GTR-128/GTR-129
Development Document
V 0.4

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CONTENT

1 Introduction

GTR-128/GTR-129 is designed as durable and multi-functional GPS/GSM/GPRS tracker. It integrates highly sensitive GPS module and quad-band GSM 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 and low cost 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-128/GTR-129 system. The built-in GSM and GPS antennas are for easy installation without hassle.

The key functions of GTR-128/GTR-129 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 Configuration and Firmware update
- Alert functions including Power low/ Over speed/ Movement alarms
- Tracking in preferred interval, scheduling and Geo-fence
- Embedded magnet and double clips for easy installation
- No any button and plug-in then power on for simple use
- Multiple power kits suit to diverse vehicles and motorcycles

This document describes the communication protocol between GTR-128/GTR-129 and application server, the built-in behavior modes of GTR-128/GTR-129, 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 "GSs" :Report setting "GSG" :Write Geo-fence parameter "GSg" :Report Geo-fence parameter "GSC" :Action command "GSr" :Position and status report (format 0) "GSh" :Position and status report (format 1) "GSb": Data buffered reports	Command head
IMEI	(The IMEI number)	GSM device ID
T	'0' : Middle of sequential message '1' : Start of sequential message '2' : End of sequential message '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-128/GTR-129 configure parameters" for detail definition
*	*	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 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

2.2 Format of configuration message

2.2.1 Server -> Device

This message is used to configure GTR-128/GTR-129 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,……*Check Sum!
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= TSPRXAB27GHKLMnaicz*U!*29!

2.2.2 Device -> Server

The message is generated by the GTR-128/GTR-129 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-128STD-12050972.5.1.0.0*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 is 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-128/GTR-129 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 3=cross over the boundary 4=stay in area 5=stay out of area
upper_left_Lon upper_left_Lat	The upper left coordinate of specified area.
right_bottom_Lon right_bottom_Lat	The right-bottom coordinate of specified area.
startTime endTime 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-128/GTR-129 to inform the application server of its location and status. There are two types of GPRS report message format, “format 0” and “format 1”.

Report format 0 (GSr,…) & format 1 (GSh,…) are configurable reports. 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-128/GTR-129 -> Server (format 0)

If configuration parameter O3=TSPRXAB27GHKLMnaicz*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, Capacity of battery that presently supplied to GTR/128/GTR-129,analog_input_value,odometer_value,GSM_signal_strength,cell_ID*checksum!

GTR-128/GTR-129 -> Server (format 1)

If configuration parameter ON= SARY*U!, then the report is GSh,IMEI,GPS_Fix,Report_type,Joint_IO_status*checksum!

2.6 Parameters of Report Messages

Parameters of Report Message		
Codeword	Parameters	Description
A	GPS fix status	1=not fix 2=2D fix 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 unit: 0.000001 degree
6	Latitude	(N or S)dd.dddddd
7	Latitude	(N or S)ddmm.mmmm
8	Latitude	(+ or -)ddddddddd unit: 0.000001 degree
G	Altitude	xxxxx Unit: meter
H	Speed	xxx.xx unit: knots (1.852km/hr)
I	Speed	xxx unit: km/hr
J	Speed	xxx unit: mile/hr
K	Heading	xxx unit: degree
L	Number of satellite in use	xx
M	HDOP	xx.x
P	Alarm status	xx(hex digits) bit0=SOS alarm bit1=Parking alarm status bit3=Autonomous geo-fence alarm bit4=Geo-fence alarm bit5=Speed alarm bit6=Main battery disconnection alarm bit7=Main battery low alarm

		bit8=Fuel low alarm (analog input) bit9= Jammer alarm
Z	Geo-fence status	Empty field: no geo-fence alarm Ixx: get in area xx Oxx: get out area xx
Q	Report Media	xx(hex digits) bit0=SMS bit1=TCP bit2=UDP bit6=Roaming bit7=GPRS report format
R	Report type	1=Ping report 4=Motion mode static report 5=Motion mode moving report 6=Motion mode static to moving report 7=Motion mode moving to static report 8=Angle change report E=Error report G=Geo-fence alarm report H=Autonomous Geo-fence alarm report I=SOS alarm report K=Speed alarm report L=Timer 0 report M=Timer 1 report N=Timer 2 report P=L4 report Q=Stopwatch 0 report R=Stopwatch 1 report V= Digital input report a=Analog input report e=Counter 0 report f=Counter 1 report i=Odometer report j= ACC report l=Main battery disconnected m=Main battery low alarm report o=OTA download complete p=OTA download fail

		q=parking alarm report t=jammer report v=power-on report (re-boot) w=FTP download success report x=FTP download fail report y=FTP upload success report z=FTP upload fail report
S	IMEI	
T	Device ID	
U	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.
V	Digital input status (1=Active, 0=Inactive)	xx (hex digits) bit1=Input 1
W	Digital output status (1=Active, 0=Inactive)	xx (hex digits) 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) bit0= bit1=Input 1 bit7=Motion status, 0=static, 1=moving bit8= bit9=Output 1 bit13=ACC 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	**Capacity of battery that presently supplied to GTR-129 (this is for GTR-129 only)**	**if main battery is connected, n=voltage of main battery (eg, 12300=12.3V) If main battery is not connected, GTR-129 would use backup batteries, that is Li-battery, n=capacity of Li backup battery (eg, 80%)**
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**
x	**Cell ID-BSIC**	**base station identity code, 1 digit or 2 digits**
y	**Cell ID-RSSI**	**received signal strength indicator, 1 digit or 2 digits**
z	**Cell ID (All)**	
#		
*****		
?		
!	**!**	**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=SOS 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=L4 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
t=Jammer report	C: GSM signal strength
v=power-on report (reboot)	Y: Joint I/O status
w=FTP download success	Download file name(string)
x=FTP download fail	Download file name(string)
y=FTP upload success	Upload file name(string)
z=FTP upload fail	Upload file name(string)

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 TSPRXAB27GHKLMnaicz*U!. The parameter of Cell ID is z. So you could close to show Cell ID by removing “z” in O3 to be TSPRXAB27GHKLMnaic*U!

2.7 Code word of Configuration Parameter

Most behaviors of GTR-128/GTR-129 could be changed by Configuration Parameters. You could change the setting of configuration parameters by the following methods.

1. **Generate the configuration file (profile) by "GTR128ConfigTool_DEV.exe". Then refer the instruction of test5.gstraq.com to send the configuration to the device.**
2. **Send the "GSS,….!" setting with the configuration parameters to GTR-128/GTR-129**
3. **Send the "GSC,….!" command with the configuration parameters to GTR-128/GTR-129**

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-128/GTR-129.

Configuration Parameters					
		Code words	Parameters	Type	Description
Main	Device	O5	Device ID	char(16)	
		O7	Firmware Version	char(28)	Read only
		O6	Time Zone Offset	s32, in seconds	-43200 ~ 46800
		B2	IMEI number	char(16)	Read only
	SIM	B0	PIN code	char(7)	
		B1	Phone number of SIM card	char(19)	
		B3	IMSI number	char(16)	Read only
	Battery	J6	Battery alarm report Media	Media type	bit0=SMS bit1=TCP bit2=UDP bit7=GPRS report format
		J9	The power capacity for main battery power low alarm	u16, in mV	Default=11500
		JA	The action for main	Action	Please refer to section 2.10 for

			battery disconnection alarm	type	detail.
		JB	The action for backup battery power low alarm (GTR-129 only)	Action type	Please refer to section 2.10 for detail.
	Other setting	O3	Report format 0	char(32)	Default= TSPRXAB27GHKLMnaicz*U!
		ON	Report format 1	char(32)	Default=SARY*U!
		OG	Enable/ disable data buffer function	1/0	Default=1
		OB	Debug message output media	u8	1=debug port (RS-232) 2=in device Default=2
		OC	Debug message level	u8	1=all message 4=NEMA only
		OO	Report media for reading configuration	Media type	bit1=TCP bit2=UDP bit6=debug port
		Oa	Password of simple command	Char(7)	
		S9	Enable/disable indicator LED	1/0	Default=1
	GPS	C1	The time for starting to get GPS fix before the next report time if GTR-128/GTR-129 does not get GPS fix in last report, or got a GPS fix 1 hour ago	u16, in seconds	60 ~ 600 **Note: GTR-128/GTR-129 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	u16, in seconds	10 ~ 120 **Note: GTR-128/GTR-129 will send out the report whether it gets GPS fix or not when C2 time ends.**

			GTR-128/GTR-129 got a GPS fix within 1 hour		
		C3	GPS fix time before sending out the first report	u16, in seconds	0 ~ 600 If "C3"=0, disable first report message.
		C5	Enable NMEA output message	1/0	0=disable 1=enable Default=0
		CB	EPO download request interval when EPO update fails	u32, in seconds	Range:>=60,0 Default=0
Communication	GPRS	D1	APN	char(32)	
		D2	User Name	char(32)	
		D3	Password	char(32)	
		D4	DNS 1	char(32)	
		D5	DNS 2	char(32)	
		D8	GPRS mode for L4 command	Media type	02=TCP 04=UDP
		E0	Host IP or domain name 1	char(32)	
		E1	Host Port number 1	u16	
		E4	Interval in on-line state for disconnecting and then re-connecting	u16, in seconds	0,60~65535 0=disable
		E5	Interval for checking if GPRS connection is on-line. If GPRS connection is cut, GTR-128/GTR-129 will try to connect to server for one	u16, in seconds	0=disable

			time.		
		E6	Enable/disable GTR-128/GTR-129 to send “IMEI,OK” to server after GPRS connection is re-built.	1/0	0=disable 1=enable Available when E5 is not 0
		E7	Timeout of L4 connection	u16, in seconds	>=2, default=30
		EA	Time for keeping GPRS connection after sending report	u8, in seconds	>=2, default=2
	Acknowledgement	A0	Send confirmation to server after receiving command from server	1/0	0=disable 1=enable Confirmation message="ACK\r"
		A1	Wait confirmation from server after sending message to server	1/0	0=disable 1=enable Confirmation message="ACK\r"
		A2	Timeout of waiting confirmation from server	u8	1~255
		A3	Device ACK with ID string	1/0	0=disable 1=enable
		A4	ID string is IMEI or device ID	1/0	0=Device id 1=IMEI Available when A3=1
		A5	Enable Simple Command	1/0	0=disable 1=enable
Security	SOS	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 SOS	Media Type	00=Disable 01=SMS 02=TCP 04=UDP
		H1	Max number of SMS report for each phone number	u16	1~65535
		H2	report interval	u16, in seconds	3 ~ 65535
		H3	Number of GPRS report	u8	0=continuous
	Speed Limit	SA	Upper limit of speed alarm	u8, in Km/h	0 ~ 255 0=disable, default=0
		SB	Lower limit of speed alarm	u8, in Km/h	0 ~ 255 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 bit1=TCP bit2=UDP bit7=GPRS report format
		SE	Action for high speed alarm	Action type	Please refer to section 2.10 for detail.
		SF	Action for low speed alarm	Action type	Please refer to section 2.10 for detail.
	Parking Alar	SI	Enable parking alert	1/0	0=disable 1=enable

					Default=0
		SJ	Triggering source of parking alarm	xxxx (hex digits)	Bit 1=Din1 Bit 7=Motion Sensor Bit 13=ACC Default=2080
		SK	Report media of parking alarm	Media type	Please refer to 2.9 report media
		SL	Action type of parking alarm	Action type	Please refer to 2.10 action type
	Jammer Alarm	Ob	Report media of jammer alarm	Media type	Please refer to 2.9 report media
		Oc	Action type of jammer alarm	Action type	Please refer to 2.10 action type
		K0	Geo-fence enable	1/0	0=disable 1=enable Default=0
		K1	Enable/disable autonomous geo-fence	1/0	0=disable 1=enable Default=0
		K2	Autonomous geo-fence radius	u32, in meter	30~4Giga Default=100
		K3	Geo-fence alarm report Media	Media type	bit0=SMS bit1=TCP bit2=UDP bit7=GPRS report format
		K4	Report media for reading Geo-fence data	Media type	bit1=TCP bit2=UDP
		K6	Action for geo-fence alarm	Action type	Please refer to section 2.10 for detail.
		K7	Action for autonomous geo-fence alarm	Action type	Please refer to section 2.10 for detail.

Tracking	Ping	OD	Report media for ping	Media type	bit0=SMS bit1=TCP bit2=UDP bit7=GPRS report format
		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 0=disable
		RA	Report interval in static state at roaming GSM network when bit 6 of Rb is 1 (Rb=42 or 43 or 44)	u32, in seconds	0, 3 ~ 4Giga 0=disable
		Rb	Report media in static state	Media type	bit0=SMS bit1=TCP bit2=UDP bit6=Roaming flag bit7=GPRS report format
		Rc	Action for static report	Action type	Please refer to section 2.10 for detail.
		Rd	GPS always on in static state	1/0	0=disable 1=enable
		Re	Turn off GSM in static state	1/0	0=turn on GSM module 1=turn off GSM module
		Rf	Keep GPRS on-line in static state	1/0	Available when Re=0 0=disable 1=enable
	Tracking (Moving state)	Ri	Report interval in moving state	u32, in seconds	0, 3 ~ 4 Giga 0=disable
		RI	Report interval in moving state at roaming GSM	u32, in seconds	0, 3 ~ 4 Giga 0=disable

			network when bit 6 of Rj is 1 (Rj=42 or 43 or 44)		
		Rj	Report media in moving state	Media type	bit0=SMS bit1=TCP bit2=UDP bit6=Roaming flag bit7=GPRS report format
		Rk	Action for moving report	Action type	Please refer to section 2.10 for detail.
		Rl	GPS always on in moving state	1/0	0=disable 1=enable
		Rn	Keep GPRS on-line in moving state	1/0	0=disable 1=enable
		Ro	Traveled distance for sending report	u32, in meters	0, 50 ~ 4 Giga 0=disable
		Rp	Traveled distance to be judged as keep in moving state	u16, in meter	0, 50 ~ 4 Giga 0=disable
	Tracking (Switching state)	Rs	Report Media for switching from static to moving state	Media type	bit0=SMS bit1=TCP bit2=UDP bit7=GPRS report format
		Rt	Report Media for switching from moving to static state	Media type	bit0=SMS bit1=TCP bit2=UDP bit7=GPRS report format
		Ru	Action for switching from static to moving state	Action type	Please refer to section 2.10 for detail.
		Rv	Action for switching from	Action type	Please refer to section 2.10 for detail.

			moving to static state		
		Rw	Minimum distance to be judged as moving state	u16, in meters	0, 30 ~ 65535 0=disable
		Rx	Interval for switching from validation to static state if no motion detected	u16, in seconds	0=Interval is the same with Ri 3~65535
		Ry	Interval for switching from moving to static state if no motion detected	u16, in seconds	0=Interval is the same with Ri 3~65535
		Rz	Motion sensor sensitivity	u16,	0=disable Default=5
Timer	Timer 0	W0	Start time	u32, in seconds	0 ~ 86399 Default=0
		W1	End time	u32, in seconds	1 ~ 86400 Default=86400
		W2	Report interval	u16, in seconds	1 ~ 65535 Default=3600
		W3	Weekday mask	u8, xx(hex digits)	00 ~ 7f Weekday is in hex-digit format which specifies applicable day in a week, where bit 0 represents Sunday, bit1 represents Monday, etc.
		W4	Report Media	Media type	bit0=SMS bit1=TCP bit2=UDP bit7=GPRS report format

		W5	Action	Action type	Please refer to section 2.10 for detail.
	Timer 1	X0	Start time	u32, in seconds	0 ~ 86399 Default=0
		X1	End time	u32, in seconds	1 ~ 86400 Default=86400
		X2	Report interval	u16, in seconds	1 ~ 65535 Default=3600
		X3	Weekday mask	u8, xx(hex digits)	00 ~ 7f Weekday is in hex-digit format which specifies applicable day in a week, where bit 0 represents Sunday, bit1 represents Monday, etc.
		X4	Report Media	Media type	bit0=SMS bit1=TCP bit2=UDP bit7=GPRS report format
		X5	Action	Action type	Please refer to section 2.10 for detail.
	Timer 2	Y0	Start time	u32, in seconds	0 ~ 86399 Default=0
		Y1	End time	u32, in seconds	1 ~ 86400 Default=86400
		Y2	Report interval	u16, in seconds	1 ~ 65535 Default=3600
		Y3	Weekday mask	u8, xx(hex digits)	00 ~ 7f 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	Media type	bit0=SMS bit1=TCP

					bit2=UDP bit7=GPRS report format
		Y5	Action	Action type	Please refer to section 2.10 for detail.
Stopwatch	Stopwatch 0	WA	Report interval	u32, in seconds	0, 3~4Giga Default=60
		WB	Number of report	u8	0=continuous Default=1
		WC	Report media	Media type	bit0=SMS bit1=TCP bit2=UDP bit7=GPRS report format
		WD	Action	Action type	Please refer to section 2.10 for detail.
		WE	Enable/disable stopwatch	1/0	0=disable stopwatch 1=enable stopwatch
	Stopwatch 1	XA	Report interval	u32, in seconds	0, 3~4Giga Default=60
		XB	Number of report	u8	0=continuous Default=1
		XC	Report media	Media type	bit0=SMS bit1=TCP bit2=UDP bit7=GPRS report format
		XD	Action	Action type	Please refer to section 2.10 for detail.
		XE	Enable/disable stopwatch	1/0	0=disable stopwatch 1=enable stopwatch
Counter 0		Pa	Occurring frequency for	u32,	0=no action/ report

			counter 0 to report/ make action		
		Pb	Automatically reset counter	1/0	1=enable 0=disable
		Pc	Report media of counter	Media type	bit0=SMS bit1=TCP bit2=UDP bit7=GPRS report format
		Pd	Action for counter	Action type	Please refer to section 2.10 for detail.
	Counter 1	Pg	Occurring frequency for counter 1 to report/ make action	u32,	0=no action/ report
		Ph	Automatically reset counter	1/0	1=enable 0=disable
		Pi	Report media of counter	Media type	bit0=SMS bit1=TCP bit2=UDP bit7=GPRS report format
		Pj	Action for counter	Action type	Please refer to section 2.10 for detail.
Odometer		PA	Traveled GPS distance for odometer to report / make action.	u32, in meters	0, 50~4Giga
		PC	Report media of odometer	Media type	bit0=SMS bit1=TCP bit2=UDP bit7=GPRS report format
		PD	Action for odometer	Action type	Please refer to section 2.10 for detail.

		PE	Enable/ disable odometer	1/0	0=disable 1-enable Default=1
IO Port	Analog Input	QA	Upper threshold of analog input	u16, in mV	0=no trigger
		QB	Lower threshold of analog input	u16, In mV	0=no trigger
		QC	Report media of analog input	Media type	bit0=SMS bit1=TCP bit2=UDP bit7=GPRS report format
		QD	Action for analog input	Action type	Please refer to section 2.10 for detail.
		QE	Check interval	u16, in seconds	0=disable
	ACC Input	Qa	Report media when ACC input is activated	Media type	bit0=SMS bit1=TCP bit2=UDP bit7=GPRS report format
		Qb	Report media when ACC input goes inactive	Media type	bit0=SMS bit1=TCP bit2=UDP bit7=GPRS report format
		Qc	Action when ACC input is activated	Action type	Please refer to section 2.10 for detail.
		Qd	Action when ACC input goes inactive	Action type	Please refer to section 2.10 for detail.
	Digital Input	Qg	Report media when digital input is activated	Media type	bit0=SMS bit1=TCP bit2=UDP bit7=GPRS report format

		Qh	Report media when digital input goes inactive	Media type	bit0=SMS bit1=TCP bit2=UDP bit7=GPRS report format
		Qi	Action when digital input is activated	Action type	Please refer to section 2.10 for detail.
		Qj	Action when digital input goes inactive	Action type	Please refer to section 2.10 for detail.
	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)

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 SOS 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. If parameter=(ALL), then all user configuration data will be reported.
L3	Read Geo-fence	
L4	Make GTR-128/GTR-129 connect to Server	
L5	Disconnect from Server	
LA	Restore default configuration	No argument: Restore all parameters to default setting. (W): for saving current configuration as 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, checksum) Type:1=firmware, 3=profile
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), n=digital output, 0=deactivate, 1=activate
FD	Upload file to FTP	(IP,port,username,password,type,delete) type:1=profile, 2 =debug message, delete:1=delete bug message, 0=not delete bug message

Example: Ask GTR-128/GTR-129 to send configuration parameters.
GSC,123456789012345,L1(Ra,Rb,Rc,Ri,Rj)*2a!

Example: Ask GTR-128/GTR-129 to restore default configuration.
GSC,123456789012345,LA*6a!

Example: Ask GTR-128/GTR-129 to send SMS message to 0918518518.
GSC,123456789012345,LJ(0918518518,”Please call service center ASAP.”)*3b!

Example: Ask GTR-128/GTR-129 to clear counter 0 & counter 1.
GSC,123456789012345,Lc(0,0),Lc(1,0)*4a!

Example: Ask GTR-128/GTR-129 to enable odometer and connect to server immediately.
GSC,123456789012345,Ld(E),L4*5f!

Example: Ask GTR-128/GTR-129 to activate digital output.
GSC,123456789012345,Lo(1,1)*69!

2.9 Report Media

Report media is the method that GTR-128/GTR-129 sends report. No matter how you send the command by SMS or TCP or UDP, GTR-128/GTR-129 will send the report according to the appropriate report media setting.

Report Media	**Media type**	**bit0=SMS** **bit1=TCP** **bit2=UDP** **bit6=Roaming flag** **bit7=GPRS report format**

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
Bit 6: please refer to 6.2.2 Roaming allow/ disallow
Bit 7: 1=send by format 1, 0=send by format 0
A report media byte is represented by 2 hex digits. Unused bits must be set to 0.

			Report Media Type					
bit	**7=GPRS report format**	**6=roaming flag**	**5**	**4**	**3**	**2=UDP**	**1=TCP**	**0=SMS**
Ex 1 TCP by format 0	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**
Ex 2 UDP by format 1	**1**	**0**	**0**	**0**	**0**	**1**	**0**	**0**
Ex 3 UDP by format 0	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**
Ex 4 TCP by format 0 and save reports to	**0**	**1**	**0**	**0**	**0**	**0**	**1**	**0**

buffer in roaming GSM network								

<u>Example 1</u>: Ask GTR-128/GTR-129 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!

<u>Example 2</u>: Ask GTR-128/GTR-129 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 GSM	4AH
Reset Device	4BH

Example 1: Ask GTR-128/GTR-129 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-128/GTR-129 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-128/GTR-129 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 "TR600ConfigTool_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-128/GTR-129 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-128/GTR-129 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-128/GTR-129

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.

- **Generate the configuration file (profile) by "GTR128ConfigTool_DEV.exe". Then refer the instruction of test5.gstraq.com to send the configuration to the device.**
- **Send the "GSS,….!" setting with the configuration parameters to GTR-128/GTR-129**
- **Send the "GSC,….!" command with the configuration parameters to GTR-128/GTR-129**

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 GPRS setting (D1,E0,E1)

Codeword	Parameters	Value
D1	APN	Internet
E0	Host IP 1	201.89.56.207
E1	Host Port number 1	5000

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

Example 2:
Ping GTR-128/GTR-129 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 GSM & GPRS

4.1 GPRS Setting

In order to activate the communication between server and device, the GPRS parameter is necessary to be set at the beginning. The 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 DNS1 and DNS2.

GPRS	D1	APN	char(32)	
	D2	User Name	char(32)	
	D3	Password	char(32)	
	D4	DNS 1	char(32)	
	D5	DNS 2	char(32)	
	E0	Host IP 1 or domain name	char(32)	Fixed IP or domain name
	E1	Host Port number 1	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 and D5. Please skip the fields.

The setup format of GPRS setting is "**GSS,IMEI,T,S,D1=y1,D2=y2,D3=y3,D4=y4, D5=y5, 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 0=Disable
A1	Wait confirmation from server after sending message to server	1/0	1=Enable 0=Disable Confirmation message="ACK\r"
A2	Timeout of waiting confirmation from server	u8	0~255 Default=5
A3	Device Ack with ID string	1/0	
A4	ID string is IMEI or device ID	1/0	1=IMEI, 0=Device ID 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.

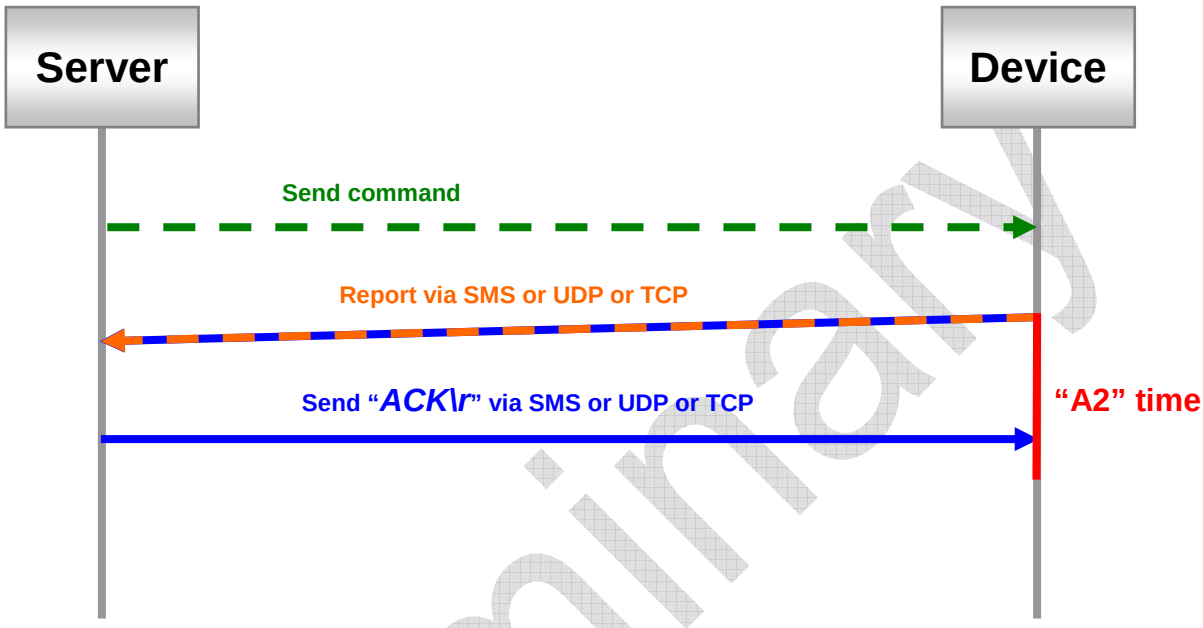
For example, set A0=1, A1=1, A3=1, A4=1, server sends command to GTR-128/GTR-129 whose IMEI is 011412000010789. After receiving command, GTR-128/GTR-129 will send acknowledgement receipt as “011412000010789,ACK\r”

For example, set A0=1, A1=1, A3=1, A4=0 and O5=”Globalsat” (device ID). After receiving command, GTR-128/GTR-129 will send acknowledgement receipt as “Globalsat,ACK\r”

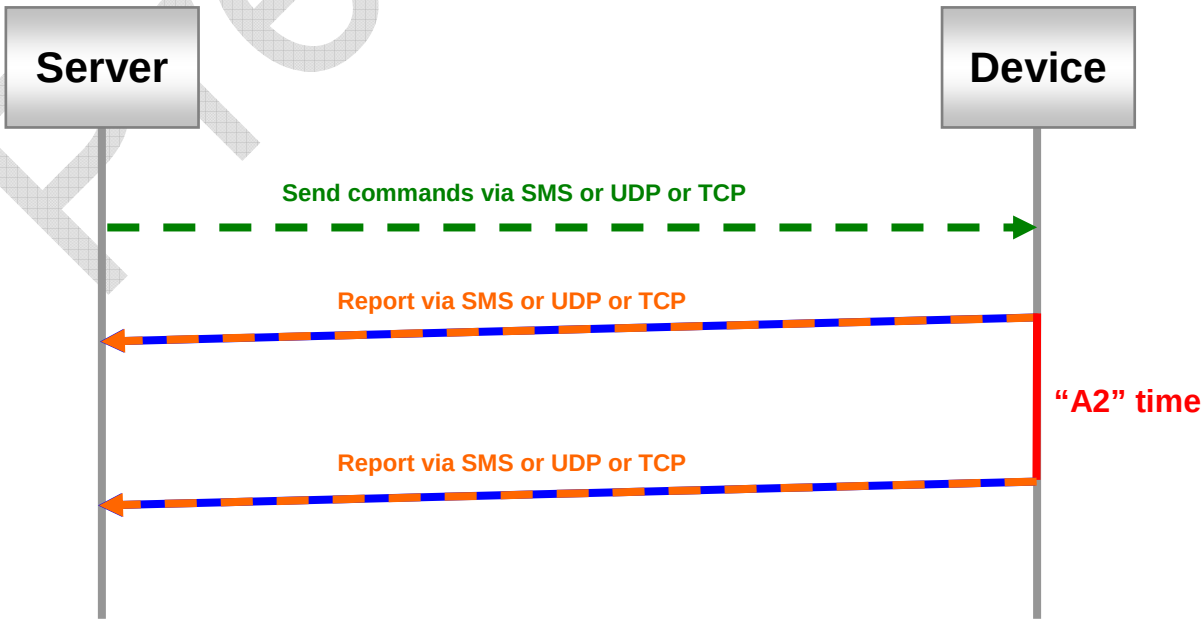
For example, set A0=1, A1=1, A3=0. After receiving the command, GTR-128/GTR-129 will send acknowledgement receipt as “ACK\r”

4.2.1 Receive Acknowledgement from Server

Received ACK from server during "A2" time:

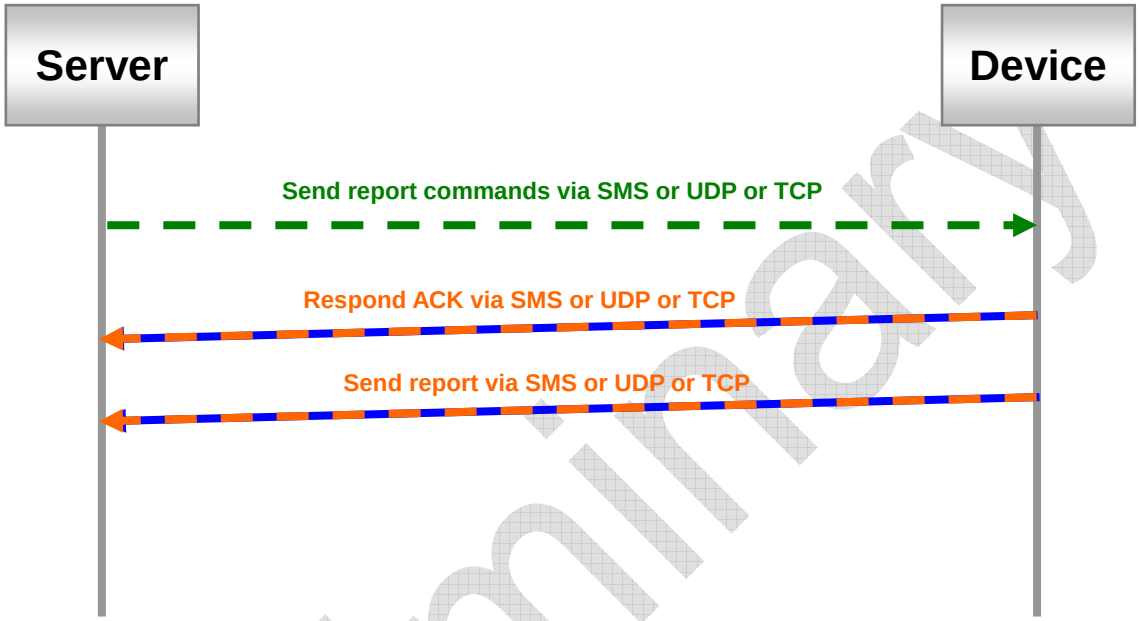


Didn't receive ACK from server during "A2" time:

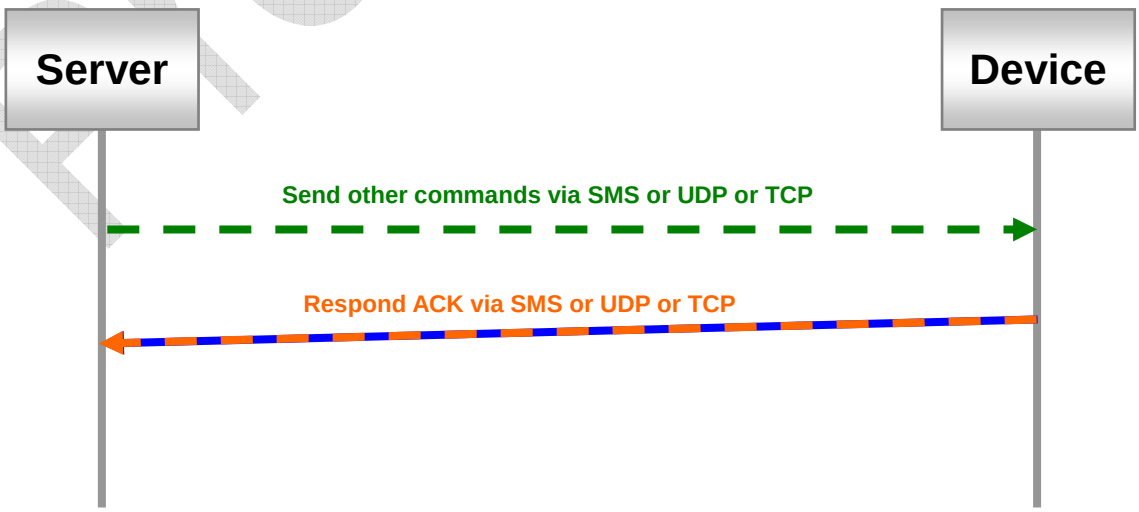


4.2.2 Respond Acknowledgement to Server

Receive report command from server:



Receive other command from server:



4.3 GPRS connection

If 'Rn' is set in moving state or 'Rf' is set in static state, then GTR-128/GTR-129 will try to keep 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, GSM 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-128/GTR-129 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-128/GTR-129 will establish GPRS connection when it wants to send UDP or TCP reports. After the report has been sent out, the device will keep 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 setup GPRS connection for receiving command or configuration messages. 'L4' command is used to achieve the purpose. GTR-128/GTR-129 will connect to server immediately when getting L4 command. After the connection is established, GTR-128/GTR-129 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 L4 command	02=TCP 04=UDP	Connection protocol for always on-line and "L4" command.
E4	Interval in on-line state for	u16, in	0=disable

	disconnecting and then re-connecting	seconds	
E5	Interval for checking if GPRS connection is on-line. If GPRS connection is cut, GTR-128/GTR-129 will try to connect to server for one time.	u16, in seconds	0=disable
E6	Enable/disable GTR-128/GTR-129 to send "IMEI,OK" to server after GPRS connection is re-built.	1/0	0=disable 1=enable Available when E5 is not 0
E7	Timeout of L4 connection	u16, in seconds	>=2, default=30
EA	Time for keeping GPRS connection after sending report	u8, in seconds	>=2, default=2
Rf	Keep GPRS on-line in static state	0/1	0=disable 1=enable
Rn	Keep GPRS on-line in moving state	0/1	0=disable 1=enable

Command format:

GSC,IMEI,L4*Checksum!

Command Codeword	Parameters
L4	Connect to server

Example: Ask GTR-128/GTR-129 to connect to server by TCP.

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

5 GPS

In the general tracking modes, GTR-128/GTR-129 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-128/GTR-129 does not get GPS fix in last report, or got GPS fix for 1 hour ago	u16, in seconds	60 ~ 600 Note: GTR-128/GTR-129 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-128/GTR-129 got GPS fix within 1 hour	u16, in seconds	10 ~ 120 Note: GTR-128/GTR-129 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 If "C3"=0, disable first report message.
Rd	GPS always on in static state	1/0	0=disable 1=enable
Rl	GPS always on in moving	1/0	0=disable

	state		1=enable

C1 example, the next report time is 10:00:00 and GTR-128/GTR-129 does not get GPS fix in last report, C1 is 180 seconds. GTR-128/GTR-129 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-128/GTR-129 got GPS fix within 1 hour, C2 is 20 seconds. GTR-128/GTR-129 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-128/GTR-129 is in the static state. When GTR-128/GTR-129 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-128/GTR-129. The command is N1. Please set the tolerance time for GTR-128/GTR-129 to get fixed before sending out the report by the parameter OS. GTR-128/GTR-129 will turn on GPS once N1 command is received. If GTR-128/GTR-129 gets GPS fix within OS time, it will send ping report as soon as it gets GPS fix. If it can not get GPS fix within the allowed time, it will send out the report at the end of OS time.

Code word	Parameters	Value	Description
OD	Report media for ping (N1) report	Media type	Please refer to section 2.9 Report media
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 Default=30

Command format:

GSC,IMEI,N1*Checksum!

Command Code word	Parameters
N1	Ping device

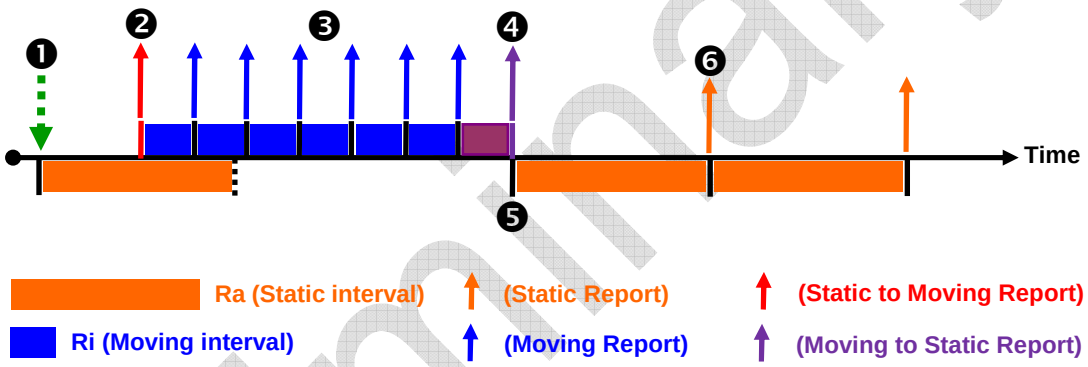
Example 1: Ping GTR-128/GTR-129 location and ask it to report via SMS no later than 20 seconds.

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

6.2 Motion Report

GTR-128/GTR-129 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. Each state has independent parameters to control the behavior.

Basically, GTR-128/GTR-129 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-128/GTR-129 detects motion, it will enter moving state and send “static to moving” report.
❸	Moving state report.
❹	When GTR-128/GTR-129 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 GPRS connection after sending reports. But you may set GPRS to be always on-line so that server can send message to device at any time. Please refer to section “4.3 GPRS connection” for the usage of always on-line connection.

GSM can be configured to be off in static state to save battery power. The device will turn GSM 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-128/GTR-129 will not send report. Action will not be triggered if action type is set to 00.

Parameter 'Rz' is used to control the sensitivity of motion sensor. The larger the value is, the less sensitive the sensor is. If Rz=0, the motion sensor is disabled and the device will be in static state.

The related parameters are listed below.

State	Code word	Parameters	Value	Description
Static state	Ra	Report interval in static state	u32, in seconds	1~4 Giga seconds
	RA	Report interval in static state at roaming GSM network when bit 6 of Rb is 1	u32, in seconds	1~4 Giga seconds
	Rb	Report Media in static state	Media type	Please refer to 2.9 Report media
	Rc	Action for static state	Action type	Please refer to 2.10 Action type
	Rd	GPS always on in static state	1/0	1=enable, 0=disable

	Re	Turn off GSM module in static state	1/0	0=turn on GSM 1=turn off GSM
	Rf	Keep GPRS on-line in static state	1/0	Available when Re=0 0=disable 1=enable
Moving state	Ri	Report interval in moving state	u32, in seconds	3~4 Giga seconds
	RI	Report interval in static state at roaming GSM network when bit 6 of Rj is 1	u32, in seconds	1~4 Giga seconds
	Rj	Report Media in moving state	Media type	Please refer to 2.9 Report media
	Rk	Action for moving state	Action type	Please refer to 2.10 Action type
	Rl	GPS always on in moving state	1/0	1=enable, 0=disable
	Rn	Keep GPRS on-line in moving state	1/0	0=disable 1=enable
	Ro	Traveled distance for sending report in moving state	0=disable 1~1000000 Unit: meter	
	Rp	Traveled distance to be judged as keeping in moving state	u16, Unit: meter	0=disable
Changing state	Rs	Report media for changing from static to moving state	Media type	Please refer to 2.9 Report media
	Rt	Report media for changing from moving to static state	Media type	Please refer to 2.9 Report media
	Ru	Action for changing from static to moving state	Action type	Please refer to 2.10 Action type
	Rv	Action for changing from moving to static state	Action type	Please refer to 2.10 Action type
	Rw	Minimum distance to be judged as moving state	u16, Unit: meter	0 ~ 65535 0=disable
	Rx	Interval for switching from validation to static state if no motion detected	u16, in seconds	0=Interval is the same with Ri
	Ry	Interval for switching from	u16, in seconds	0=Interval is the

		moving to static state if no motion detected		same with Ri
	Rz	Motion sensor sensitivity	u16	0=disable Default=5

Example 1:
Set GTR-128/GTR-129 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-128/GTR-129 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-128/GTR-129 to check angle value if speed is over 5 km/h in motion mode. Parameter 'S8' is for setting the angle change of GTR-128/GTR-129. The default of angle change is 30 degree. Setting the value of S8 to be 0 would disable the report of angle change.

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

The report type of angle change report is 8.

6.2.2 Roaming allow/disallow

While GTR-128/GTR-129 travelling to the area of the roaming GSM network, users could choose GTR-128/GTR-129 to send reports as usual as the frequency in home GSM network or to save the original frequency of reports in home GSM network to buffer storage. If there is no problem of roaming GPRS connection fee, users could set the report media of moving state and static state to be '02' or '04' (parameters 'Rb' and 'Rj').

Considering to the high GPRS traffic cost in the roaming network, users could set GTR-128/GTR-129 to save the original frequency of motion reports (parameters 'Ra' and 'Ri') to buffer storage in the area of roaming GSM network. And then send out those buffered reports to server when it returns to the home GSM network. At the same time, users could set a lower frequency for sending the reports in roaming GSM network by parameters 'RA' and 'RI'. In that condition, please set the report media of moving state and static state to be '42' or '44'. (parameters 'Rb' and 'Rj').

7. Alert

7.1 Emergency

When SOS (Emergency) button is hold and pressed over 2 seconds, The SOS flag of alarm status will be raised and GTR-128/GTR-129 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 SOS report, please send "Na" command to GTR-128/GTR-129.

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 SOS flag is dismissed by server.

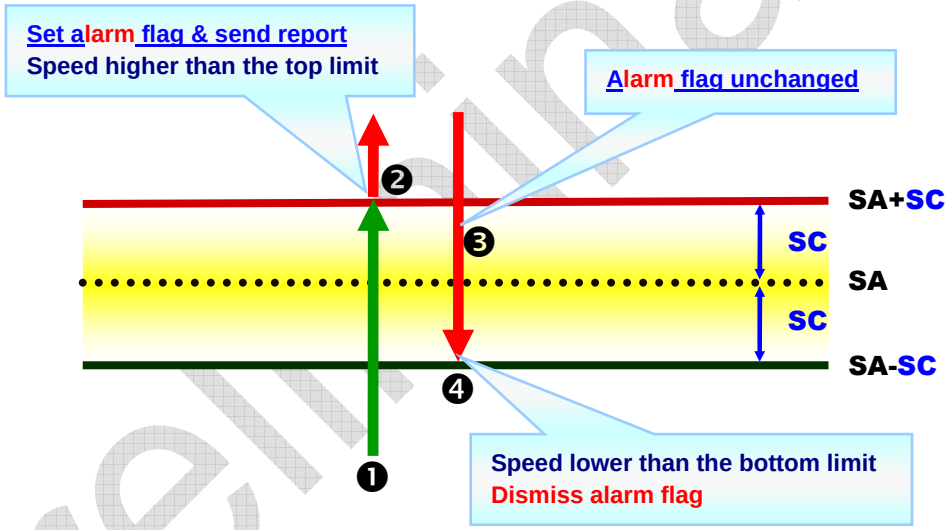
The related parameters are listed in the following table:

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
H1	Report number of SMS	u16	1 ~ 65535
H2	report interval	u16, in seconds	
H3	Report number of GPRS	u8	0=continue sending SOS alarm report till receive stop command

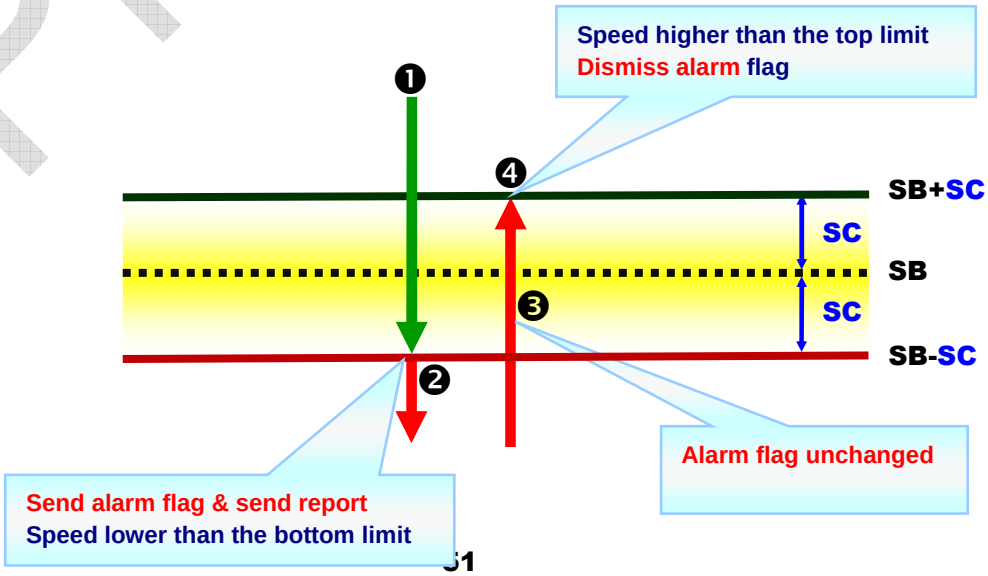
7.2 Speed Limits

GTR-128/GTR-129 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. 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.

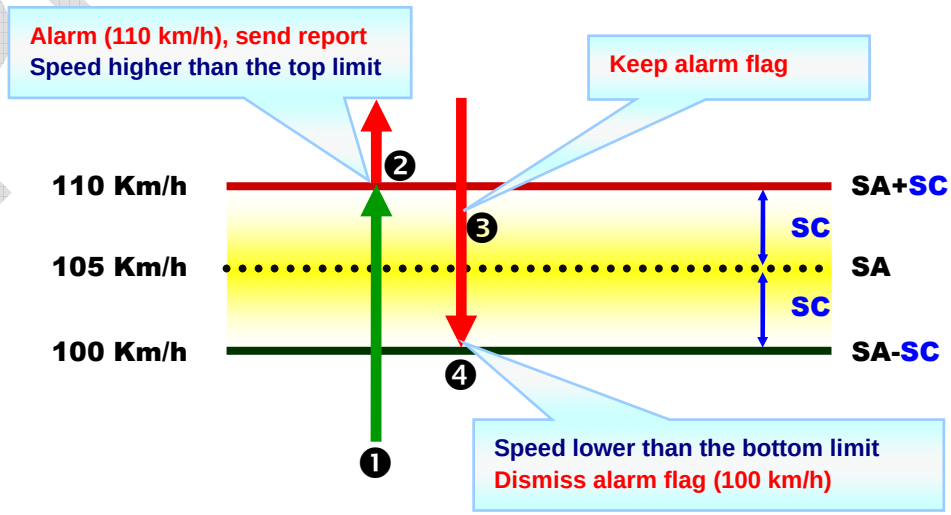
Code word	Parameters	Value
SA	Upper limit of speed alarm	u8, in Km/H 0 ~ 255 Km/H 0=disable
SB	Lower limit of speed alarm	u8, in Km/H 0 ~ 255 Km/H 0=disable
SC	Hysteresis of speed alarm	u8, in Km/H 0 ~ 255 Km/H
SD	Report media of speed alarm	Please refer to 2.9 Report media
SE	Action for high speed alarm	Please refer to 2.10 Action type.
SF	Action for low speed alarm	Please refer to 2.10 Action type.

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:

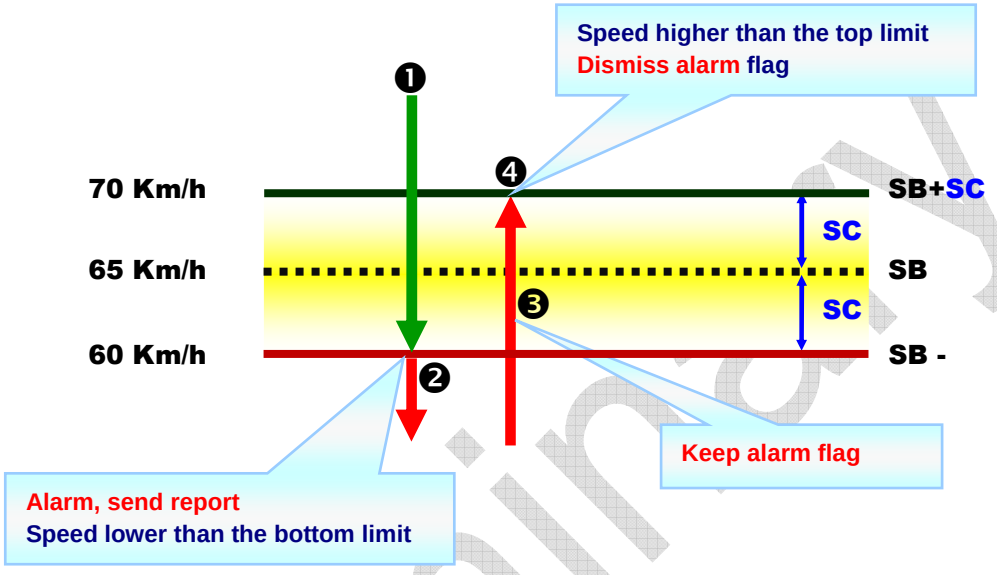


Example 2:

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!

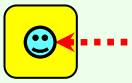
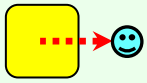
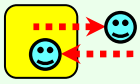
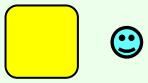
7.3 Geo-fence

Geo-fence is for setting a rectangular area as permissible area or restricted area. When GTR-128/GTR-129 gets out of the permissible area or goes in to the restricted area, GTR-128/GTR-129 will send a report and/or trigger an action.

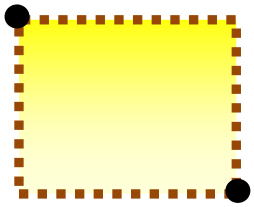
Geo-fence function needs the information of GPS to check with the settings. Please refer to chapter "5. GPS" for the setting.

GTR-128/GTR-129 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!

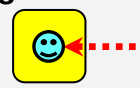
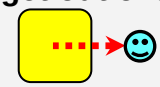
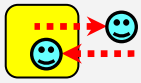
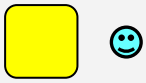
A complete geo-fence configuration message may be composed of several packets in sequence. All the area IDs in the message must be in ascending order.

'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 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 1=get in area  2=get out of area  3=cross over the boundary  4=stay in area  5=stay out of area 	Alert type of Geo-fence
upper_left_Lon, upper_left_Lat	upper_left_Lon =Lon upper_left_Lat =Lat Lon: (+ or -)ddddddddd unit: 0.000001 degree Lat: (+ or -)ddddddddd unit: 0.000001 degree	The top left coordinates of specified area
right_bottom_Lon, right_bottom_Lat	right_bottom_Lon =Lon right_bottom_Lat =Lat Lon: (+ or -)ddddddddd unit: 0.000001 degree Lat: (+ or -)ddddddddd unit: 0.000001 degree Example: 12129141 12129141 x0.000001=12.129141 degree	The right bottom coordinates of specified area

Start Time	**0~86399 sec** **Example:** **00:00:01 = 1** **23:59:59 = 86399**	
End Time	**1~86400 sec** **Example:** **00:00:01 = 1** **23:59:59 = 86399**	
weekday	**bit0=Sunday** **bit1=Monday** **bit2=Tuesday** **bit3=Wednesday** **bit4=Thursday** **bit5=Friday** **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 0=disable (default)
K3	Report media of geo-fence alarm	Media type	Please refer to 2.9 report media.
K4	Report media of reading geo-fence area	Media type	Please refer to 2.9 report media.
K6	Action for geo-fence alarm	Action type	Please refer to 2.10 action type

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-128/GTR-129 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-128/GTR-129 disable geo-fence

GSC,135097652783615,N7*38!

7.3.4 Dismiss Geo-fence Alarm

GTR-128/GTR-129 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-128/GTR-129 still stay in the geo-fence area or stay out of the area. After dismissing the geo-fence alarm, if GTR-128/GTR-129 still stays in the geo-fence area or stay out of the area, GTR-128/GTR-129 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-128/GTR-129 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-128/GTR-129 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-128/GTR-129 will send a report and/or trigger an action.

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 0=disable autonomous geo-fence Default=0
K2	Autonomous geo-fence radius	u32, in meters	>=30, default=100
K3	Report media of geo-fence alarm	Media type	Please refer to 2.9 report media.
K7	Action for autonomous geo-fence alarm	Action type	Please refer to 2.10 action type

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-128/GTR-129 will send report and/or trigger an action according to the setting of

Qa, Qb, Qc & Qd.

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.
Qb	Report media when ACC input goes inactive	Media type	Please refer to 2.9 report media.
Qc	Action when ACC input is activated	Action type	Please refer to 2.10 action type
Qd	Action when ACC input goes inactive	Action type	Please refer to 2.10 action type

Example 1:

Asking GTR-128/GTR-129 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,10339376540375,3,0,Qa=02,Qb=02,Qc=43,Qd=42*67!

7.6 Main battery alert

GTR-128/GTR-129 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.

Code word	Parameter	Value	Description
J6	Battery alarm report Media	Media type	bit0=SMS bit1=TCP bit2=UDP bit7=GPRS report format
J9	The power capacity for main battery power low alarm	u16, in mV	Default=11500
JA	The action for main battery disconnection alarm (GTR-129 only)	Action type	Please refer to 2.10 action type
JB	The action for main battery power low alarm	Action type	Please refer to 2.10 action type

7.7 Parking Alert

When parking alert is enabled, GTR-128/GTR-129 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-128/GTR-129 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"

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

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!

7.8 Jammer Alert

GTR-128/GTR-129 would detect if there is jammer interfere the GSM work, GTR-128/GTR-129 would set the flag of jammer alarm and send out jammer alarm report.

Code word	Parameters	Value	Description
Ob	Report media of jammer alarm	Media type	Please refer to 2.9 report media
Oc	Action type of jammer alarm	Action type	Please refer to 2.10 action type

Example

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.

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	
W1	End time	1~86400	
W2	Report interval	1~65535	
W3	Weekday mask	00~7f	u8, xx(hex digits)
W4	Report Media		Please refer to 2.9 Report media
W5	Action type		Please refer to 2.10 Action type.

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	
X1	End time	1~86400	
X2	Report interval	1~65535	
X3	Weekday mask	00~7f	u8, xx(hex digits)
X4	Report Media		Please refer to 2.9 Report media
X5	Action type		Please refer to 2.10 Action type.
Y0	Start time	0~86399	
Y1	End time	1~86400	
Y2	Report interval	1~65535	
Y3	Weekday mask	00~7f	u8, xx(hex digits)
Y4	Report Media		Please refer to 2.9 Report media
Y5	Action type		Please refer to 2.10 Action type.

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

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

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-128/GTR-129 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.

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
Pb	Automatically reset counter 0	1/0	1=enable 0=disable
Pc	Report media of counter 0	Media type	Please refer to 2.9 media type
Pd	Action for counter 0	Action type	Please refer to 2.10 Action type.
Pg	Occurring frequency for counter 1 to report/ make action	u32	0=no action/ report
Ph	Automatically reset counter 1	1/0	1=enable 0=disable
Pi	Report media of counter 1	Media type	Please refer to 2.9 media type
Pj	Action for counter 1	Action type	Please refer to 2.10 Action type.

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

Command Codeword	Parameters
Lc	Counter control : Lc(n,a) n=counter 0~1 a=0: clear counter a=1: increment counter

Example 1: Ask GTR-128/GTR-129 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-128/GTR-129. 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.

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	
PC	Report media of odometer	Media type	bit0=SMS bit1=TCP bit2=UDP bit7=GPRS report format
PD	Action for odometer	Action type	Please refer to 2.10 Action type.
PE	Enable/disable odometer	1/0	0=disable 1=enable Default=1

Command format:

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

Command Codeword	Parameters
Ld	Odometer control (C)=clear, (D)=disable, (E)=enable

Example 1: Ask GTR-128/GTR-129 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, SOS 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.

There are two types of GPRS report format, "format 0" and "format 1". Typically format 0 is used for normal report which contains as much information as possible, and format 1 is used for heart beat report which contains necessary information to notify the server that the device is working properly.

Selection of report format 0/1 is defined in the report media setting for respective report condition. Please refer to section "2.9 Report media" for detail.

Format 0 and format 1 are configurable by setting O3 & ON respectively.
There are three types of SMS messages. The first type is the same as GPRS report which is not friendly for reading. In order to overcome this drawback, you could choose Google map format or GeoSMS format for easy reading.

12.1 Format 0 of Report Messages

Format 0 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 codeword. Please collect the required codeword and put them together to form a string and set to "O3". Then GTR-128/GTR-129 will generate report according to the codeword sequence and translate to corresponding information.

Parameter's Codeword	Description
O3	Report format 0

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

Example 1:

Set report format 0 by configuration message.
GSS,135785412249986,3,0,O3=TSPRXAB27GHKLMnaicz*U!*4d!

Then format 0 report 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,Capacity of battery that presently supplied to GTR/128/GTR-129,analog_input_value,odometer_value,GSM_signal_strength,cell_ID*checksum!

For example:
GSr,135785412249986,01,I,EA02,,3,230410,153318,E12129.2839,N2459.8570,0,1.17,212,8,1.0,12.3V*55!

Example 2:
Ask GTR-128/GTR-129 report "format of format 0" (Send command via SMS or TCP or UDP)
GSC,136647890362718,3,0,L1(O3)*6D!

GTR-128/GTR-129 receives the command and reports the following message.
GSs,136647890362718,3,0,O3=TSPRXAB27GHKLMnaicz*U!*46!

12.2 Format 1 of Report Messages

Format 1 report is prefixed by "GSh". Its content is configurable by setting parameter "ON". Please refer to section 2.6 for the available report parameter and the respective codeword. Please collect the required codeword and put them together to form a string and set to "ON". Then GTR-128/GTR-129 will generate report according to the codeword sequence and translate to corresponding information.

Parameter's Codeword	Description
ON	Report format 1

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

Example 1:

Set GTR-128/GTR-129 format 1 of report by configuration message.

GSS,131826789036289,3,0,ON=SARY*U!*46!

Then format 1 report will be in the following format.

GSh,IMEI,GPS_Fix status,report type,joint I/O status*checksum!

For example:

GSh,131826789036289,3,M,ea04*3d!

Example 2:

Ask GTR-128/GTR-129 report "format of format 1" (Send command via SMS or TCP or UDP)

GSC,131826789036289,3,0,L1(ON)*36!

GTR-128/GTR-129 receives the command and reports the following message

GSs,131826789036289,3,0,ON=SARY*U!*20!

12.3 SMS Format Report

If the SMS flag of the report media is enabled when GTR-128/GTR-129 is generating report, a SMS report will be sent to the phone number defined by F0. There're two types of SMS message. The first one is the same as GPRS messages described in the above sections. The second type is a configurable text which is designed for easy reading. Parameter 'F2' is used to control SMS message type.

Code word	Parameters	Value	Description
F0	SMS return phone number	char(20)	
F2	SMS format 1	1/0	0=Same as GPRS report 1=Google format 2=GEO SMS

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
X field	Refer to X field table
GSM signal	Range=1~30 (the bigger number indicates the stronger GSM signal)
Speed	Default unit: km/h
Battery voltage	Unit=mV or percentage (GTR-129 only)
Latitude and Longitude in Google format	

Example:

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

GeoSMS Format:

Content	Description
Open GeoSMS format GeoSMS/ Version Number;Latitue;Longitude	
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
X field	Refer to X field table
GSM signal	Range=1~30 (the bigger number indicates the stronger GSM signal)
Speed	Default unit: km/h
Battery voltage	Unit=mV or percentage (GTR-129 only)
Latitude and Longitude in	

Example:

GeoSMS/2;2504.8015,N;12133.9766,E;E;Ping report,110727 02:48,3D fix,16,23,12000mV

13 Error Report

When specific errors like the temperature is over than the tolerance for charging device or there is no GPS signal or there is no GSM signal, GTR-128/GTR-129 would send error report/ make action. The report type of error report is 'E.' The concerning parameters are as below.

Code word	Parameters	Value	Description
Od	Report media of error report	Media type	bit0=SMS bit1=TCP bit2=UDP bit7=GPRS report format
Oe	Action for error	Action type	Please refer to 2.10 Action type.

The error would be shown as "text" and in the field of "X" parameter.

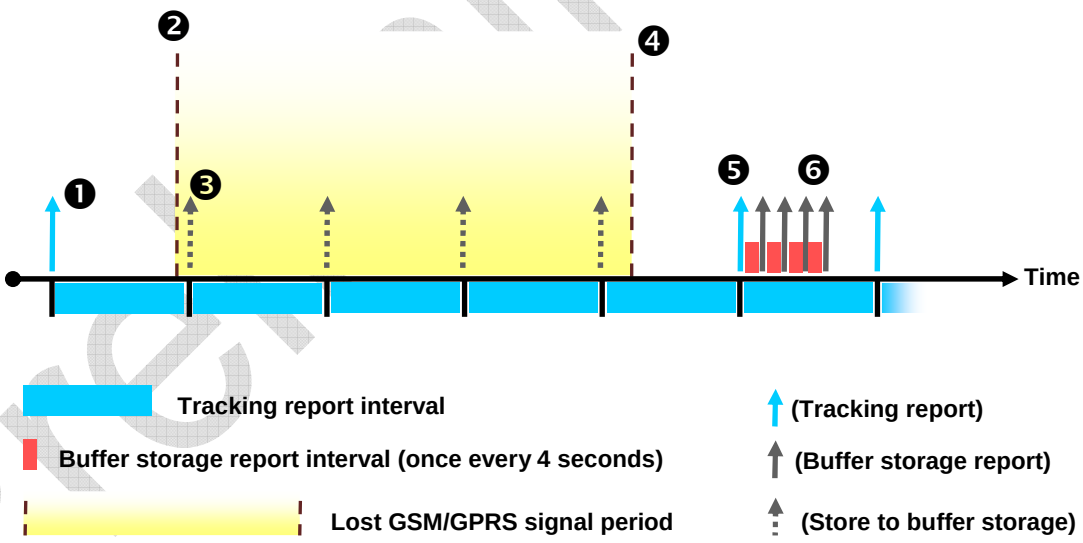
1. **When there is error message produced by GSM module, the field of "X" parameter would show "+CME ERROR."**
2. **When the temperature is over the working operation, the field of "X" parameter would show "Over operation temperature."**
3. **When the temperature is over the charging tolerance, the field of "X" parameter would show "Over charging temperature."**
4. **When tracker cannot detect GPS signal, the field of "X" parameter would show "GPS abnormal."**
5. **When tracker cannot register GSM network, the field of "X" parameter would show "GSM abnormal."**
6. **When there is problem for saving report to buffer or debug message, the field of "X" parameter would show "Flash error."**

14 Buffer Storage

When GTR-128/GTR-129 is carried to the areas without GSM/GPRS signal coverage, GTR-128/GTR-129 could not send reports to server. In order not to lose the location report, GTR-128/GTR-129 will save the location reports during the periods without GSM/GPRS signal to buffer storage. When GTR-128/GTR-129 is moved to the areas with GSM/GPRS signal, it will retrieve the reports in the buffer storage and send them to server. GTR-128/GTR-129 could save up to 1530 pieces of location reports to buffer storage.

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 GSM/GPRS signal coverage.
❸	Save location report to buffer storage
❹	Enter area with GSM/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 1=enable (default)

14.1 Bulk uploading of Buffered Report to Server

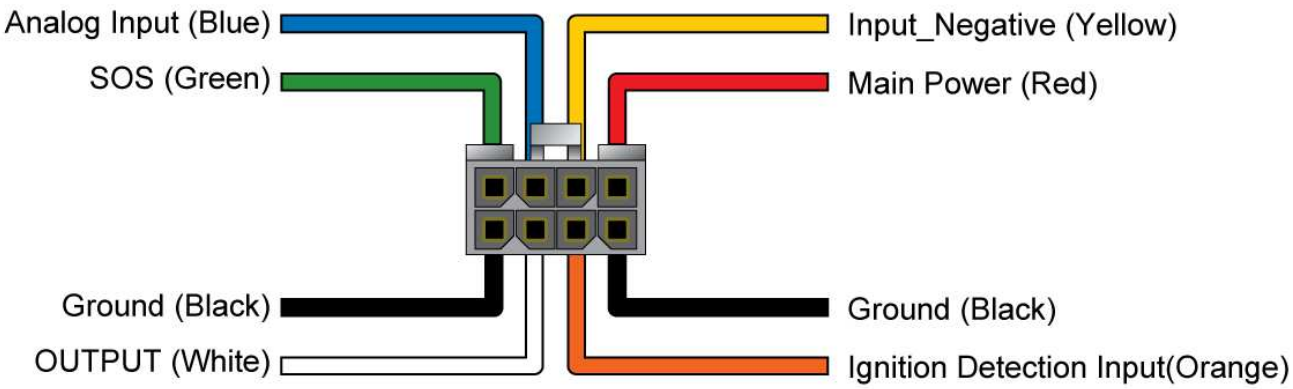
Because of no good GPRS coverage or of GSM-roaming conditions, there might be accumulated a lot of unsent reports in the buffer storage. When GTR-128/GTR-129 starts to upload buffered reports to server, it can take a lot of time. User could set GTR-128/GTR-129 to concatenate several buffered reports into one string and send it to server. When server confirms the receiving, GTR-128/GTR-129 could send the following buffered reports. It could speed up the uploading of buffered reports and save the 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-128/GTR-129 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	**SOS** (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-128/GTR-129 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 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	
QB	The fuel level for sending out fuel low alarm report	u16, in m V	
QC	Report media of fuel low alarm	Media type	Please refer to “2.9 report media.”
QD	Action for fuel low alarm	Action type	Please refer to “2.10 action type.”
QE	Check interval	u16, in seconds	0=disable

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-128/GTR-129 to make report and/or action when digital input is activated or inactive. 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.”
Qh	Report media when digital input goes inactive	Media type	Please refer to “2.9 report media.”
Qi	Action when digital input is activated	Action type	Please refer to “2.10 action type.”
Qj	Action when digital input goes inactive	Action type	Please refer to “2.10 action type.”
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 reflect 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)	

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-128/GTR-129 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-128/GTR-129", "GTR-128/GTR-129 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-128/GTR-129 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-128/GTR-129 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** **=0 → deactivate**
Autonomous geo-fence	**AG**	**[=XXX→ activate and set the radius]** **(XXX must be greater than 30.)** **=0 → deactivate**
Link Server	**LI**	
Parking alert	**PK**	**=1→ activate** **=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-128/GTR-129 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-128/GTR-129 whose IMEI is 011412000010789.
The command is "GSS,011412000010789,3,1,Oa=VICTORY*2a!"
For example, cancel the password of GTR-128/GTR-129 whose IMEI is 011412000010789.
The command is GSS,011412000010789,3,1,Oa=*5b!"

Example 1, ping GTR-128/GTR-129 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-128/GTR-129 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-128/GTR-129 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 GR-128/GTR-129 to specify download information including the FTP host address, port, user name, password, target file & file size. Then GTR-128/GTR-129 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

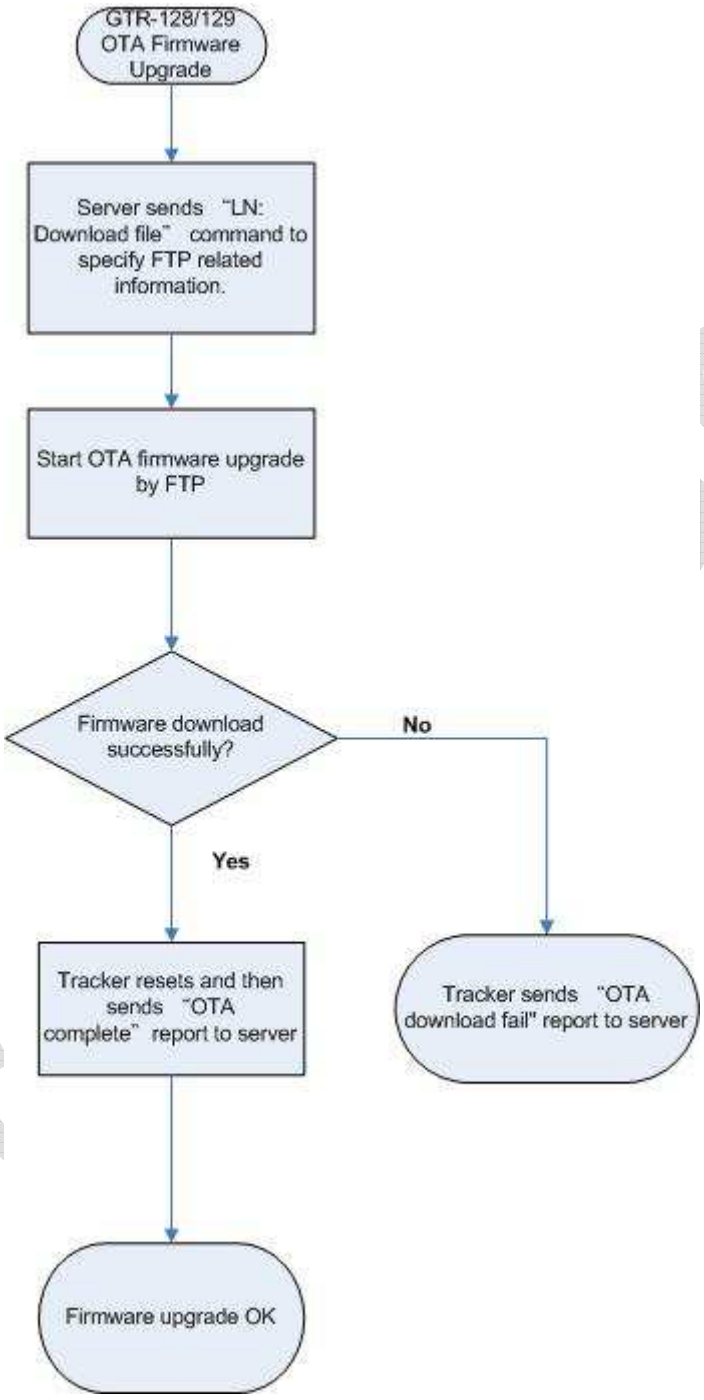
- **IP: FTP host address**
- **Port: FTP host port**
- **UN: FTP user name**
- **PSW: FTP password**
- **Type: 1=firmware**
- **Filename: firmware filename to be downloaded**
- **Size: file size**

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-128/GTR-129 again.


GTR-128/129 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

17.2 OTA Setting Configuration

Without connecting GTR-128/GTR-129 to PC for setting the required parameters, you could set the parameters by configuration tool and save the configurations as a profile. Then upload the configuration file to FTP site. Then server sends LN (Download) to GR-128/GTR-129 to specify download information including the FTP host address, port, user name, password, target file & file size. Then GTR-128/GTR-129 will connect to FTP host and start downloading the file.

The command for OTA setting configuration 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: 3=profile (configuration file)**
- **Filename: configuration filename to be downloaded**
- **Size: file size**

For example:

GSC,123456789012345,LN(ftp.abc.com.tw,21,setting,setpwd,3,gtr128setting.pro,1292)*0a!

The report type of successful OTA setting configuration is 'w'. For example:

GSr,123456789012345,4,w,00,,3,250310,113916,E12029.2620,N2059.9890,0,1.16,0,8,0.8,05*1e!

The report type of OTA setting configuration failure is 'x'. For example:

GSr,123456789012345,4,x,00,,3,250310,113916,E12029.2620,N2059.9890,0,1.16,0,8,0.8,05*11!

Note:
You could get the configuration tool at Support→ Tools on menu bar of http://test5.gstraq.com/

17.3 OTA Uploading Debug Message

While bug occurs on GTR-128/GTR-129, there is no need to take down the device from vehicle or equipment and get out the debug message for transmitting it to PC. You could make GTR-128/GTR-129 upload its debug message to FTP site by sending command.

The command for OTA Uploading debug message is

“GSC,IMEI,FD(IP,port,UN,PSW,type,delete)*checksum!”, where

IP: FTP host address

Port: FTP host port

UN: FTP user name

PSW: FTP password

Type: 2=debug message

Delete: 1=delete bug message,

0=not delete bug message

For example:

GSC,123456789012345,FD(ftp.abc.com.tw,21,setting,setpwd,2,1)*71!

The report type of successful OTA uploading debug message is ‘y’. For example:

GSr,123456789012345,4,y,00,,3,250310,113916,E12029.2620,N2059.9890,0,1.16,0,8,0.8,05*1e!

The report type of OTA uploading debug message failure is ‘z’. For example:

GSr,123456789012345,4,z,00,,3,250310,113916,E12029.2620,N2059.9890,0,1.16,0,8,0.8,05*11!