detects motion, it will enter moving state and send “static to moving” report. |
| ❸ | Moving state report. |
| ❹ | When GTR-388 is static, it will send “moving to static” report and then return to the static state. |
| ❺ | Re-start timer for static interval. |
| ❻ | Static state report. |

In both states, GPS can be configured to be always on for GPS related function to work properly. The device will terminate 3G/GPRS connection after sending reports. But you may set 3G/GPRS to be always on-line so that server can send message to device at any time. Please refer to section “4.3 3G/GPRS connection” for the usage of always on-line connection.

3G/GPRS can be configured to be off in static state to save battery power. The device

**will turn 3G/GPRS on to send report and then turn it off after report has been sent.**

**In moving state, the traveled distance can be considered to generate report as well as report interval, whatever criterion is matched first. Then the report is sent and the device re-starts to check distance and interval. You may need to keep GPS on for this function to work. Please refer to "Chapter 5 GPS" for detail.**

**If the motion sensor is triggered by a short vibration pulse in static state, you may configure the device to watch for further vibration before switching to moving state. An intermediate state called validation state is used to confirm the movement. If the moving distance exceeds the threshold (Rw) within allowable time window (Rx), the device will switch to moving state. Otherwise it will return to static state. Validation state can be disabled by setting Rw=0.**

**Traveled distance can be used as a motion syndrome in moving state. If the traveled distance exceeds the threshold (Rp) within time window (Ry), the device will keep in moving state. Setting Rp=0 will disable the distance check.**

**You may configure parameters to send report and/or trigger action for state transition.**

**If report interval is set to 0, GTR-388 will not send report. Action will not be triggered if action type is set to 00.**

**Parameter 'Gt' is used to control the sensitivity of G-sensor. The larger the value is, the less sensitive the sensor is.**
**The report type of static report is '4'.**
**The report type of moving report is '5'.**
**The report type of static to moving report is '6'.**
**The report type of moving to static report is '7'.**
**The related parameters are listed below.**

| State | Code word | Parameters | Value | Description |
|---|---|---|---|---|
| Static state | Ra | Report interval in static state | u32, in seconds | 0, 15~4 Giga seconds<br>Default=3,600 |
| | Rb | Report Media in static state | Media type | Please refer to 2.9 Report media<br>Default=02 TCP |

| | | | | |
|---|---|---|---|---|
| | Rc | Action for static state | Action type | Please refer to 2.10 Action type Default=0000000000 |
| | Rd | GPS always on in static state | 1/0 | 1=enable, 0=disable Default=0 |
| | Re | Turn off GSM module in static state | 1/0 | 0=turn on GSM 1=turn off GSM Default=0 |
| | Rf | Keep 3G/GPRS on-line in static state | 1/0 | Available when Re=0 0=disable 1=enable Default=0 |
| Moving state | Qe | Enable ACC on as moving state | 1/0 | 0=disable 1=enable Default=0 |
| | Ri | Report interval in moving state | u32, in seconds | 0, 15~4 Giga seconds Default=30 |
| | Rj | Report Media in moving state | Media type | Please refer to 2.9 Report media Default=02, TCP |
| | Rk | Action for moving state | Action type | Please refer to 2.10 Action type Default=0000000000 |
| | Rl | GPS always on in moving state | 1/0 | 1=enable, 0=disable Default=1 |
| | Rn | Keep 3G/GPRS on-line in moving state | 1/0 | 0=disable 1=enable Default=0 |
| | Ro | Traveled distance for sending report in moving state | 0=disable 1~1000000 Unit: meter | Default=0 |
| | Rp | Traveled distance to be judged as keeping in moving state | u16, Unit: meter | 0=disable Default=0 |
| Changing state | Rs | Report media for changing from static to moving state | Media type | Please refer to 2.9 Report media Default=02, TCP |
| | Rt | Report media for changing | Media type | Please refer to 2.9 |

| | | | | |
|---|---|---|---|---|
| | | from moving to static state | | Report media<br>Default=02, TCP |
| | Ru | Action for changing from static to moving state | Action type | Please refer to 2.10 Action type<br>Default=0000000000 |
| | Rv | Action for changing from moving to static state | Action type | Please refer to 2.10 Action type<br>Default=0000000000 |
| | Rw | Minimum distance to be judged as moving state | u16,<br>Unit: meter | 0, 30~ 65535<br>0=disable<br>Default=0 |
| | Rx | Interval for switching from validation to static state if no motion detected | u16, in seconds | 0, 3~ 65535<br>0=Interval is the same with Ri |
| | Ry | Interval for switching from moving to static state if no motion detected | u16, in seconds | 0, 3~ 65535<br>0=Interval is the same with Ri |
| | Rz | Interval for triggering G-sensor | u16, in seconds | 0=disable<br>Default=5 |
| | Gt | G-sensor sensitivity | u8 | 5=high, 10=medium, 25=low<br>Default=5 |

**Example 1:**

**Set GTR-388 motion report with report interval of 3600 seconds for static state (Ra), report interval of 30 for moving state (Ri) and report media of static state (Rb) TCP, report media of moving state (Rj) TCP**

**GSS,130158974523157,3,0,Ra=3600,Ri=30,Rb=02,Rj=02*5d!**

**Example 2:**

**Ask GTR-388 to send TCP report periodically with interval=60 seconds, discarding the motion sensor.**

**GSS,130158974523157,3,0,Rz=0,Ra=60,Rb=02*55!**

**Example 3:**

**Set static report interval=7200 seconds, and turn off GSM at static state.**

**GSS,130158974523157,3,0, Ra=7200,Rb=02,Rc=00,Rd=0,Re=1,Rf=0*4a!**

### 6.2.1 Angle Change Setting

**In order to get sharp tracks with all corners, user could set GTR-388 to check angle value if speed is over 5 km/h in motion mode. Parameter 'S8' is for setting the angle change of GTR-388. The default of angle change is 30 degree. Setting the value of S8 to be 0 would disable the report of angle change. The report type of angle change report is 8.**

| Code word | Parameters | Value | Description |
|---|---|---|---|
| S8 | Angle Change | u8, in degree | 0~180 degree<br>Default=30<br>0=disable angle change |

# 7. Alert

## 7.1 Emergency

**When Emergency button is hold and pressed over 2 seconds, The Emergency flag of alarm status will be raised and GTR-388 will start to send emergency reports by SMS and/or TCP/UDP with the interval defined by 'H2'.**

**The SMS reports can be configured to send to maximum 6 sets of phone numbers. The number of reports is defined by 'H1'. If you'd like to stop Emergency report, please send "Na" command to GTR-388.**

**Emergency report can also be sent to server by TCP or UDP. The number of report is defined by 'H3'. If H3 is set to zero, then the report will be sent continuously until the Emergency flag is dismissed by server. The report type of emergency alarm is 'I'.**

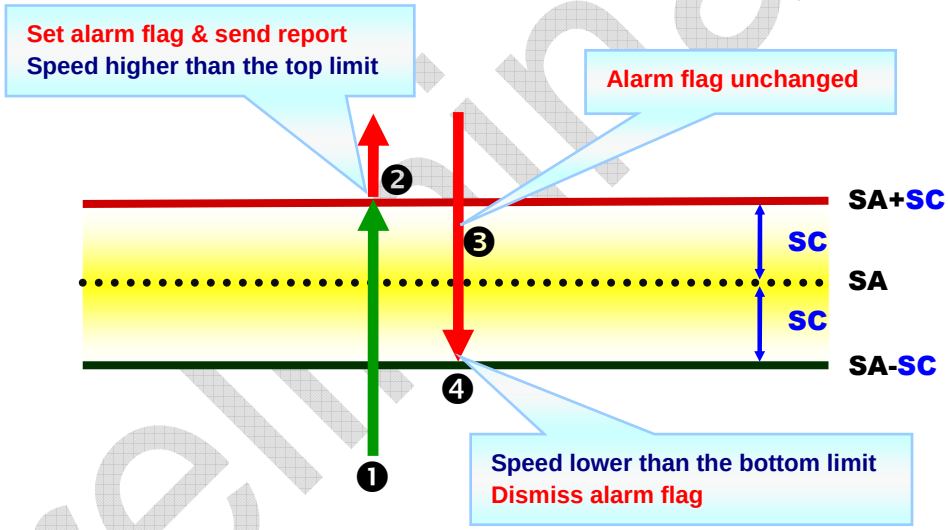
**The related parameters are listed in the following table:**

| Code word | Parameters | Value | Description |
|---|---|---|---|
| G0 | SMS Phone number 1 | char(20) | |
| G1 | SMS Phone number 2 | char(20) | |
| G2 | SMS Phone number 3 | char(20) | |
| G3 | SMS Phone number 4 | char(20) | |
| G4 | SMS Phone number 5 | char(20) | |
| G5 | SMS Phone number 6 | char(20) | |
| H0 | Report media | | Please refer to 2.9 Report media<br>Default=03, SMS+TCP |
| H1 | Report number of SMS | u16 | 1 ~ 65535<br>Default=1 |
| H2 | report interval | u16, in seconds | 3~ 65535<br>Default=30 |
| H3 | Report number of 3G/GPRS report | u8 | 0=continue sending Emergency alarm report till receive stop command |

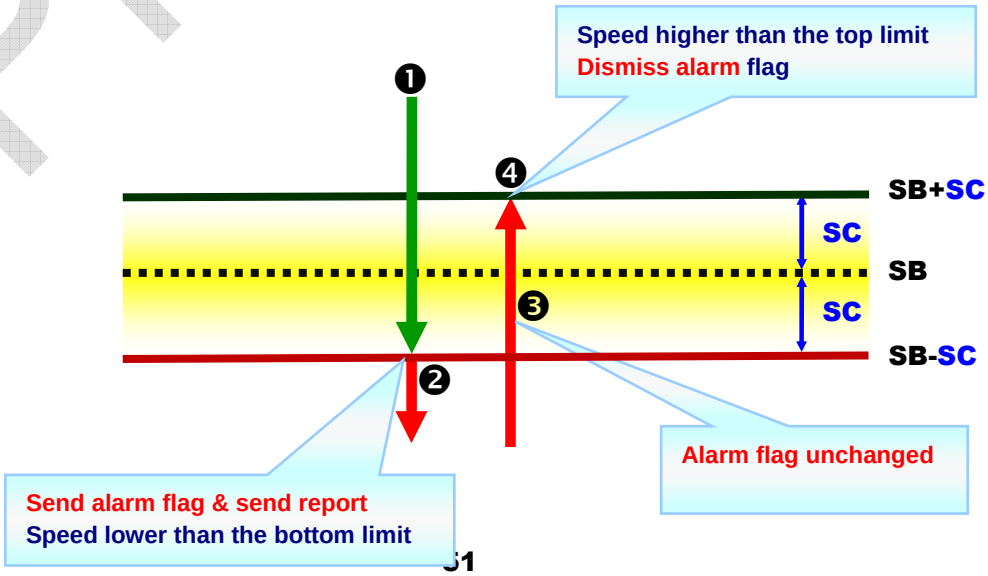
# 7.2 Speed Limits

**GTR-388 implements high speed alarm and low speed alarm. There're two parameters for the function to work. One is the speed limit (SA / SB). The other one is the hysteresis range. Once the speed alarm is detected, the alarm flag of alarm status is set, a report is sent and action is triggered. The alarm flag will be automatically dismissed if the alarm condition is disappeared. Speed alarm detection requires GPS information so the GPS should be turned on. The report type of speed alarm is 'K'. Please refer to chapter "5. GPS" for the setting. Please refer to the illustrations below for the detection behavior.**

## High Speed Limit




## Low Speed Limit



**The parameters of speed alarm are listed below.**

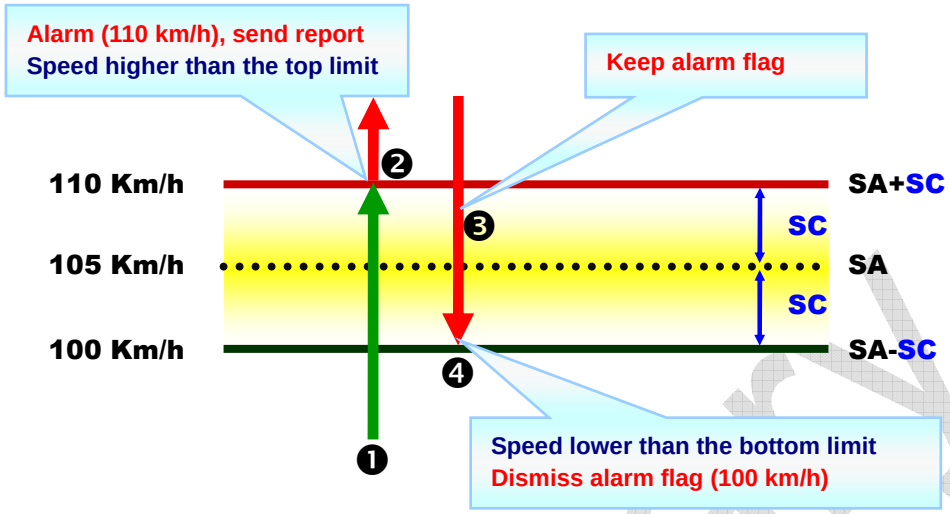
| Code word | Parameters | Value |
|---|---|---|
| SA | Upper limit of speed alarm | u8, in KmMH<br>0 ~ 255 KM/H<br>0=disable<br>Default=0 |
| SB | Lower limit of speed alarm | u8, in KM/H<br>0 ~ 255 KM/H<br>0=disable<br>Default=0 |
| SC | Hysteresis of speed alarm | u8, in KM/H<br>0 ~ 255 KM/H<br>Default=5 |
| SD | Report media of speed alarm | Please refer to 2.9 Report media<br>Default=02, TCP |
| SE | Action for high speed alarm | Please refer to 2.10 Action type.<br>Default=0000000000 |
| SF | Action for low speed alarm | Please refer to 2.10 Action type.<br>Default=0000000000 |

## 7.2.1 Enable Speed Limit Alert

**Example 1:**
**Set upper limit of speed alert**

**GSS,10339376540375,3,0,SA=105,SC=5,SD=02*65!**

The behavior is as follows:

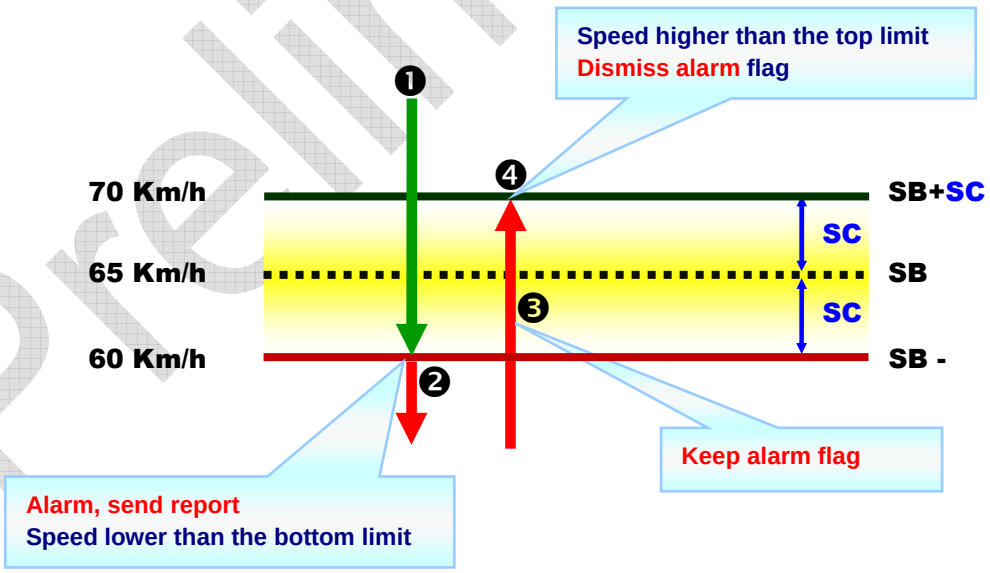



**Example 2:**

**Set lower limit of speed alert (Send command via SMS or TCP or UDP)**

**GSS,10339376540375,3,0,SB=65,SC=5,SD=02*51!**

The behavior is as follows:




## 7.2.2 Disable Speed Limit Alert

**Example 1:**

**Disable upper limit of speed alert**

**GSS,10339376540375,3,0,SA=0*51!**

**Example 2:**
**Disable lower limit of speed alert**

**GSS,10339376540375,3,0,SB=0*52!**

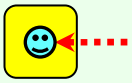
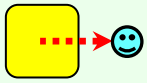
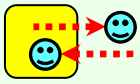
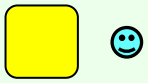
# 7.3 Geo-fence

**Geo-fence is for setting a rectangular area as permissible area or restricted area. When GTR-388 gets out of the permissible area or goes in to the restricted area, GTR-388 will send a report and/or trigger an action.**

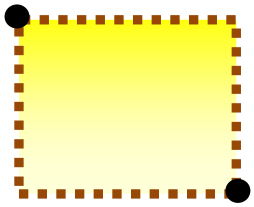
**Geo-fence function needs the information of GPS to check with the settings. Please refer to chapter "5. GPS" for the setting.**

**GTR-388 supports up to 8 sets of geo-fence areas. Each area could be configured and re-configured For example, after you set 10 sets of geo-fence areas. You could change the 7th geo-fence area setting independently.**

**Geo-fence area with type=0 is disabled. You could disable any one of the previously set geo-fence area by setting it again and change the alert type to be 0. The alert types of geo-fence are illustrated below.**

| Alert type of Geo-fence | | | | |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
| Get in area | Get out of area | Cross over the boundary | Stay in area | Stay out of area |
|  |  |  |  |  |

**(upper_left_Lon,upper_left_Lat)**



**(right_bottom_Lon,right_bottom_Lat)**

## 7.3.1 Setup Geo-fence

**A Geo-fence area is defined by several parameters.**

- **Area ID**
- **Left (west) longitude, Top (north) latitude**

- Right (east) longitude, Bottom (south) latitude
- Type
- Optional effective time window (start time, end time, weekday mask)

**Message format for configuring Geo-fence area:**

**GSG,IMEI,T,S,id1=(type,upper_left_Lon,upper_left_Lat,right_bottom_Lon,right_bottom_Lat[,StartTime,EndTime,weekday]),id2=(…),id3=(…),…*Checksum!**

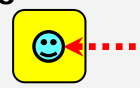
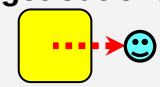
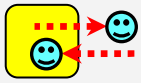
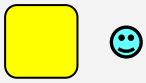
**A complete geo-fence configuration message may be composed of several packets in sequence. All the area IDs in the message must be in ascending order.**

**'T' field in the message denotes the sequence control flag. Bit 0~2 represents start of message, end of message & erase setting respectively. For example:**
**'1': Start of message**
**'2': End of message**
**'3' : Start and End of message, i.e., only one packet for message**
**'5' : Erase all of the previously set geo-fence areas + start of message (when you need to set new geo-fence areas by more than 1 packet)**
**'7' : Erase all of the previously set geo-fence areas + start and end of message (when you need to set new geo-fence areas by only 1 packet)**

**Longitude & latitude are in the unit of 0.000001 degree. East longitude & north latitude are represented by positive numbers and the prefix '+' can be omitted. West longitude & south latitude are represented by negative numbers and the prefix '-' should be added.**

**Effective time window is an optional field. It specifies the effective time in a day and applicable day in a week. Start time & end time are in seconds counted from 12:00:00AM. Weekday mask is expressed by 2 hex digits with bit 0~6 represent Sunday ~Saturday respectively.**

| Format | Value | Note |
|---|---|---|
| GSG | "GSG" : Write geo-fence parameter command | Command head |
| IMEI | (The IMEI number) | GSM device ID |
| T | Bit 0 : Start of message | Message |

| | | |
|---|---|---|
| | Bit 1 : End of message<br>Bit 2 : Erase all of previous setting | packet control |
| S | ‘0’,’1’,’2’,’3’,…,’6’,’7’ | Sequence number |
| id | ‘1’ ~ ‘8’ | Area ID |
| type | 0=disable the area<br>1=get in area<br>  <br>2=get out of area<br>  <br>3=cross over the boundary<br>  <br>4=stay in area<br>  <br>5=stay out of area<br>  | Alert type of Geo-fence |
| upper_left_Lon,<br>upper_left_Lat | upper_left_Lon =Lon<br>upper_left_Lat =Lat<br><br>Lon: (+ or -)ddddddddd<br>unit: 0.000001 degree<br>Lat: (+ or -)ddddddddd<br>unit: 0.000001 degree | The top left coordinates of specified area |
| right_bottom_Lon,<br>right_bottom_Lat | right_bottom_Lon =Lon<br>right_bottom_Lat =Lat<br><br>Lon: (+ or -)ddddddddd<br>unit: 0.000001 degree<br>Lat: (+ or -)ddddddddd<br>unit: 0.000001 degree<br><br>Example: 12129141<br>12129141 x0.000001=12.129141 degree | The right bottom coordinates of specified area |

| | | |
|---|---|---|
| **Start Time** | **0~86399 sec**<br><br>**Example:**<br>**00:00:01 = 1**<br>**23:59:59 = 86399** | |
| **End Time** | **1~86400 sec**<br><br>**Example:**<br>**00:00:01 = 1**<br>**23:59:59 = 86399** | |
| **weekday** | **bit0=Sunday**<br>**bit1=Monday**<br>**bit2=Tuesday**<br>**bit3=Wednesday**<br>**bit4=Thursday**<br>**bit5=Friday**<br>**bit6=Saturday** | |
| ***** | ***** | **End of field** |
| **Checksum** | **The checksum value is derived by the same method of NMEA standard. It is calculated by 'exclusive OR' the 8 data bits of each character before "*" in the sentence, but excluding "*". The hexadecimal value of the most significant and least significant 4 bits of the result are converted to two ASCII characters (0-9, A-F) for transmission. The most significant character is transmitted first.** | |
| **!** | **!** | **Message delimiter** |

**Example 1.1:**

**Set up 2nd ~7th sets of geo-fence areas**

**GSG,130738902846156,1,0,2=(2,121752441,24756536,121752924,24755863),3=(2,121743236,24748254,12174845,24744844)*78!**

**GSG,130738902846156,0,1,4=(1,121758267,24786053,121760745,24784397),5=(3,160053272,24144678,160056791,2414037)*73!**

**GSG,130738902846156,2,2,6=(1,160080072,24161526,160080866,24160439),7=(2,160075888,2410602,120722923,2406402)*47!**

**Example 1.2:**
**Disable the 6th set of geo-fence (by setting the alert type to be 0)**
**GSG,130738902846156,3,0,6=(0,160080072,24161526,160080866,24160439)*54!**

**Example 1.3.1:**
**Erase 2nd ~7th sets of geo-fence areas and set 2 geo-fence areas**
**GSG,130738902846156,7,0,1=(1,12146435,25009979,121466711,25008423),2=(1,121471624,25012487,121474736,25010756)*7C!**

**Example 1.3.2:**
**Erase 2nd ~7th sets of geo-fence areas and set 3 geo-fence areas**
**GSG,130738902846156,5,0,1=(1,12146435,25009979,121466711,25008423),2=(1,121471624,25012487,121474736,25010756)*7E!**
**GSG,130738902846156,2,1,3=(1,123479371,28016629,123148068,28015657)*55!**

**Example 2.1:**
**Set up 1st ~8th sets of Geo-fence areas**
**GSG,132763902812736,1,0,1=(1,121305521,24999088,121308246,24997649,00,86400,7f),2=(1,121302452,25004397,121305285,25002842)*0A!**
**GSG,132763902812736,0,1,3=(1,121299427,25014101,121302345,25012545),4=(1,121301723,25022909,121305306,25021101)*4F!**
**GSG,132763902812736,0,2,5=(1,12146435,25009979,121466711,25008423),6=(1,121471624,25012487,121474736,25010756)*74!**
**GSG,132763902812736,0,3,7=(1,121479371,25016629,12148068,25015657),8=(1,121547295,25043931,121548105,25043547)*7C!**

**Example 2.2:**
**change the 7th set of geo-fence area**
**GSG,132763902812736,3,0,7=(1,123479371,28016629,123148068,28015657)*5C!**

## 7.3.2 Reading Geo-fence setting

**Command of reading geo-fence data is 'L3' and the report media is defined by 'K4'.**

| Command Code word | Parameters |
|---|---|
| L3 | (id1,id2~id3,id4) |

**Example 1:**
**Read 1st ~8th Geo-fence areas**
**GSC,132763902812736,L3(1-8)*3d!**

**Example 2:**
**Read Geo-fence area 1,2,3 & 8.**
**GSC,132763902812736,L3(1~3,8)*71!**

**Message format for reading Geo-fence area:**
**GSg,IMEI,T,S,id1=(type,upper_left_Lon,upper_left_Lat,right_bottom_Lon,right_bottom_Lat[,StartTime,EndTime,weekday]),id2=(…),id3=(…),…*Checksum!**

**About the parameters of reading geo-fence, please refer to the parameters of setting geo-fence.**

**Example 1:**
**Report 1~5 coordinates of Geo-fence**

**GSg,132763902812736,1,0,1=(1,121305521,24999088,121308246,24997649,00,86400,7F),2=(1,121302452,25004397,121305285,25002842,00,86400,7F)*6D!**

**GSg,132763902812736,0,1,3=(1,121299427,25014101,121302345,25012545,00,86400,7F),4=(1,121301723,25022909,121305306,25021101,00,86400,7F)*6F!**

**GSg,132763902812736,2,2,5=(1,12146435,25009979,121466711,25008423,00,86400,02)*5f!**

## 7.3.3 Enable Geo-fence Alert

**Geo-fence is independent from other functions. It needs the information of GPS to check with the settings. So the GPS should be additionally turned on regardless of other reports. Please refer to chapter "5. GPS" for the setting.**

**After configuring the geo-fence areas, there must be an additional command 'N6' to turn on the function. It can be turned off by 'N7' command or by setting K0=0.**

| Codeword | Parameters | Value | Description |
|---|---|---|---|
| K0 | Enable geo-fence | 1/0 | 1=enable<br>0=disable (default) |
| K3 | Report media of geo-fence alarm | Media type | Please refer to 2.9 report media.<br>Default=02, TCP |
| K4 | Report media of reading geo-fence area | Media type | Please refer to 2.9 report media.<br>Default=20, debug port |
| K6 | Action for geo-fence alarm | Action type | Please refer to 2.10 action type<br>Default= 0000000000 |

**Command's format for enable/disable Geo-fence:**

**GSC,N6*Checksum!**

| Command Codeword | Function |
|---|---|
| N6 | Enable Geo-fence |
| N7 | Disable Geo-fence |

**Example 1:**

**Asking GTR-388 enter geo-fence alert state and use timer 1: Start Time: 12:00:00AM (X0=0), End Time:11:59:59PM(X1=86399), Report Interval=0 (X2=0), Weekday: Sunday~ Saturday (X3=7f), Report Media: GPS ON(X4=80)**

**GSC,011412000010789,N6(X0=0,X1=86399,X2=0,X3=7f,X4=80)*2b!**

**Example 2:**

**Asking GTR-388 disable geo-fence**

**GSC,135097652783615,N7*38!**

## 7.3.4 Dismiss Geo-fence Alarm

**GTR-388 would send out only one geo-fence alarm report when it violates the**

**geo-fence rule. The user should dismiss the alarm flag by "Ne" command and the monitoring of geo-fence will re-start. If geo-fence function is disabled by "N7" command, the alarm flag will also be cleared.**

**If you set the alert type of geo-fence as "stay in area" (type 4) or "stay out of area" (type 5), you could dismiss the geo-fence alarm to check if GTR-388 still stay in the geo-fence area or stay out of the area. After dismissing the geo-fence alarm, if GTR-388 still stays in the geo-fence area or stay out of the area, GTR-388 would send a new report.**

**Command's format for dismiss Geo-fence alarm status:**

**GSC,Ne*Checksum!**

| Command Codeword | Function |
|---|---|
| Ne | Dismiss Geo-fence Alarm |

**Example 1:**
**Dismiss GTR-388 geo-fence alarm status**
**GSC,135097652783615,Ne*6A!**

# 7.4 Autonomous Geo-fence

**Autonomous geo-fence is independent from geo-fence. When the function is enabled, GTR-388 will try to get GPS fix and make itself as the center of circle and draw a circle as the geo-fence area. When the device is moved out of the circle, autonomous geo-fence alarm flag of alarm status is set. Then GTR-388 will send a report and/or trigger an action. The report type of autonomous geo-fence report is 'H'.**

**Please note that autonomous geo-fence will be automatically disabled once the alarm flag is triggered. It can be enabled again for a new geo-fence area.**

**The radius of the circle is defined by the parameter 'K2'. You could activate autonomous geo-fence by the command Nk or by setting the parameter K1=1. You could also deactivate autonomous geo-fence by the command Nl or by setting the parameter K1=0.**

| Code word | Parameter | Value | Description |
|---|---|---|---|
| K1 | Enable /disable autonomous geo-fence | 1/0 | 1=enable autonomous geo-fence<br>0=disable autonomous geo-fence<br>Default=0 |
| K2 | Autonomous geo-fence radius | u32, in meters | >=30, default=100 |
| K3 | Report media of autonomous geo-fence alarm | Media type | Please refer to 2.9 report media.<br>Default=02, TCP |
| K7 | Action for autonomous geo-fence alarm | Action type | Please refer to 2.10 action type<br>Default=0000000000 |

**Example 1:**
**Enable autonomous geo-fence and set the radius as 1000 meters (K2=1000).**
**GSC,011412000010789,Nk(K2=1000)*06!**

**Example 2:**
**Disable autonomous geo-fence**
**GSC,011412000010789,Nl*45!**

**Command's format for dismiss autonomous geo-fence alarm status:**

**GSC,Nm*Checksum!**

| Command Codeword | Parameters |
|---|---|
| Nm | Dismiss autonomous Geo-fence Alarm |

**Example 1:**
**Dismiss autonomous geo-fence alarm.**
**GSC,135097652783615,Nm*42!**

# 7.5 ACC alert

**ACC signal is a dedicated input that detects the power status of vehicle. Activation of ACC means the vehicle power is turned on. Once the status of ACC is changed, GTR-388 will send report and/or trigger an action according to the setting of Qa, Qb, Qc & Qd. The report type of ACC report is 'j'.**

**If the report media is set to 00, there's no report sent.**
**If the action type is set to 00, there's no action triggered.**

| Code word | Parameter | Value | Description |
|---|---|---|---|
| Qa | Report media when ACC input is activated | Media type | Please refer to 2.9 report media. Default=02, TCP |
| Qb | Report media when ACC input goes inactive | Media type | Please refer to 2.9 report media. Default=02, TCP |
| Qc | Action when ACC input is activated | Action type | Please refer to 2.10 action type Default=0000000000 |
| Qd | Action when ACC input goes inactive | Action type | Please refer to 2.10 action type Default=0000000000 |

**Example 1:**

**Asking GTR-388/ to report by TCP(Qa=02, Qb=02) if ACC status is changed. Enable odometer when ACC input is activated (Qc=43). Disable odometer when ACC input goes inactive (Qd=42)**

**GSS,103393765403 75,3,0,Qa=02,Qb=02,Qc=43,Qd=42*67!**

# 7.6 Main battery alert

**GTR-388 will monitor the main battery continuously. Threshold of battery low is defined by J9. When main battery voltage is low or disconnected, it will send report and/or trigger an action according to the setting of J6, JA, J9 & JB. The report type of main power low is “m”.**

| Code word | Parameter | Value | Description |
|---|---|---|---|
| J6 | Battery alarm report Media | Media type | bit0=SMS<br>bit1=TCP<br>bit2=UDP<br>Default=02, TCP |
| J9 | The voltage for device to send main battery power low alarm | u16, in mV | Range:3,000~12,000<br>12V Default=11,500<br>5V Default=3,800<br>Note: GTR-388 is installed with surge protection. And there would be a gap of 0.3V between real voltage of main battery and measured voltage. |
| JA | The action for main battery disconnection alarm | Action type | Please refer to 2.10 action type<br>Default=0000000000 |
| JB | The action for main battery power low alarm | Action type | Please refer to 2.10 action type<br>Default=0000000000 |

# 7.7 Parking Alert

**When parking alert is enabled, GTR-388 will monitor selected source for triggering parking alarm. The triggering sources include activation of digital input, detecting motion activity and activation of ACC input. The selected triggering source is defined by 'SJ', which is represented by 4 hex digits. One or more sources can be selected to trigger parking alarm.**

**If selected source is triggered, GTR-388 will set parking alarm flag of alarm status, send a report or/and trigger an action. No further parking report or action will be generated until parking alert is enabled again. Parking alert is enabled by setting 'SI' to 1 or by simple command "PK=1". The report type of parking alarm is 'q'.**

| Code word | Parameters | Value | Description |
|---|---|---|---|
| SI | Enable parking alert | 1/0 | 0=disable<br>1=enable<br>Default=0 |
| SJ | Triggering source of parking alarm | xxxx (hex digits) | Bit 1=digital input<br>Bit 7=Motion Sensor<br>Bit 13=ACC<br>Default=2080 |
| SL | Report media of parking alarm | Media type | Please refer to 2.9 report media<br>Default=02 |
| SK | Action type of parking alarm | Action type | Please refer to 2.10 action type<br>Default=0000000000 |

**Example:**

**Enable parking alarm (SI=1) and set triggering source as motion sensor detects vibration (SJ=0080), set report type as TCP (SL=02)**

**GSS,10339376540375,3,0,SI=1,SJ=0080,SL=02*54!**

**Enable parking alarm (SI=1) and set triggering source as motion sensor detects vibration or ACC on (SJ=2080), set report type as UDP (SL=04)**

**GSS,10339376540375,3,0,SI=1,SJ=2080,SL=04*50!**

# 8 Timer

**Timer can be used to send report or trigger events. There are three periodic timers for setting specified time report. The timers are effective during the time frame from start time to end time and the weekday defined by weekday mask. When start time is reached, the device enables the periodic timer with defined interval.**

**Start time and end time are counted in seconds from 12:00:00 AM. Weekday mask is used to define the effective days in a week. Bit 0 ~ bit 6 are used to activate the time on Sunday ~ Saturday respectively. If the bit is set, the timer is enabled on that appropriate day. Weekday mask is represented by 2 hex digits.**

**Timer 0 operates differently from other timers. When there is a new event (report), it will re-start to count down the report interval again.**
**Timer 1 ~ 2 will not count down the report interval when there is a new event.**
**The report type of timer 0 is 'L'. The report type of timer 1 is 'M'. The report type of timer 2 is 'N'.**

**Note:**
**The timer is set to use a day as a unit. So the start time must be earlier than the end time.**

# 8.1 Timer 0

**The configuration parameters of timer 0 are listed below.**

| Code word | Parameters | Value | Description |
|---|---|---|---|
| W0 | Start time | 0~86399 | Default=0 |
| W1 | End time | 1~86400 | Default=86,400 |
| W2 | Report interval of Timer 0 | 1~65535 | Default=3,600 |
| W3 | Weekday mask | 00~7f | u8, xx(hex digits) |

| | | | |
|---|---|---|---|
| | | | Default=00 |
| W4 | Report Media of Timer 0 | | Please refer to 2.9 Report media<br>Default=02, TCP |
| W5 | Action type of Timer 0 | | Please refer to 2.10 Action type.<br>Default=0000000000 |

# 8.2 Timer 1~2

**The configuration parameters of timer 1~2 are listed below.**
**("X":Timer 1, "Y":Timer 2)**

| Code word | Parameters | Value | Description |
|---|---|---|---|
| X0 | Start time | 0~86399 | Default=0 |
| X1 | End time | 1~86400 | Default=86,400 |
| X2 | Report interval of Timer 1 | 1~65535 | Default=60 |
| X3 | Weekday mask | 00~7f | u8, xx(hex digits)<br>Default=00 |
| X4 | Report Media of Timer 1 | | Please refer to 2.9 Report media<br>Default=02, TCP |
| X5 | Action type of Timer 1 | | Please refer to 2.10 Action type.<br>Default=0000000000 |
| Y0 | Start time | 0~86399 | Default=0 |
| Y1 | End time | 1~86400 | Default=86,400 |
| Y2 | Report interval of Timer 2 | 1~65535 | Default=60 |
| Y3 | Weekday mask | 00~7f | u8, xx(hex digits)<br>Default=00 |
| Y4 | Report Media of Timer 2 | | Please refer to 2.9 Report media<br>Default=02, TCP |
| Y5 | Action type of Timer 2 | | Please refer to 2.10 Action type.<br>Default=0000000000 |

**Example 1:**

**Make timer 2 to work from 8:00AM to 6:PM on Monday to Friday with interval=30 minutes.**

**GSS,123456789012345,3,0,Y0=28800,Y1=64800,Y2=1800,Y3=3e,Y4=02,Y5=00*0c!**

**Example 2:**

**Set autonomous geo-fence to activate 18:00pm and deactivate at 6:00am next day on every Saturday and Sunday**

**The timer is set to use a day as a unit. So the start time must be earlier than the end time. For that scenario, the start time is later than the end time. So it needs to use 2 timers to meet the requirement.**

**You could use timer 1 and timer 2 as below.**

**Timer 1**

**Start time 18:00 PM: 18 hours=64800 seconds →X0=64800**

**End time 23:59 PM: 23 hours and 59 minutes=86399 seconds →X1=86399**

**Saturday → X3=40**

**Report media TCP →X4=02**

**Interval 600 Seconds →X2=600**

**Action type: autonomous geo-fence →X5=49**

**Command: GSS,123456789012345,3,0,X0=64800,X1=86399,X2=600,X3=40,X4=02,X5=49*63!**

**Timer2**

**Start time 00:00 AM: 0 seconds →Y0=0**

**End time 06:00 AM: 6 hours =21600 seconds →Y1=21600**

**Sunday → Y3=01**

**Report media TCP →Y4=02**

**Interval 600 Seconds →Y2=600**

**Action type: autonomous geo-fence →Y5=49**

**Command:GSS,123456789012345,3,0,Y0=0,Y1=21600,Y2=600,Y3=01,Y4=02,Y5=49*64!**

# 9 Stopwatch

**Stopwatch is a periodic timer started by command or triggered action. There are 2 stopwatches in total. Each stopwatch is controlled by 5 parameters (enable flag, interval, number of reports, report media and action type). It will stop if number of report is reached. If the number of report is set to 0, then the stopwatch can be terminated by stop stopwatch action or by configuration message. The report type of stopwatch 0 is 'Q'. The report type of stopwatch 1 is 'R'.**

**The configuration parameters of stopwatch are listed below.**
**("W": Stopwatch 0, "X": Stopwatch 1)**

| Code word | Parameters | Value | Description |
|---|---|---|---|
| WA | Report interval of stopwatch 0 | u32, in seconds | 3~4 Giga<br>Default=60 |
| WB | Number of stopwatch 0 report | u8 | 0=continuous<br>Default=1 |
| WC | Report media of stopwatch 0 | Media type | Please refer to 2.9 media type<br>Default=02, TCP |
| WD | Action of stopwatch 0 | Action type | Please refer to 2.10 Action type.<br>Default=0000000000 |
| WE | Enable/disable stopwatch 0 | 1/0 | 0=disable stopwatch<br>1=enable stopwatch<br>Default=0 |
| | | | |
| XA | Report interval of stopwatch 1 | u32, in seconds | 3~4 Giga<br>Default=60 |
| XB | Number of stopwatch 1 report | u8 | 0=continuous<br>Default=1 |
| XC | Report media of stopwatch 1 | Media type | Please refer to 2.9 media type<br>Default=02, TCP |
| XD | Action of stopwatch 1 | Action type | Please refer to 2.10 Action type.<br>Default=0000000000 |
| XE | Enable/disable stopwatch 1 | 1/0 | 0=disable stopwatch<br>1=enable stopwatch<br>Default=0 |

**Example 1:**

**Enable stopwatch 1 with interval=10 minutes, 4 reports, by UDP.**

**GSS,123456789012345,3,0,YA=600,YB=4,YC=04,YD=00,YE=1*66!**

# 10 Counter

**GTR-388 has implemented 2 software counters. Counter is for measuring the occurring times of particular event. When the counter value is accumulated to a threshold level, it will generate a counter event which would generate a report and/or trigger another action. If the "automatically reset counter" flag is set, the counter value will be reset to zero after the report/action. The report type of counter 0 is 'e'. The report type of counter 1 is 'f'.**

**If the trigger level of a counter is set to zero, then the counter will be disabled.**

**All events that have action type settings can be configured to increment or reset counter value. You may also use 'Lc' command to control the activity.**
**About the action type, please refer to "2.10 Action Type."**

| Code word | Parameters | Value | Description |
|---|---|---|---|
| Pa | Occurring frequency for counter 0 to report/ make action | u32 | 0=no action/ report<br>Default=0 |
| Pb | Automatically reset counter 0 | 1/0 | 1=enable<br>0=disable<br>Default=0 |
| Pc | Report media of counter 0 | Media type | Please refer to 2.9 media type<br>Default=02, TCP |
| Pd | Action for counter 0 | Action type | Please refer to 2.10 Action type.<br>Default=0000000000 |
| | | | |
| Pg | Occurring frequency for counter 1 to report/ make action | u32 | 0=no action/ report<br>Default=0 |
| Ph | Automatically reset counter 1 | 1/0 | 1=enable<br>0=disable<br>Default=0 |
| Pi | Report media of counter 1 | Media type | Please refer to 2.9 media type |

| | | | |
|---|---|---|---|
| | | | Default=02, TCP |
| Pj | Action for counter 1 | Action type | Please refer to 2.10 Action type. Default=0000000000 |

**Command format:** GSC,IMEI,Lc(n,a)*Checksum!

| Command Codeword | Parameters |
|---|---|
| Lc | Counter control : Lc(n,a)<br>n=counter 0~1<br>a=0: clear counter<br>a=1: increment counter |

**Example 1: Ask GTR-388 to increment counter 0 (SE=A8) when the speed is over 70 km/hr. And when the speed is over 70 km/hr (SA=70) for 3 times (Pa=3), make counter 0 report via TCP (Pc=02).**
**GSS,10339376540375,3,0,SA=70,SE=A8,Pa=3,Pc=02*2b!**

**Example 2: Clear counter 1**
**GSC,10339376540375,Lc(1,0)*5e!**

**Example 3: Increment counter 1**
**GSC,10339376540375,Lc(1,1)*5f!**

# 11 Odometer

**Odometer is for measuring the traveled GPS distance of GTR-388. It could be configured to generate a report and/or trigger an action when it has traveled for certain distance. The odometer can be enabled, disabled or cleared by 'Ld' command. The report type of odometer is 'i'.**

**Note:**
**The traveled GPS distance is different from traveled geographical distance. The traveled distance of the tracker's odometer might not be the same with the traveled distance of your car's odometer.**

| Code word | Parameters | Value | Description |
|---|---|---|---|
| PA | Traveled GPS distance for odometer to report/ make action. | u32, in meters | >=50, Default=0 |
| PC | Report media of odometer | Media type | bit0=SMS<br>bit1=TCP<br>bit2=UDP<br>Default=02, TCP |
| PD | Action for odometer | Action type | Please refer to 2.10 Action type.<br>Default=0000000000 |
| PE | Enable/disable odometer | 1/0 | 0=disable<br>1=enable<br>Default=1 |

**Command format:**

**GSC,IMEI,Ld(C/D/E)*Checksum!**

| Command Codeword | Parameters |
|---|---|
| Ld | Odometer control<br>(C)=clear, (D)=disable, (E)=enable |

**Example 1: Ask GTR-388 to increment counter 0 (PD=A8) and report by TCP (PC=02)**

**when the traveled distance of odometer is 10,000 meters (PA=10,000).**
**GSS,10339376540375,3,0,PE=1,PA=10000,PC=02,PD=A8*1a!**

**Example 2: Clear odometer**
**GSC,10339376540375,Ld(C)*37!**

**Example 3: Disable odometer**
**GSC,10339376540375,Ld(D)*30!**

**Example 4: Enable odometer**
**GSC,10339376540375,Ld(E)*31!**

# 12 Report Messages

**A report is generated by a specific event, such as ping, Emergency alarm, digital input activated, etc. Each event has a corresponding report type and report media. Please refer to section 2.6 for the mapping of report type. The report media defines the report channel (TCP/UDP/SMS) and report format.**

# 12.1 3G/GPRS Report Format

**3G/GPRS report is prefixed by "GSr". Its content is configurable by setting parameter "O3". Please refer to section 2.6 for the available report parameter and the respective code word. Please collect the required code word and put them together to form a string and set to "O3". Then GTR-388 will generate report according to the code word sequence and translate to corresponding information.**

| Parameter's Code word | Description |
|---|---|
| O3 | 3G/GPRS Report format |

**(Refer to "2.6. Parameters of Report Messages" for details of parameters' definition)**

**Example 1:**
**Set 3G/GPRS report format by configuration message.**
**GSS,135785412249986,3,0,O3=TSPRXAB27GHKLMmnaictuvw*U!*1f!**

**Then 3G/GPRS report format will be in the following format.**
**GSr,Device_ID,IMEI,Alarm_status,Report_Type,Variable_field,GPS_Fix,UTC_Date,UTC_Time,Longitude,Latitude,Altitude,Speed,Heading,Number_of_Satellites,HDOP,main_battery_voltage,backup_battery_voltage,analog_input_value,odometer_value,GSM_signal_strength,cell_ID_MCC,cell_ID_MNC,cell_ID_LAC,cell_ID_CID*checksum!**

**For example:**
**GSr,135785412249986,01,I,EA02,,3,230410,153318,E12129.2839,N2459.8570,0,1.17,212,8,1.0,12300mV*55!**

**Example 2:**

**Read 3G/GPRS report format of GTR-388 report (Send command via SMS or TCP or UDP)**

**GSC,136647890362718,L1(O3)6e*!**

**GTR-388 receives the command and reports the following message.**

**GSs,136647890362718,3,0,O3=TSPRXAB27GHKLMmnaictuvw*U!*34!**

# 12.2 SMS Format Report

**If the SMS flag of the report media is enabled when GTR-388 is generating report, a SMS report will be sent to the phone number defined by F0. The type of SMS message is the Google map link.**

| Code word | Parameters | Value | Description |
|---|---|---|---|
| F0 | SMS return phone number | char(20) | |

**Google Format:**

| Content | Description |
|---|---|
| Report Type | Refer to return text of report type table |
| Date & Time | yymmdd hh:mm (24 hour format) |
| GPS status | Not fix, 2D fix, 3D fix |
| Speed | Default unit: km/h |
| Battery voltage | Unit=mV |
| Latitude and Longitude in Google format | |

| Report type | Text on SMS |
|---|---|
| Ping report | Ping report |
| Motion static report | Static report |
| Motion moving report | Moving report |
| Static to moving report | Start moving |
| Moving to static report | Moving report |
| Geo-fence alarm report | Geofence alarm |
| Autonomous geo-fence alarm | Autonomous geo-fence alarm |
| Emergency alarm report | Emergency |
| Speed alarm report | Over speed |
| Timer 0 | Timer 0 |
| Timer 1 | Timer 1 |
| Timer 2 | Timer 2 |
| Stopwatch 0 report | Stopwatch 0 |

| | |
|---|---|
| Stopwatch 1 report | Stopwatch 1 |
| Digital input report | DI active / DI inactive |
| Fuel low report | Fuel low alarm |
| Counter 0 report | Counter 0 |
| Counter 1 report | Counter 1 |
| Odometer | Odometer |
| ACC report | DI active / DI inactive |
| Main battery disconnected | Main Bat. Lost |
| Main battery low alarm report | Main Bat. Low |
| Parking alarm | Parking alarm |

**Example:**

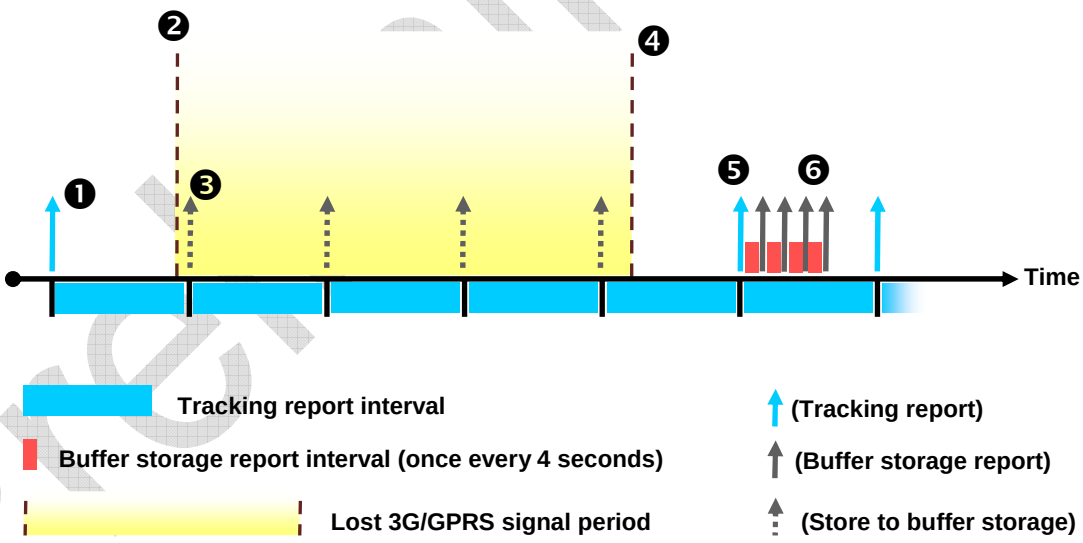
**Pingreport,11072702:48,3Dfix,23Km/h,12000mV,http://maps.google.com/maps?f=q&hl=en&q=22.540103,114.082329&ie=UTF8&z=16**

# 14 Buffer Storage

**When GTR-388 is carried to the areas without 3G/GPRS signal coverage, GTR-388 could not send reports to server. In order not to lose the location report, GTR-388 will save the location reports during the periods without 3G/GPRS signal to buffer storage. When GTR-388 is moved to the areas with 3G/GPRS signal, it will retrieve the reports in the buffer storage and send them to server. GTR-388 could save up to 1530 pieces of location reports to buffer storage. The buffer reports would start with "Gsb".**

**Note:**
**The report format of buffered reports' beginning would be "GSb", not "GSr".**

**The behavior is illustrated as following.**




| | |
|---|---|
| ❶ | Send tracking report |
| ❷ | Enter area without 3G/GPRS signal coverage. |
| ❸ | Save location report to buffer storage |
| ❹ | Enter area with 3G/GPRS signal |
| ❺ | Send tracking report |
| ❻ | Send the location report in the buffer storage |

**The parameter of enable data buffer function is OG.**

| Code word | Parameters | Value | Description |
|---|---|---|---|

| | | | |
|---|---|---|---|
| OG | Enable/ disable buffer storage function | 1/0 | 0=disable<br>1=enable<br>Default=1 |

# 14.1 Bulk uploading of Buffered Report to Server

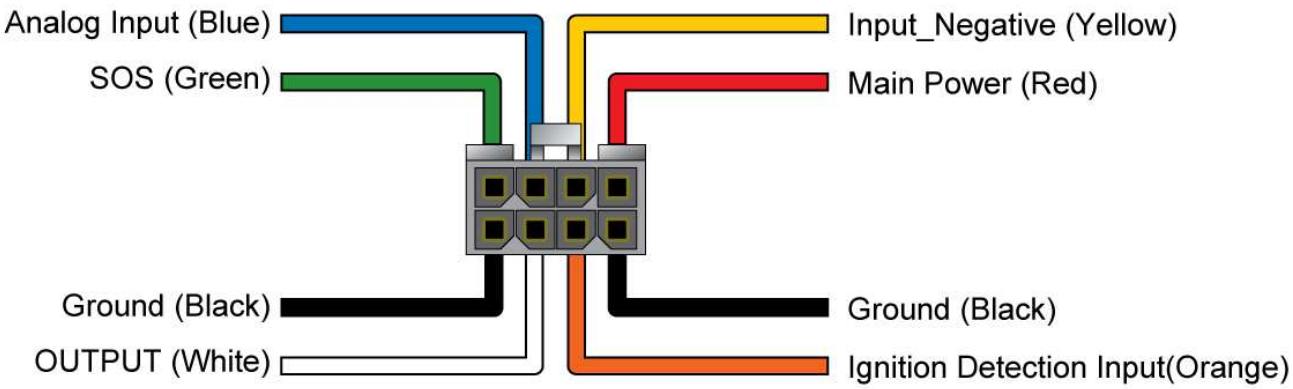
**Because of no good 3G/GPRS coverage or of 3G/GPRS-roaming conditions, there might be accumulated a lot of unsent reports in the buffer storage. When GTR-388 starts to upload buffered reports to server, it can take a lot of time. User could set GTR-388 to concatenate several buffered reports into one string and send it to server. When server confirms the receiving, GTR-388 could send the following buffered reports. It could speed up the uploading of buffered reports and save the 3G/GPRS traffic fee. Users could set the quantity of buffered reports to be concatenated as a string by the parameter S7.**

| Code word | Parameters | Value | Description |
|---|---|---|---|
| S7 | Numbers of buffered reports to be concatenated as a string | 1~30 | Default=1 |

# 15 I/O port

**GTR-388 has 1 analog input, 1 digital input and 1 digital output. Analog input is used to measure the value of an analog sensor such as temperature sensor or fuel sensor. Digital input is negative trigger. It can be connected to sensor output such as door lock switch. Digital output is active low. It can be used to control other devices such as the power relay of a refrigerator.**

**The wiring diagram is depicted below.**




| Wire Color | Description |
|---|---|
| Green | **Emergency** (Negative Trigger) |
| Blue | **Analog Input** |
| Yellow | **Digital Input** (Negative Trigger) |
| Red | **Main Power** |
| Black | **Ground** |
| White | **Digital Output** (Negative Trigger) |
| Orange | **Ignition Detection Input** (Positive Trigger) |
| Black | **Ground** |

# 15.1 Fuel sensor input

**GTR-388 has an analog input for connecting fuel sensor.**

**When fuel level is decreased less than QB value, firmware would set “fuel low” flag, generate and send fuel low report/ make fuel low action . The “fuel low” flag would be cleared while fuel is added over the level of QA value. If fuel is decreased less than QB value, firmware would set “fuel low” flag, generate and send battery low report /make fuel low action again.**

**When fuel level is decreased less than QB value, firmware would set “fuel low” flag, generate and send fuel low report/ make fuel low action. If user adds fuel but not reach QA level, the “fuel low” flag would NOT be cleared. So tracker would NOT generate nor send fuel low report nor make fuel low action again then the fuel level is decreased than QB value again.**
**QE is the interval for checking if fuel level is decreased to QB value.**
**The report type of fuel low alarm is ‘a’.**
**The related configuration parameters are listed in the table below.**

| Code word | Parameters | Value | Description |
|---|---|---|---|
| QA | The fuel level for dismissing fuel low alarm flag | u16, in m V | Default=0 |
| QB | The fuel level for sending out fuel low alarm report | u16, in m V | Default=0 |
| QC | Report media of fuel low alarm | Media type | Please refer to “2.9 report media.” Default=02, TCP |
| QD | Action for fuel low alarm | Action type | Please refer to “2.10 action type.” Default=0000000000 |
| QE | Check interval | u16, in seconds | 0=disable Default=0 |

**Example:**

**Set check interval to 10 seconds. Generate report and deactivate digital output if fuel level exceeds 5.7V.**
**GSS,123456789012345,3,0,QA=5700,QC=04,QD=C1,QE=10*2d!**

# 15.2 Digital input

**Digital input is negative triggered. You could set GTR-388 to make report and/or action when digital input is activated or inactive. The report type of digital input report is 'V'. The related configuration parameters are listed below.**

| Code word | Parameters | Value | Description |
|---|---|---|---|
| Qg | Report media when digital input is activated | Media type | Please refer to "2.9 report media." Default=02, TCP |
| Qh | Report media when digital input goes inactive | Media type | Please refer to "2.9 report media." Default=02, TCP |
| Qi | Action when digital input is activated | Action type | Please refer to "2.10 action type." Default=0000000000 |
| Qj | Action when digital input goes inactive | Action type | Please refer to "2.10 action type." Default=0000000000 |
| Qy | Digital input status | xx(hex digit) | Read only. See note below. |

**Note: 'Qy' is a read only flag which collect all the status of all digital inputs. It is represented by 2 hex digits. Bit 1 reflects the status of digital input. If the bit is set, it means the input is in active triggered.**

**Example:**
**Generate report when digital input goes active.**
**GSS,123456789012345,3,0,Qg=04,Qi=00,Qh=00,Qj=00*50!**

# 15.3 Digital output

**The digital output is negative triggered. The state can be changed by the triggered action of events or by 'Lo' command. You could read or set the digital output status by the parameter Qz.**

| Codeword | Parameters | Value | Description |
|---|---|---|---|
| Qz | Digital output status | xx(hex digit) | Default=00 |

**Command format**

**GSC,IMEI,Lo(n,a)*checksum!**

**n=1, a:0=deactivate, 1=activate**

**Example: Activate digital output**

**GSC,12345678901234,Lo(1,1)*5c!**

**Example: Deactivate digital output**

**GSC,12345678901234,Lo(1,0)*5d!**

# 16 Simple command

**Typical command of GTR-388 is composed of command code words, parameters & checksum. The code words are hard to remember and you may need a tool to generate the checksum. The purpose of simple command is to simplify the command format and send command without checksum. You could send simple commands to TR-206 by mobile phone's SMS.**

**The simple commands are "ping GTR-388", "GTR-388 motion report", "Control digital output", "Link to server", "Autonomous geo-fence", "Parking alert", and "Reset device."**

**For ping command, you could set the tolerance time of GPS fix.**

**For motion report, you could set the static report interval and the moving report interval. So there are two simple commands for GTR-388 to switch to motion report, one is "MM" for setting moving report interval, and the other is "MS" for setting static report interval. The unit of the simple command's concerning parameters is second.**

**For autonomous geo-fence, you could activate or deactivate the function. The default radius of geo-fence area is 100 meters. You could set the radius of the geo-fence area by adding the value after the code word and equal mark. The unit of radius is meter. It must be greater than 30 meters.**

**For controlling the digital output, you could activate or deactivate digital output.**

**For parking alert, you could activate or deactivate parking alert.**

**The simple commands could be optionally added with the equal mark and the concerning parameters. If you do not add parameters with the simple command, GTR-388 will take the present setting as the setting.**
**Below please find the table of simple command.**

| Command | Code Word | Concerning Parameter |
|---|---|---|
| Ping | PI | [=tolerance time of GPS fix] |
| Motion moving | MM | [=moving report interval] |
| Motion static | MS | [=static report interval] |

| | | |
|---|---|---|
| **Control digital output1** | **DO1** | **=1→ activate**<br>**=0 → deactivate** |
| **Autonomous geo-fence** | **AG** | **[=XXX→ activate and set the radius]**<br>**(XXX must be greater than 30.)**<br>**=0 → deactivate** |
| **Link Server** | **LI** | |
| **Parking alert** | **PK** | **=1→ activate**<br>**=0 → deactivate** |
| **Reset device** | **RS** | |

**Note:**
1. To enable the simple command, please make the parameter A5=1.
   For example, GSS,011412000010789,3,1,A5=1*2d!
2. You could send several simple commands in one SMS. The simple command is separated by the "comma." Do not keep any blanks between the commas. Otherwise, GTR-388/ could not distinguish what is the command.
3. The simple commands must be capital case.

## Command format:

## "password,simple command 1,simple command 2,simple command 3, …"

**In order to protect the privacy, the simple command had better be followed after the password.**
**The parameter of setting simple command's password is "Oa." If you want to cancel the password, you could set Oa to be blank.**

**For example, set the password to be "VICTORY" for GTR-388 whose IMEI is 011412000010789.**
**The command is "GSS,011412000010789,3,1,Oa=VICTORY*2a!"**
**For example, cancel the password of GTR-388 whose IMEI is 011412000010789.**
**The command is GSS,011412000010789,3,1,Oa=*5b!"**

**Example 1, ping GTR-388 and set the tolerance time of GPS fix as 3 minutes. The password is 520JX**
**The command is "520JX,PI=180"**

**Example 2, switch GTR-388 to motion mode and set the moving report interval as 30 seconds and static report interval as 30 minutes. The password is 7777.**
**The command is "7777,MM=30,MS=1800"**

**Example 3, make GTR-388 link to server. And there is no password.**
**The command is “LI”**

**Example 4, activate digital output 1. And there is no password.**
**The command is “DO1=1”**

**Example 5, deactivate digital output 1. And the password is JLTW.**
**The command is “JLTW,DO1=0”**

**Example 6, activate autonomous geo-fence and set radius as 3 kilometers. And the password is TWLG.**
**The command is “TWLG,AG=3000”**

**Example 7, activate autonomous geo-fence and use the present setting of radius. And there is no password.**
**The command is “AG”**

**Example 8, deactivate autonomous geo-fence. And the password is praise.**
**The command is “praise,AG=0”**

# 17 OTA Function

## 17.1 OTA Firmware Upgrade

**When there is new firmware, server sends LN (Download) to GTR-388 to specify download information including the FTP host address, port, user name, password, target file & file size. Then GTR-388 will connect to FTP host and start downloading the file.**
**After upgrading firmware, tracker will reboot and send "OTA complete" report to server. If firmware upgrade fails, tracker will send "OTA download fail" report to server.**

**The command for OTA firmware upgrade is**
**"GSC,IMEI,LN(IP,port,UN,PSW,type,filename,size)*checksum!", where**

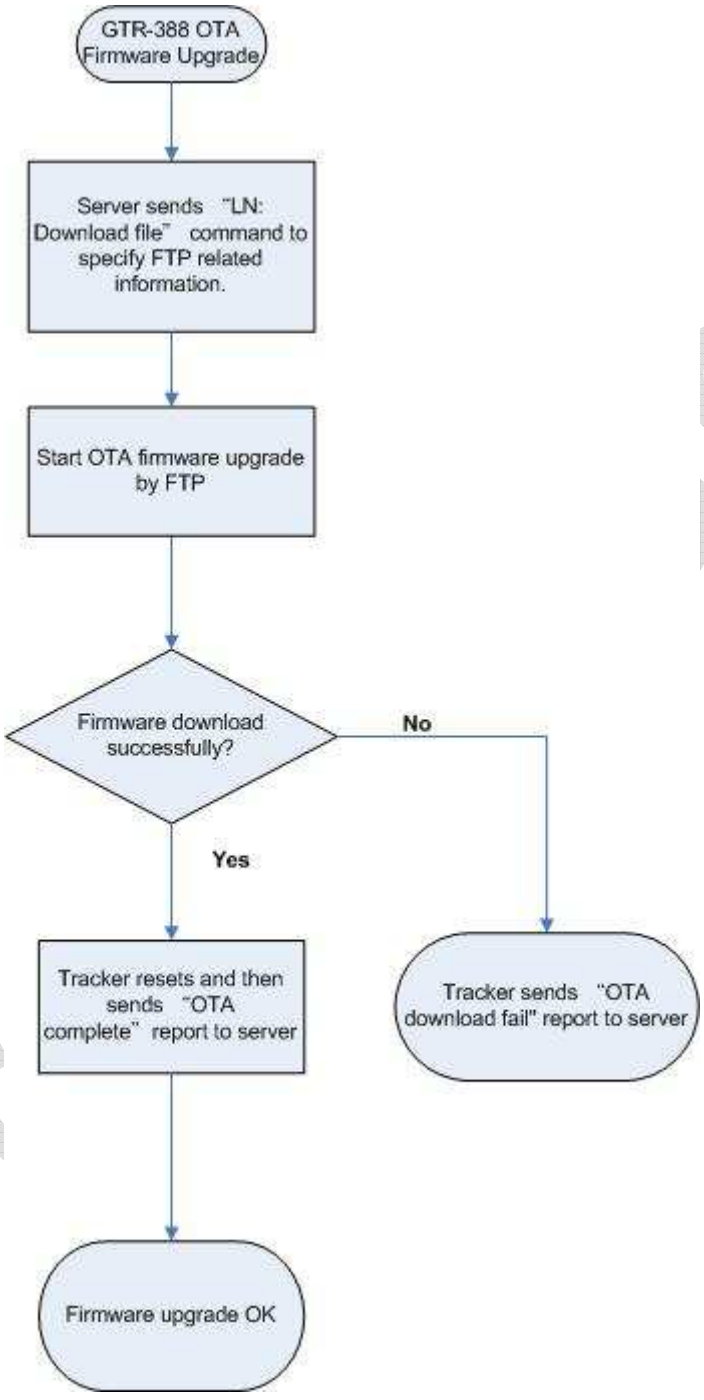
- **IP: FTP host address**
- **Port: FTP host port**
- **UN: FTP user name**
- **PSW: FTP password**
- **Type: 1=firmware**
- **Filename: firmware filename to be downloaded**
- **Size: file size**

**For example:**
**GSC,123456789012345,LN(ftp.abc.com.tw,21,upgrade,upgradepsw,1,100326.dfu,188993)*31!**

**The report type of OTA upgrade complete is 'o'. For example:**
**GSr,123456789012345,4,o,00,,3,250310,113916,E12029.2620,N2059.9890,0,1.16,0,8,0.8,05*06!**

**The report type of OTA upgrade failure is 'p'. For example:**
**GSr,123456789012345,4,p,00,,3,250310,113916,E12029.2620,N2059.9890,0,1.16,0,8,0.8,05*19!**

**Note**:
After upgrading firmware, please configure GTR-388/ again.


GTR-388 OTA Firmware Upgrade
Server sends "LN: Download file" command to specify FTP related information.
Start OTA firmware upgrade by FTP
Firmware download successfully?
No
Yes
Tracker resets and then sends "OTA complete" report to server
Tracker sends "OTA download fail" report to server
Firmware upgrade OK