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GPS Tracker
Communication Protocol

(JM-VL03)

Change History

Author	Date	Version	Reviewed By	Approved By	Description
Bian Yutao	Dec. 9, 2015	1.0.0			Initial release
Bian Yutao	Mar. 3, 2017	1.1.0			Added plug-in module transparent protocol
Bian Yutao	Apr. 14, 2017	1.1.1			Added description of online command replies
Bian Yutao	Oct. 14, 2017	1.1.2			Synchronized audio recording protocol

Contents

I. Protocol Packet Format

Format	Length (Byte)	Description
Start Bit	2	0x78 0x78 (1 byte) or 0x79 0x79 (2 bytes)
Packet Length	1 (2)	Length = Protocol number + Information content + Information sequence number (SN) + CRC
Protocol Number	1	It indicates the type of the transfer packet (see the following table for details).
Information Content	N	It is determined by different applications and their "protocol numbers".
Information SN	2	The SN will be automatically added by "1" for each data sending after power-on.
CRC	2	It is the CRC-ITU value from "Packet Length" to "Information SN". If the receiver receives a packet that contains a CRC error, it ignores the error and discards the packet (See Attachment 1 for algorithm details).
Stop Bit	2	It is fixed at 0x0D 0x0A.

1. Protocol Number Details

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II. Protocol Packet Details

1. Login Packet

Description:

- **A login packet is used to establish connection between the terminal and the platform. It carries terminal information.**
- **When the GPRS link is established, the terminal will send a login packet to the server. If a return packet is received within 5 seconds, the link is through; otherwise, the terminal will continue to send login packets.**
- **If no return packet is received within 5 seconds, the terminal will regard it as response timeout.**
- **If the timeout counts reach 3, the terminal will enable timed restart.**

a) Login Packet

Login Packet

		Length	Details
Start Bit		2	0x78 0x78
Packet Length		1	Length = Protocol number + Information content + Information SN + CRC
Protocol Number		1	0x01
Information Content	Terminal ID	8	Example: If the IMEI is 123456789123456, then the terminal ID is 0x010x230x450x670x890x120x340x56.
	Type Identity Code	2	It is used to judge the type of a terminal.
	Time Zone/Language	2	See the following table for details.
Information SN		2	The SN will be automatically added by "1" for each data sending after power-on.
CRC		2	It is the CRC-ITU value from "Packet Length" to "Information SN". If the receiver receives a packet that contains a CRC error, it ignores the error and discards the packet (See Attachment 1 for algorithm details).
Stop Bit		2	It is fixed at 0x0D 0x0A.

Example data: 78781101075253367890024270003201000512790D0A

Time Zone/Language

One and a half byte (bit15–bit4)	15	It is a value calculated by expanding the time zone by 100.
	14	
	13	
	12	
	11	
	10	
	9	
	8	
	7	

	6		
	5		
	4		
Lower half byte (bit4–bit0)	3	GMT	
	2	It is not defined.	
	1	Language select bit	1
	0	Language select bit	0

Bit3 0-------Eastern time
1-------Western time
If: the extended bit "0X32 0X00" refers to "GMT+8:00",
then the GTM in Hex is "0X0320", which is converted from "8*100=800".

The extended bit "0X4D 0XD8" refers to "GMT-12:45",
then the GTM in Hex is "0X04,0XDD", which is converted from "12.45*100=1245".

Here, to save 4 bytes, the calculation result shifts to the left for 4 bits cyclically and combines the eastern time, western time, and language select bit.

b) Server Responding to Login Packet

	Length	Details
Start Bit	2	0x78 0x78
Packet Length	1	Length = Protocol number + Information content + Information SN + CRC
Protocol Number	1	0x01
Information SN	2	The SN will be automatically added by "1" for each data sending after power-on.
CRC	2	It is the CRC-ITU value from "Packet Length" to "Information SN". If the receiver receives a packet that contains a CRC error, it ignores the error and discards the packet (See Attachment 1 for algorithm details).
Stop Bit	2	It is fixed at 0x0D 0x0A.

Example data: 7878050100059FF80D0A

2. Heartbeat Packet

Description:

- **The heartbeat packet is used to maintain GPRS link connectivity.**
- **When the GPRS link is established, the terminal will send a heartbeat packet to the server. If a return packet is received within 5 seconds, the link is through. In this case, new heartbeat packets will be sent in a timed manner.**
- **If no return packet is received within 5 seconds, the terminal will regard it as response timeout.**
- **If the timeout counts reach 3, the terminal will enable timed restart.**

a) The terminal sends a heartbeat packet.

Heartbeat Packet

		Length	Details
Start Bit		2	0x78 0x78
Packet Length		1	Length = Protocol number + Information content + Information SN + CRC
Protocol Number		1	0x13
Information Content	Terminal Information Content	1	See the following table for details.
	Voltage Level	1	0X00: No power (power off) 0x01: Battery extremely low (making calls or sending SMS's are impossible) 0x02: Battery very low (low battery alert will be triggered) 0x03: Battery low (the device can be used as usual) 0x04: Battery medium 0x05: Battery high 0x06: Battery extremely high
	GSM Signal Strength	1	0x00: No signal 0x01: Extremely weak signal 0x02: Weak signal 0x03: Good signal 0x04: Strong signal
	Language/Extended Port Status	2	Latter bit, where "0x01" refers to Chinese and "0x02" English.
Information SN		2	The SN will be automatically added by "1" for each data sending after power-on.
CRC		2	It is the CRC-ITU value from "Packet Length" to "Information SN". If the receiver receives a packet that contains a CRC error, it ignores the error and discards the packet (See Attachment 1 for algorithm details).
Stop Bit		2	It is fixed at 0x0D 0x0A.

Example data: 78780A134004040001000FDCEE0D0A

Terminal information content details

It occupies 1 byte and indicates various status information of the mobile phone.

Bit		Code Connotation
BYTE	Bit7	1: Cut off fuel/power
		0: Restore fuel/power
	Bit6	1: Position fixed
		0: Not Positioned
	Bit3–Bit5	Extended bit
	Bit2	1: Charge with power connected
		0: Charge with no power connected
	Bit1	1: ACC on
		0: ACC off
	Bit0	1: Defense on
		0: Defense off

b) Return packet (from server)

	Length	Details
Start Bit	2	0x78 0x78
Packet Length	1	Length = Protocol number + Information content + Information SN + CRC
Protocol Number	1	0x13
Information SN	2	The SN will be automatically added by "1" for each data sending after power-on.
CRC	2	It is the CRC-ITU value from "Packet Length" to "Information SN". If the receiver receives a packet that contains a CRC error, it ignores the error and discards the packet (See Attachment 1 for algorithm details).
Stop Bit	2	It is fixed at 0x0D 0x0A.

Example data: 78 78 05 13 01 00 E1 A0 0D 0A

3. GPS Location Packet

Description:

- **The location packet carries the location data of the terminal.**
- **After the GPS module is positioned and the connection is established, the terminal will upload data about fixes by preset rules.**
- **After the connection is established and there are cache fixes, the terminal will upload these cache fixes.**

a) Location packet (sent by terminal)

Location packet

		Length	Details
Start Bit		2	0x78 0x78
Packet Length		1	Length = Protocol number + Information content + Information SN + CRC
Protocol Number		1	0x22 (UTC)
Information Content	Date and time	6	Year (1 byte) Month (1 byte) Day (1 byte) Hour (1 byte) Minute (1 byte) Second (1 byte) (which must convert to decimal)
	Number of Satellites	1	The first character refers to GPS Information Length; while the second character refers to Number of Satellites that involve in positioning (which must convert to decimal).
	Latitude	4	It is a value calculated by converting to decimal which is further divided by 1,800,000.
	Longitude	4	It is a value calculated by converting to decimal which is further divided by 1,800,000.
	Speed	1	It is a value in decimal.
	Course and Status	2	Convert to a 16-bit binary. Please calculate by bit (see the following table for details).
	MCC	2	Mobile Country Code (convert to decimal)
	MNC	1	Mobile Network Code (convert to decimal)
	LAC	2	Location Area Code (convert to decimal)
	CellID	3	Cell Tower ID (convert to decimal)
	ACC	1	It indicates the ACC status, where "00" means ACC off and "01" ACC on (unavailable on GT06)
	Data upload mode	1	The mode to upload GPS data points (unavailable on GT06) 0x00: Upload in fixed interval 0x01: Upload at fixed distance 0x02: Upload at cornering point 0x03: Upload upon ACC status change 0x04: Upload the last fix after the status changes from moving to still 0x05: Upload the last valid fix prior to network interruption and reconnection 0x06: Force to upload a GPS fix upon ephemeris refresh 0x07: Upload a fix upon key press

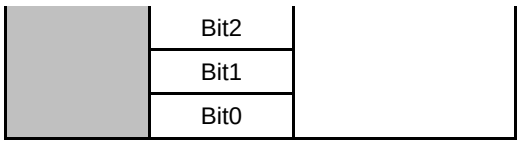
			0x08: Upload location information upon power-on 0x09: Not used 0x0A: Upload the last longitude and latitude and update the time after the device goes still 0x0B: Parse the uploaded longitude and latitude packet over WiFi 0x0C: Upload upon LJDW (immediate position) command 0x0D: Upload the last longitude and latitude after the device goes still 0x0E: GPSDUP upload (upload at a fixed interval in still state) 0x0F: Exit tracking mode
	GPS data re-upload	1	0x00: Real-time upload; 0x01: Re-upload
	Mileage statistics	4	Convert to decimal to get the result (For products without this feature, there is no such place in the packet)
Information SN		2	The SN will be automatically added by "1" for each data sending after power-on.
CRC		2	It is the CRC-ITU value from "Packet Length" to "Information SN". If the receiver receives a packet that contains a CRC error, it ignores the error and discards the packet (See Attachment 1 for algorithm details).
Stop Bit		2	It is fixed at 0x0D 0x0A.

Example data:
787822220F0C1D023305C9027AC8180C46586000140001CC00287D001F71000001000820860D0A

i. Status and course details

This occupies 2 bytes to indicate the moving direction of the terminal. The value range is 0–360°. It regards due north as 0° and counts clockwise.

BYTE_1	Bit7	0
	Bit6	0
	Bit5	GPS Real-time/Differential Positioning
	Bit4	Positioned or Not
	Bit3	East/West longitude
	Bit2	South/North latitude
	Bit1	Course
	Bit0	
BYTE_2	Bit7	
	Bit6	
	Bit5	
	Bit4	
	Bit3	



For example: the value is 0x15 0x4C, the corresponding binary is 00010101 01001100,

BYTE_1 Bit7	0
BYTE_1 Bit6	0
BYTE_1 Bit5	0 (real time GPS)
BYTE_1 Bit4	1 (GPS has positioned)
BYTE_1 Bit3	0 (East Longitude)
BYTE_1 Bit2	1 (North Latitude)
BYTE_1 Bit1	0
BYTE_1 Bit0	1
BYTE_2 Bit7	0
BYTE_2 Bit6	1
BYTE_2 Bit5	0 → Course 332° (0101001100 in binary, or 332 in decimal)
BYTE_2 Bit4	0
BYTE_2 Bit3	1
BYTE_2 Bit2	1
BYTE_2 Bit1	0
BYTE_2 Bit0	0

which means GPS tracking is on, real time GPS, location at north latitude, east longitude and the course is 332°.

b) Return packet (from server)

No return packet is required from the server.

4. LBS Multi-Base Extended Information Packet

Description:

- **It is used to transmit location information when the terminal doesn't locate.**

a) LBS extended information packet (sent by terminal)

		Length	Details
Start Bit		2	0x78 0x78
Packet Length		1	Length = Protocol number + Information content + Information SN + CRC
Protocol Number		1	0x28
Information Content	UTC	6	Year (1 byte) Month (1 byte) Day (1 byte) Hour (1 byte) Minute (1 byte) Second (1 byte) (which must convert to decimal)
	MCC	2	Mobile Country Code (convert to decimal)
	MNC	1	Mobile Network Code (convert to decimal)
	LAC	2	Location Area Code (convert to decimal)
	CI	3	Cell Tower ID (Cell ID) (convert to decimal)
	RSSI	1	It indicates the signal strength of a cell. Its value range is 0x00–0xFF, where "0x00" indicates the signal is the weakest; while "0xFF" the strongest.
	NLAC1	2	Same as LAC
	NCI1	3	Same as CI
	NRSSI1	1	Same as RSSI
	NLAC2	2	Same as LAC
	NCI2	3	Same as CI
	NRSSI2	1	Same as RSSI
	NLAC3	2	Same as LAC
	NCI3	3	Same as CI
	NRSSI3	1	Same as RSSI
	NLAC4	2	Same as LAC
	NCI4	3	Same as CI
	NRSSI4	1	Same as RSSI
	NLAC5	2	Same as LAC
	NCI5	3	Same as CI
	NRSSI5	1	Same as RSSI
	NLAC6	2	Same as LAC
	NCI6	3	Same as CI
	NRSSI6	1	Same as RSSI
	Timing Advance	1	It refers to the difference between the actual length of time that a signal takes to reach the base station from a mobile station and the length of time that a signal takes to reach the base station from a mobile station when the distance

			between the two is "0".
	Language	2	Latter bit, where "0x01" refers to Chinese and "0x02" English.
Information SN		2	The SN will be automatically added by "1" for each data sending after power-on.
CRC		2	It is the CRC-ITU value from "Packet Length" to "Information SN". If the receiver receives a packet that contains a CRC error, it ignores the error and discards the packet (See Attachment 1 for algorithm details).
Stop Bit		2	It is fixed at 0x0D 0x0A.

Example data:
78783B2810010D02020201CC00287D001F713E287D001F7231287D001E232D287D001F4018000000000000000000000000000000000000FF00020005B14B0D0A

b) Return packet (from server)
No return packet is required from the server.

5. Alarm Packet

Description:

- **It is used to transmit the terminal-defined alarm content.**
- **The server responds to the alarm content received and sends the address parsed from the longitude and latitude to the terminal.**
- **Then the terminal sends the address received to the preset SOS number.**

a) Alarm packet (sent by terminal)

Alarm packet (single geofence)

		Length	Details
Start Bit		2	0x78 0x78
Packet Length		1	Length = Protocol number + Information content + Information SN + CRC
Protocol Number		1	0x26 (UTC)
Information Content	Date and time	6	Year (1 byte) Month (1 byte) Day (1 byte) Hour (1 byte) Minute (1 byte) Second (1 byte) (which must convert to decimal)
	Number of Satellites	1	The first character refers to GPS Information Length; while the second character refers to Number of Satellites that involve in positioning (which must convert to decimal).
	Latitude	4	It is a value calculated by converting to decimal which is further divided by 1,800,000.
	Longitude	4	It is a value calculated by converting to decimal which is further divided by 1,800,000.
	Speed	1	It is a value in decimal.
	Course and Status	2	Convert to a 16-bit binary. Please calculate by bit (see GPS location packet for details).
	LBS length	1	Total length of LBS information (Self-length + MCC + MNC + LAC + CellID)
	MCC	2	Mobile Country Code (convert to decimal)
	MNC	1	Mobile Network Code (convert to decimal)
	LAC	2	Location Area Code (convert to decimal)
	CellID	3	Cell Tower ID (convert to decimal)
	Terminal information	1	See the following table for details.
	Voltage Level	1	0X00: No power (power off) 0x01: Battery extremely low (making calls or sending SMS's are impossible) 0x02: Battery very low (low battery alert will be triggered) 0x03: Battery low (the device can be used as usual) 0x04: Battery medium 0x05: Battery high 0x06: Battery extremely high
	GSM signal strength	1	0x00: No signal 0x01: Extremely weak signal

			0x02: Weak signal 0x03: Good signal 0x04: Strong signal
	Alert and language	2	See the following table for details.
	Mileage statistics	4	Convert to decimal to get the result (For products without this feature, there is no such place in the packet)
Information SN		2	The SN will be automatically added by "1" for each data sending after power-on.
CRC		2	It is the CRC-ITU value from "Packet Length" to "Information SN". If the receiver receives a packet that contains a CRC error, it ignores the error and discards the packet (See Attachment 1 for algorithm details).
Stop Bit		2	It is fixed at 0x0D 0x0A.

Example data:
787825260F0C1D030B26C9027AC8180C4658600004000901CC00287D001F718004041302000C472A0D0A

Alarm packet (multiple geofences)

		Length	Details
Start Bit		2	0x78 0x78
Packet Length		1	Length = Protocol number + Information content + Information SN + CRC
Protocol Number		1	0x27 (UTC)
Information Content	Date and time	6	Year (1 byte) Month (1 byte) Day (1 byte) Hour (1 byte) Minute (1 byte) Second (1 byte) (which must convert to decimal)
	Number of Satellites	1	The first character refers to GPS Information Length; while the second character refers to Number of Satellites that involve in positioning (which must convert to decimal).
	Latitude	4	It is a value calculated by converting to decimal which is further divided by 1,800,000.
	Longitude	4	It is a value calculated by converting to decimal which is further divided by 1,800,000.
	Speed	1	It is a value in decimal.
	Course and Status	2	Convert to a 16-bit binary. Please calculate by bit (see GPS location packet for details).
	LBS length	1	Total length of LBS information (Self-length + MCC + MNC + LAC + CellID)
	MCC	2	Mobile Country Code (convert to decimal)
	MNC	1	Mobile Network Code (convert to decimal)
	LAC	2	Location Area Code (convert to decimal)
	CellID	3	Cell Tower ID (convert to decimal)
	Terminal information	1	See the following table for details.

	Voltage Level	1	0X00: No power (power off) 0x01: Battery extremely low (making calls or sending SMS's are impossible) 0x02: Battery very low (low battery alert will be triggered) 0x03: Battery low (the device can be used as usual) 0x04: Battery medium 0x05: Battery high 0x06: Battery extremely high
	GSM signal strength	1	0x00: No signal 0x01: Extremely weak signal 0x02: Weak signal 0x03: Good signal 0x04: Strong signal
	Alert and language	2	See the following table for details.
	Fence No.	1	This byte is valid for geofence alerts. 0: Fence No. 1; 1: Fence No. 2; …; FF: Invalid
	Mileage statistics	4	Convert to decimal to get the result (For products without this feature, there is no such place in the packet)
Information SN		2	The SN will be automatically added by "1" for each data sending after power-on.
CRC		2	It is the CRC-ITU value from "Packet Length" to "Information SN". If the receiver receives a packet that contains a CRC error, it ignores the error and discards the packet (See Attachment 1 for algorithm details).
Stop Bit		2	It is fixed at 0x0D 0x0A.

Example data: 78 78 26 27 10 04 19 09 2D 07 C5 02 7A C9 1C 0C 46 58 00 00 05 37 09 00 00 00 00 00 00 00 80 02 00 0C 01 FF 00 00 4D F6 0D 0A

i. Terminal information details

Bit		Code Connotation
BYTE	Bit7	1: Cut off fuel/power
		0: Restore fuel/power
	Bit6	1: Position fixed
		0: Not Positioned
	Bit3–Bit5	~~100: SOS~~
		011: Low battery alert
		~~010: Power cutoff~~
		~~001: Vibrating alert~~
		000: Normal
	Bit2	1: Charge with power connected
		0: Charge with no power connected
	Bit1	1: ACC on

		0: ACC off
	Bit0	1: Defense on
		0: Defense off

ii. Alarm and language details

Byte 1	0x00: Normal
	0x01: SOS alert
	0x02: Power cut alert
	0x03: Vibrating alert
	0x04: Entered fence alert
	0x05: Left fence alert
	0x06: Speed alert
	0x09: Tow/theft alert
	0x0A: Entered GPS blind spot alert
	0x0B: Left GPS blind spot alert
	0x0C: Powered on alert
	0x0D: GPS first fix alert
	0x0E: Low external battery alert
	0x0F: External battery low voltage protection alert
	0x10: SIM changed alert
	0x11: Powered off alert
	0x12: Airplane mode on following external battery low voltage protection
	0x13: Tamper alert
	0x14: Door alert
	0x15: Powered off due to low battery
	0x16: Sound-control alert
	0x17: Rogue base station detected alert
	0x18: Cover removed alert
	0x19: Low internal battery alert
	0x20: Entered deep sleep mode alert
	0x21: Reserved
	0x22: Reserved
	0x23: Fall alert
	0x29: Harsh acceleration
	0x2A: Sharp left cornering alert
	0x2B: Sharp right cornering alert
	0x2C: Collision alert
	0x30: Harsh braking
0x32: Device unplugged alert	0x32: Device unplugged alert
	0xFF: ACC OFF

	0xFE: ACC ON
Byte 2	0x01: Chinese 0x02: English 0x00: No response from the platform is required

Note: As alerts accumulate, the alerts and alarm bytes in the terminal information may overlap, in which case the alarm byte will be regarded as the baseline. That means when the alarm byte is "0x00", the alarm content in the terminal information can be determined.

b) Return packet (from server)

	Length	Details
Start Bit	2	0x78 0x78
Packet Length	1	Length = Protocol number + Information content + Information SN + CRC
Protocol Number	1	0x26 (UTC)
Information SN	2	The SN will be automatically added by "1" for each data sending after power-on.
CRC	2	It is the CRC-ITU value from "Packet Length" to "Information SN". If the receiver receives a packet that contains a CRC error, it ignores the error and discards the packet (See Attachment 1 for algorithm details).
Stop Bit	2	It is fixed at 0x0D 0x0A.

Example data: 78780526001C9D860D0A

c) Server returns the Chinese address

		Length	Details
Start Bit		2	0x78 0x78
Packet Length		1	Length = Protocol number + Information content + Information SN + CRC
Protocol Number		1	0x17
Information Content	Length	1	It is the length of the data between the server flag bit and the information SN.
	Server flag bit	4	It is used by the server to mark the specific alert.
	ALARMSMS	8	Alarm code flag (ASCII)
	&&	2	Alarm code flag (ASCII)
	Address content	M	It is the address parsed by the server (UNICODE)
	&&	2	Separator (ASCII)
	Phone number	21	It is "0" for all uploaded alarm packets (ASCII)
	##	2	Separator (ASCII)
Information SN		2	The SN will be automatically added by "1" for each data sending after power-on.
CRC		2	It is the CRC-ITU value from "Packet Length" to "Information SN". If the receiver receives a packet that contains a CRC error, it ignores the error and discards the packet (See Attachment 1 for algorithm details).

Stop Bit	2	It is fixed at 0x0D 0x0A.

Example data:

78789F179900000001414C41524D534D532626970752A862A58B66003A00470054003000360044002D00310032003800330036002D005A004A004D002C5E7F4E1C7701002E60E05DDE5E02002E60E057CE533A002E4E915C71897F8DEF002E79BB60E05DDE5E025B665927655980B27EA6003200377C73002E002C00310030003A00340033262600000000000000000000000000000000000000000000000000002323001CEA970D0A

d) Server returns the English address

		Length	Details
Start Bit		2	0x79 0x79
Packet Length		2	Length = Protocol number + Information content + Information SN + CRC
Protocol Number		1	0x97
Information Content	Length	1	It is the length of the data between the server flag bit and the information SN.
	Server flag bit	4	It is used by the server to mark the specific alert.
	ALARMSMS	8	Alarm code flag (ASCII)
	&&	2	Alarm code flag (ASCII)
	Address content	M	It is the address parsed by the server (UNICODE)
	&&	2	Separator (ASCII)
	Phone number	21	It is "0" for all uploaded alarm packets (ASCII)
	##	2	Separator (ASCII)
Information SN		2	The SN will be automatically added by "1" for each data sending after power-on.
CRC		2	It is the CRC-ITU value from "Packet Length" to "Information SN". If the receiver receives a packet that contains a CRC error, it ignores the error and discards the packet (See Attachment 1 for algorithm details).
Stop Bit		2	It is fixed at 0x0D 0x0A.

Example data:

797900BC9700B500000001414C41524D534D532626004A004D00300031002D0038003900370033003100 3A0053004F005300200061006C00610072006D002E00680074007400700003A002F002F006D006100700073002E0067006F006F0067006C0065002E0063006F006D002F006D00610070007300 3F0071003D004E00320032002E00350037003300350036002C00450031003100330002E003900320 03100370031262600000000000000000000000000000000000000000000000023230069159B0D0A

6. GPS Address Request Packet

Description:

- **The user sends an address request command to the terminal, which sends an address request packet to the server to request for address parsing.**
- **Then the terminal sends the address parsed and returned by the server to the user.**

a) Address request packet (sent by terminal)

		Length	Details
Start Bit		2	0x78 0x78
Packet Length		1	Length = Protocol number + Information content + Information SN + CRC
Protocol Number		1	0x2A
Information Content	Date and time	6	Year (1 byte) Month (1 byte) Day (1 byte) Hour (1 byte) Minute (1 byte) Second (1 byte) (which must convert to decimal)
	Number of Satellites	1	The first character refers to GPS Information Length; while the second character refers to Number of Satellites that involve in positioning (which must convert to decimal).
	Latitude	4	It is a value calculated by converting to decimal which is further divided by 1,800,000.
	Longitude	4	It is a value calculated by converting to decimal which is further divided by 1,800,000.
	Speed	1	It is a value in decimal.
	Course and Status	2	Convert to a 16-bit binary. Please calculate by bit (see GPS location packet for details).
	Phone number	21	Phone number
	Alert and language	2	Latter bit, where "0x01" refers to Chinese and "0x02" English.
Information SN		2	The SN will be automatically added by "1" for each data sending after power-on.
CRC		2	It is the CRC-ITU value from "Packet Length" to "Information SN". If the receiver receives a packet that contains a CRC error, it ignores the error and discards the packet (See Attachment 1 for algorithm details).
Stop Bit		2	It is fixed at 0x0D 0x0A.

Example data:
78782E2A0F0C1D071139CA027AC8000C4658000014D8313235323031333533323137373037390000000000001002A6ECE0D0A

b) Server returns the Chinese address

	Length	Details
Start Bit	2	0x78 0x78
Packet Length	1	Length = Protocol number + Information content + Information SN + CRC

Protocol Number		1	0x17
Information Content	Length	1	It is the length of the data between the server flag bit and the information SN.
	Server flag bit	4	It is used by the server to mark the specific alert.
	ADDRESS	7	Address request code flag (ASCII)
	&&	2	Separator (ASCII)
	Address content	M	It is the address parsed by the server (UNICODE)
	&&	2	Separator (ASCII)
	Phone number	21	It is the phone number used by the server to transmit back the terminal request packet (ASCII)
	##	2	Separator (ASCII)
Information SN		2	The SN will be automatically added by "1" for each data sending after power-on.
CRC		2	It is the CRC-ITU value from "Packet Length" to "Information SN". If the receiver receives a packet that contains a CRC error, it ignores the error and discards the packet (See Attachment 1 for algorithm details).
Stop Bit		2	It is fixed at 0x0D 0x0A.

Example data:

78786E176800000001414444524553532626 4F4D7F6E003A5E7F4E1C7701002E60E05DDE5E020
02E60E057CE533A002E4E915C71897F8DEF002E79BB60E05DDE5E025B665927655980B27EA60
03200357C73002E2626383631333432313633323639390000000000000000023230016C1EC0D0A

c) Server returns the English address

		Length	Details
Start Bit		2	0x79 0x79
Packet Length		2	Length = Protocol number + Information content + Information SN + CRC
Protocol Number		1	0x97
Information Content	Length	1	It is the length of the data between the server flag bit and the information SN.
	Server flag bit	4	It is used by the server to mark the specific alert.
	ADDRESS	7	Address request code flag (ASCII)
	&&	2	Separator (ASCII)
	Address content	M	It is the address parsed by the server (UNICODE)
	&&	2	Separator (ASCII)
	Phone number	21	It is the phone number used by the server to transmit back the terminal request packet (ASCII)
	##	2	Separator (ASCII)
Information SN		2	The SN will be automatically added by "1" for each data sending after power-on.

CRC	2	It is the CRC-ITU value from "Packet Length" to "Information SN". If the receiver receives a packet that contains a CRC error, it ignores the error and discards the packet (See Attachment 1 for algorithm details).
Stop Bit	2	It is fixed at 0x0D 0x0A.

Example data:

797900BB9700B50000000141444452455353262600 4A004D00300031002D00380039003700330031003A0053004F00530020006100 6C00610072006D002E00680074007400700030 02A002F002F006D00610070007300 2E0067006F006F0067006C0065002E0063006F006D002F006D006100700073003F0071003D004E00320032002E00350037003300350036002C00450031003100330 02E00390032003100370031262638363133343231363332363939000000000000000232300168EA50D0A

7. Online Command

Description:

- **It is assigned by the server and used to control the terminal to execute tasks.**
- **The terminal then responds to the server with the execution results.**

a) The server sends an online command.

		Length	Details
Start Bit		2	0x78 0x78
Packet Length		1	Length = Protocol number + Information content + Information SN + CRC
Protocol Number		1	0x80
Information Content	Length	1	Server flag bit + command content length
	Server Flag Bit	4	It is reserved for server recognition. The terminal returns to the server the data it receives as it is in a return packet in binary.
	Command Content	M	It is a character string in ASCII. It is compatible with SMS command.
	Language	2	Latter bit, where "0x01" refers to Chinese and "0x02" English.
Information SN		2	The SN will be automatically added by "1" for each data sending after power-on.
CRC		2	It is the CRC-ITU value from "Packet Length" to "Information SN". If the receiver receives a packet that contains a CRC error, it ignores the error and discards the packet (See Attachment 1 for algorithm details).
Stop Bit		2	It is fixed at 0x0D 0x0A.

Example data: 78780E800800000000736F732300016D6A0D0A

b) Return packet (from terminal)

Return packet sent by the terminal (universal command)

		Length	Details
Start Bit		2	0x79 0x79
Packet Length		2	Length = Protocol number + Information content + Information SN + CRC
Protocol Number		1	0x21
Information Content	Server Flag Bit	4	It is reserved for server recognition. The terminal returns to the server the data it receives as it is in a return packet in binary.
	Code	1	0X01: ASCII coding 0x02: UTF 16-BE coding
	Content	M	It refers to the data to be sent (by the coding format).
Information SN		2	The SN will be automatically added by "1" for each data sending after power-on.
CRC		2	It is the CRC-ITU value from "Packet Length" to "Information SN". If the receiver receives a packet that contains a CRC error, it ignores the error and discards the packet (See Attachment 1 for algorithm details).
Stop Bit		2	It is fixed at 0x0D 0x0A.

Example data:
7979009D2100000000014261747465727 93A342E3136562C4E4F524D414C3B20475052533A4C696E6B2055703B2047534D205369676E616C204C6576656C3A5374726F6E673B204750533A536561726368696E6720736174656C6C6974652C20535653205573656420696E206669783A302830292C20475053205369676E616C204C6576656C3A3B204143433A4F46463B20446566656E73653A4F4646002E26DF0D0A

c) Return packet from terminal (Earlier Version)

Return packet sent by the terminal (universal command)

		Length	Details
Start Bit		2	0x78 0x78
Packet Length		1	Length = Protocol number + Information content + Information SN + CRC
Protocol Number		1	0x15
Information Content	Length	1	Server flag bit + command content length
	Server Flag Bit	4	It is reserved for server recognition. The terminal returns to the server the data it receives as it is in a return packet in binary.
	Command Content	M	It is a character string returned in ASCII coding.
	Language	2	Chinese: 0x00 0x01; English: 0x00 0x02
Information SN		2	The SN will be automatically added by "1" for each data sending after power-on.
CRC		2	It is the CRC-ITU value from "Packet Length" to "Information SN". If the receiver receives a packet that contains a CRC error, it ignores the error and discards the packet (See Attachment 1 for algorithm details).
Stop Bit		2	It is fixed at 0x0D 0x0A.

Example data: 78 78 28 15 20 00 00 00 00 53 4F 53 31 3A 31 33 34 32 31 36 33 32 36 39 39 20 53 4F 53 32 3A 20 53 4F 53 33 3A 00 01 00 2A C3 9C 0D 0A

8. Time Calibration Packet

Description:

- **The time calibration packet is sent by the terminal to the server upon power-on to request for time synchronization to resolve the issue of time error when the terminal is not positioned.**
- **The server responds with the correct UTC in correct format.**

a) Time calibration packet (sent by terminal)

	Length	Details
Start Bit	2	0x78 0x78
Packet Length	1	Length = Protocol number + Information content + Information SN + CRC
Protocol Number	1	0x8A
Information SN	2	The SN will be automatically added by "1" for each data sending after power-on.
CRC	2	It is the CRC-ITU value from "Packet Length" to "Information SN". If the receiver receives a packet that contains a CRC error, it ignores the error and discards the packet (See Attachment 1 for algorithm details).
Stop Bit	2	It is fixed at 0x0D 0x0A.

Example data: 7878058A000688290D0A

b) Return packet (from server)

		Length	Details
Start Bit		2	0x78 0x78
Packet Length		1	Length = Protocol number + Information content + Information SN + CRC
Protocol Number		1	0x8A (UTC)
Information Content	Date and time	6	Year (1 byte) Month (1 byte) Day (1 byte) Hour (1 byte) Minute (1 byte) Second (1 byte) (which must convert to decimal)
Information SN		2	The SN will be automatically added by "1" for each data sending after power-on.
CRC		2	It is the CRC-ITU value from "Packet Length" to "Information SN". If the receiver receives a packet that contains a CRC error, it ignores the error and discards the packet (See Attachment 1 for algorithm details).
Stop Bit		2	It is fixed at 0x0D 0x0A.

Example data: 78780B8A0F0C1D0000150006F0860D0A

9. Information Transfer Packet

Description:

- **It is used to transmit all kinds of non-location data.**

a) Information transfer packet (sent by terminal)

		Length	Details
Start Bit		2	0x79 0x79
Packet Length		2	Length = Protocol number + Information content + Information SN + CRC
Protocol Number		1	0x94
Information Content	Information type (sub-protocol No.)	1	00: 00: External battery voltage 01–03: Customized 04: Terminal status synchronization 05: Door status 08: Self-check parameters 09: Information of visible satellites 0A: ICCID information 1BRFID ……To be added
	Data content	N	Different content will be transmitted according to different information types. For details, see the table below.
Information SN		2	The SN will be automatically added by "1" for each data sending after power-on.
CRC		2	It is the CRC-ITU value from "Packet Length" to "Information SN". If the receiver receives a packet that contains a CRC error, it ignores the error and discards the packet (See Attachment 1 for algorithm details).
Stop Bit		2	It is fixed at 0x0D 0x0A.

Example data:

7979007F9404414C4D313D43343B414C4D323D43433B414C4D333D34433B535441313D43303B4459443D30313B534F533D2C2C3B43454E5445523D3B46454E43453D46656E63652C4F4E2C302C32332E3131313830392C3131342E3430393236342C3430302C494E206F72204F55542C303B4D4946493D4D4946492C4F4646000A061E0D0A

Transferred information content

When the information type is "00", it carries the voltage of the external battery, which is a 2-bit hex. The hex is then converted into a decimal and further divided by 100. Take "0x04,0x9F" for example, it is 1183 in decimal and is 11.83 after being divided by 100, which means the voltage of the external battery is 11.83V.

When the information type is "04", it carries the terminal status synchronization information and is of variable-length in ASCII coding.

Content IDs

Definition	ID
Alarm byte 1	ALM1
Alarm byte 2	ALM2
Alarm byte 3	ALM3
Alarm byte 4	ALM4
Status byte 1	STA1
SOS number	SOS
Center number	CENTER
Geofence	FENCE
Fuel/power cutoff status	DYD
Mode	MODE

✧ ALM1 (status)

Bit	Definition	Remarks
bit7	Vibrating alert	1: ON; 0: OFF
bit6	Alert via GPRS	1: ON; 0: OFF
bit5	Alert via call	1: ON; 0: OFF
bit4	Alert via SMS	1: ON; 0: OFF
bit3	Tow/theft alert	1: ON; 0: OFF
bit2	Alert via GPRS	1: ON; 0: OFF
bit1	Alert via call	1: ON; 0: OFF
bit0	Alert via SMS	1: ON; 0: OFF

✧ ALM2 (status)

Bit	Definition	Remarks
bit7	Low internal battery alert	1: ON; 0: OFF
bit6	Alert via GPRS	1: ON; 0: OFF
bit5	Alert via call	1: ON; 0: OFF
bit4	Alert via SMS	1: ON; 0: OFF
bit3	Low external battery alert	1: ON; 0: OFF
bit2	Alert via GPRS	1: ON; 0: OFF
bit1	Alert via call	1: ON; 0: OFF
bit0	Alert via SMS	1: ON; 0: OFF

✧ ALM3 (status)

Bit	Definition	Remarks
bit7	Speed alert	1: ON; 0: OFF
bit6	Alert via GPRS	1: ON; 0: OFF
bit5	Alert via call	1: ON; 0: OFF
bit4	Alert via SMS	1: ON; 0: OFF
bit3	Power cut alert	1: ON; 0: OFF
bit2	Alert via GPRS	1: ON; 0: OFF
bit1	Alert via call	1: ON; 0: OFF

bit0	Alert via SMS	1: ON; 0: OFF

✧ **ALM4 (status)**

Bit	Definition	Remarks
bit7	SOS alert	1: ON; 0: OFF
bit6	Alert via GPRS	1: ON; 0: OFF
bit5	Alert via call	1: ON; 0: OFF
bit4	Alert via SMS	1: ON; 0: OFF
bit3	Voice control alert	1: ON; 0: OFF
bit2	Alert via GPRS	1: ON; 0: OFF
bit1	Alert via call	1: ON; 0: OFF
bit0	Alert via SMS	1: ON; 0: OFF

✧ **STA1 (status)**

Bit	Definition	Remarks
bit7	Defense status	1: Defense on; 0: Defense off
bit6	Auto defense	1: ON; 0: OFF
bit5	Manual defense	1: ON; 0: OFF
bit4	Remote cancellation of defense	1: ON; 0: OFF
bit3	To be defined	
bit2	To be defined	
bit1	Tamper switch	1: Close; 0: Open
bit0	Tamper alert	1: ON; 0: OFF

✧ **Fuel/power cutoff status**

Bit	Definition	Remarks
bit7	Undefined	
bit6	Undefined	
bit5	Undefined	
bit4	Undefined	
bit3	Delay execution because the speed is too high	1: Valid; 0: Invalid
bit2	Delay execution because the terminal is not positioned	1: Valid; 0: Invalid
bit1	Cut fuel/power	1: Valid; 0: Invalid
bit0	Connect fuel/power	1: Valid; 0: Invalid

✧ **SOS: It transmits in ASCII coding (multiple SOS numbers are separated by commas [,]).**

- **Center number: It transmits in ASCII coding.**
- **Geofence: It transmits in ASCII coding.**
- **Mode: It transmits in ASCII coding (parameters are separated by commas [,]).**

Example:
ALM1=FF;ALM2=FF;ALM3=FF;STA1=CO;DYD=01;SOS=12345,2345,5678;CENTER=987654;
FENCE=FENCE,ON,0,-22.277120,-113.516763,5,IN,1; MODE= MODE,1,20,500

Note: Not all of the content will be transmitted. The platform can parse according to bits. The content uploaded varies with products.

When the information type is "05", it carries the detection (door detection) status of the external I/O in hex.

Bit	Definition	Remarks
bit7	TBD	
bit6	TBD	
bit5	TBD	
bit4	TBD	
bit3	TBD	
bit2	I/O port status	1: High; 0: Low
bit1	Trigger status	1: Level high; 0: Level low
bit0	Door status	1: ON; 0: OFF

When the information type is "09", it carries the GPS status of the terminal in hex.

GPS module status	1	0x00: No such feature; 0x01: Satellite searching; 0x02: 2D positioning; 0x03: 3D positioning; 0x04: Sleeping
Number of satellites engaged in position fix	1	Based on this the number of transmission strength is determined.
GPS1 strength	1	Strength of GPS location satellite 1
GPS2 strength	1	Strength of visible satellite 2
……		
Number of GPS satellites that are visible but not engaged in position fix	1	Based on this the number of transmission strength is determined.
Visible GPS1 Strength	1	Strength of visible satellite 1
Visible GPS2 strength	1	Strength of visible satellite 2
……		
BDS module status	1	0x00: No such feature; 0x01: Satellite searching; 0x02: 2D positioning; 0x03: 3D positioning; 0x04: Sleeping
Number of BDS satellites engaged in position fix	1	This is the basis for determining the volume of satellite signal strength.
BDS1 strength	1	Strength of BDS location satellite 1
BDS2 strength	1	Strength of BDS location satellite 2
……		

Number of BDS satellites that are visible but not engaged in position fix	1	This is the basis for determining the volume of satellite signal strength.
Visible BDS1 strength	1	Strength of visible satellite 1
Visible BDS2 strength	1	Strength of visible satellite 2
……		
Extended bit length	1	It is reserved for feature expansion. If no extended bit is added, then it is "0x00" (Note: For future feature expansion, you are advised to reserve the extended bit during protocol debugging).
Extended bit	N	It changes as the extended bit length changes. When the extended bit length is "0x00", the extended bit will not be transmitted.

When the information type is "0A", it carries the ICCID information in hex.

IMEI	8	Example: If the IMEI is 123456789123456, then the terminal ID is 0x010x230x450x670x890x120x340x56.
IMSI	8	Example: If the IMEI is 123456789123456, then the terminal ID is 0x010x230x450x670x890x120x340x56.
ICCID	10	Example: If the ICCID is 12345123456789123456, then the terminal ID is 0x12 0x34 0x510x230x450x670x890x120x340x56.

When the information type is "0x10", it carries the Brazilian cost counter information in ASCII coding.

Example data: 79 79 00 4E 94 10 35 41 36 31 32 30 34 43 32 30 33 30 33 30 33 30 33 30 33 30 33 30 33 30 33 30 33 30 45 42 38 39 37 46 30 34 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 35 45 00 09 46 2B 0D 0A

Transmitted information:

5A61204C2030303030303030303030EB897F04000000000000000000000000000000005E(35 41 36 31 32 30 34 43 32 30 33 30 33 30 33 30 33 30 33 30 33 30 33 30 33 30 45 42 38 39 37 46 30 34 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 35 45)

When the information type is "1B", it carries the RFID information in hex.

RFID	8	Example: If the RFID is 2345678912, then the terminal FRID is 0x230x450x670x890x12.

b) Return packet (from server)

No response is required from the server.

10. GPS Location Packet (4G Base Station, Protocol Number: 0xA0)

Description:

- **The location packet carries the location data of the terminal.**
- **After the GPS module is positioned and the connection is established, the terminal will upload data about fixes by preset rules.**
- **After the connection is established and there are cache fixes, the terminal will upload these cache fixes.**

a) Location packet (sent by terminal)

Location packet

		Length	Details
Start Bit		2	0x78 0x78
Packet Length		1	Length = Protocol number + Information content + Information SN + CRC
Protocol Number		1	0xA0 (UTC)
Information Content	Date and time	6	Year (1 byte) Month (1 byte) Day (1 byte) Hour (1 byte) Minute (1 byte) Second (1 byte) (which must convert to decimal)
	Number of Satellites	1	The first character refers to GPS Information Length; while the second character refers to Number of Satellites that involve in positioning (which must convert to decimal).
	Latitude	4	It is a value calculated by converting to decimal which is further divided by 1,800,000.
	Longitude	4	It is a value calculated by converting to decimal which is further divided by 1,800,000.
	Speed	1	It is a value in decimal.
	Course and Status	2	Convert to a 16-bit binary. Please calculate by bit (see Attachment 3).
	MCC	2	Mobile Country Code (convert to decimal)
	MNC	1 (or 2)	Mobile Network Code (see the following note for length detail)
	LAC	4	Location Area Code (convert to decimal)
	Cell ID	8	Cell Tower ID (convert to decimal)
	ACC	1	It refers to the ACC status, where "00" means ACC off and "01" ACC on (unavailable on GT06)
	Data upload mode	1	GPS data point upload type (unavailable on GT06) 0x00: Upload in fixed interval 0x01: Upload at fixed distance 0x02: Upload at cornering point 0x03: Upload upon ACC status change 0x04: Upload the last fix after the status changes from moving to still 0x05: Upload the last valid fix prior to network interruption and reconnection 0x06: Force to upload a GPS fix upon ephemeris refresh 0x07: Upload a fix upon key press

			0x08: Upload location information upon power-on 0x09: Not used 0x0A: Upload the last longitude and latitude and update the time after the device goes still 0x0B: Parse the uploaded longitude and latitude packet over WiFi 0x0C: Upload upon LJDW (immediate position) command 0x0D: Upload the last longitude and latitude after the device goes still 0x0E: GPSDUP upload (upload at a fixed interval in still state)
	GPS data re-upload	1	0x00: Real-time upload; 0x01: Re-upload (unavailable on GT06)
	Mileage statistics	4	Convert to decimal to get the result (for products without this feature, there is no such place in the packet)
Information SN		2	The SN will be automatically added by "1" for each data sending after power-on.
CRC		2	It is the CRC-ITU value from "Packet Length" to "Information SN". If the receiver receives a packet that contains a CRC error, it ignores the error and discards the packet (See Attachment 1 for algorithm details).
Stop Bit		2	It is fixed at 0x0D 0x0A.

Note: As the MNC of some countries occupies 2 bytes, we use the most significant bit (MSB) in MCC to differentiate the length of MNC. When the MSB in MCC is "1", the length of the MNC is "2". For shipped devices, Bit15 is "0" by default; while for newly-shipped devices, Bit15 is "1".

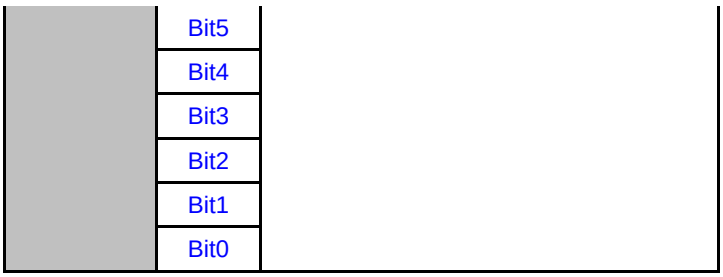
MCC bits

Bit		Code Connotation
BYTES	Bit15	1: The length of MNC is 2
		0: The length of MNC is 1
	Bit0–bit14	MCC information

ii. Status and course details

This occupies 2 bytes to indicate the moving direction of the terminal. The value range is 0–360°. It regards due north as 0° and counts clockwise.

BYTE_1	Bit7	0
	Bit6	0
	Bit5	GPS Real-time/Differential Positioning
	Bit4	Positioned or Not
	Bit3	East/West longitude
	Bit2	South/North latitude
	Bit1	Course
	Bit0	
BYTE_2	Bit7	
	Bit6	



For example: the value is 0x15 0x4C, the corresponding binary is 00010101 01001100,

BYTE_1 Bit7 0
BYTE_1 Bit6 0
BYTE_1 Bit5 0 (real time GPS)
BYTE_1 Bit4 1 (GPS has positioned)
BYTE_1 Bit3 0 (East Longitude)
BYTE_1 Bit2 1 (North Latitude)
BYTE_1 Bit1 0
BYTE_1 Bit0 1
BYTE_2 Bit7 0
BYTE_2 Bit6 1
BYTE_2 Bit5 0
BYTE_2 Bit4 0
BYTE_2 Bit3 1
BYTE_2 Bit2 1
BYTE_2 Bit1 0
BYTE_2 Bit0 0

→ Course 332° (0101001100 in binary, or 332 in decimal)

which means GPS tracking is on, real time GPS, location at north latitude, east longitude and the course is 332°.

b) Return packet (from server)

11. LBS Multi-Base Extended Information Packet (4G Base Station, Protocol Number: 0xA1)

Description:

- **It is used to transmit location information when the terminal doesn't locate.**

a) LBS extended information packet (sent by terminal)

		Length	Details
Start Bit		2	0x78 0x78
Packet Length		1	Length = Protocol number + Information content + Information SN + CRC
Protocol Number		1	0xA1
Information Content	UTC	6	Year (1 byte) Month (1 byte) Day (1 byte) Hour (1 byte) Minute (1 byte) Second (1 byte) (which must convert to decimal)
	MCC	2	Mobile Country Code (convert to decimal)
	MNC	1 (or 2)	Mobile Network Code (see the following note for length detail)
	LAC	4	Location Area Code (convert to decimal)
	CI	8	Cell Tower ID (convert to decimal)
	RSSI	1	It indicates the signal strength of a cell. Its value range is 0x00–0xFF, where "0x00" indicates the signal is the weakest; while "0xFF" the strongest.
	NLAC1	4	Same as LAC
	NCI1	8	Same as CI
	NRSSI1	1	Same as RSSI
	NLAC2	4	Same as LAC
	NCI2	8	Same as CI
	NRSSI2	1	Same as RSSI
	NLAC3	4	Same as LAC
	NCI3	8	Same as CI
	NRSSI3	1	Same as RSSI
	NLAC4	4	Same as LAC
	NCI4	8	Same as CI
	NRSSI4	1	Same as RSSI
	NLAC5	4	Same as LAC
	NCI5	8	Same as CI
	NRSSI5	1	Same as RSSI
	NLAC6	4	Same as LAC
	NCI6	8	Same as CI
	NRSSI6	1	Same as RSSI
	Timing Advance	1	It refers to the difference between the actual length of time that a signal takes to reach the base station from a mobile station and the length of time that a signal takes to reach

			the base station from a mobile station when the distance between the two is "0".
	Language	2	0x00 0x01: Chinese; 0x00 0x02: English
Information SN		2	The SN will be automatically added by "1" for each data sending after power-on.
CRC		2	It is the CRC-ITU value from "Packet Length" to "Information SN". If the receiver receives a packet that contains a CRC error, it ignores the error and discards the packet (See Attachment 1 for algorithm details).
Stop Bit		2	It is fixed at 0x0D 0x0A.

Note: As the MNC of some countries occupies 2 bytes, we use the MSB in MCC to differentiate the length of MNC. When the MSB in MCC is "1", the length of the MNC is "2". For shipped devices, Bit15 is "0" by default; while for newly-shipped devices, Bit15 is "1".

MCC bits

Bit		Code Connotation
BYTES	Bit15	1: The length of MNC is 2
		0: The length of MNC is 1
	Bit0–bit14	MCC information

b) Return packet (from server)

For 0x28, no return packet is required from the server.

12. Multi-fence Alarm Packet (4G Base Station, Protocol Number: 0xA4)

Description:

- **It is used to transmit the terminal-defined alarm content.**
- **The server responds to the alarm content received and sends the address parsed from the longitude and latitude to the terminal.**
- **Then the terminal sends the address received to the preset SOS number.**

a) Alarm packet (sent by terminal)

Alarm packet (multiple geofences)

		Length	Details
Start Bit		2	0x78 0x78
Packet Length		1	Length = Protocol number + Information content + Information SN + CRC
Protocol Number		1	0xA4 (UTC)
Information Content	Date and time	6	Year (1 byte) Month (1 byte) Day (1 byte) Hour (1 byte) Minute (1 byte) Second (1 byte) (which must convert to decimal)
	Number of Satellites	1	The first character refers to GPS Information Length; while the second character refers to Number of Satellites that involve in positioning (which must convert to decimal).
	Latitude	4	It is a value calculated by converting to decimal which is further divided by 1,800,000.
	Longitude	4	It is a value calculated by converting to decimal which is further divided by 1,800,000.
	Speed	1	It is a value in decimal.
	Course and Status	2	Convert to a 16-bit binary. Please calculate by bit (see GPS location packet for details).
	LBS length	1	Total length of LBS information (Self-length + MCC + MNC + LAC + Cell ID)
	MCC	2	Mobile Country Code (convert to decimal)
	MNC	1 (or 2)	Mobile Network Code (see the following note for length detail)
	LAC	4	Location Area Code (convert to decimal)
	Cell ID	8	Cell Tower ID (convert to decimal)
	Terminal information	1	See the following table for details.
	Voltage Level	1	0X00: No power (power off) 0x01: Battery extremely low (making calls or sending SMS's are impossible) 0x02: Battery very low (low battery alert will be triggered) 0x03: Battery low (the device can be used as usual) 0x04: Battery medium 0x05: Battery high 0x06: Battery extremely high

	GSM signal strength	1	0x00: No signal 0x01: Extremely weak signal 0x02: Weak signal 0x03: Good signal 0x04: Strong signal
	Alert and language	2	See the following table for details.
	Fence No.	1	This byte is valid for geofence alerts. 0: Fence No. 1; 1: Fence No. 2; …; FF: Invalid
Information SN		2	The SN will be automatically added by "1" for each data sending after power-on.
CRC		2	It is the CRC-ITU value from "Packet Length" to "Information SN". If the receiver receives a packet that contains a CRC error, it ignores the error and discards the packet (See Attachment 1 for algorithm details).
Stop Bit		2	It is fixed at 0x0D 0x0A.

Note: As the MNC of some countries occupies 2 bytes, we use the MSB in MCC to differentiate the length of MNC. When the MSB in MCC is "1", the length of the MNC is "2". For shipped devices, Bit15 is "0" by default; while for newly-shipped devices, Bit15 is "1".

MCC bits

Bit		Code Connotation
BYTES	Bit15	1: The length of MNC is 2
		0: The length of MNC is 1
	Bit0–bit14	MCC information

iii. Terminal information details

Bit		Code Connotation
BYTE	Bit7	1: Cut off fuel/power
		0: Restore fuel/power
	Bit6	1: Position fixed
		0: Not Positioned
	Bit3–Bit5	~~100: SOS~~
		011: Low battery alert
		~~010: Power cutoff~~
		~~001: Vibrating alert~~
		000: Normal
	Bit2	1: Charge with power connected
		0: Charge with no power connected
	Bit1	1: ACC on
		0: ACC off

	Bit0	1: Defense on
		0: Defense off

iv. Alarm and language details

Byte 1	0x00: Normal
	0x01: SOS alert
	0x02: Power cut alert
	0x03: Vibrating alert
	0x04: Entered fence alert
	0x05: Left fence alert
	0x06: Speed alert
	0x09: Tow/theft alert
	0x0A: Entered GPS blind spot alert
	0x0B: Left GPS blind spot alert
	0x0C: Powered on alert
	0x0D: GPS first fix alert
	0x0E: Low external battery alert
	0x0F: External battery low voltage protection alert
	0x10: SIM changed alert
	0x11: Powered off alert
	0x12: Airplane mode on following external battery low voltage protection
	0x13: Tamper alert
	0x14: Door alert
	0x15: Powered off due to low battery
	0x16: Sound-control alert
	0x17: Rogue base station detected alert
	0x18: Cover removed alert
	0x19: Low internal battery alert
	0x20: Entered deep sleep mode alert
	0x21: Reserved
	0x22: Reserved
	0x23: Fall alert
	0x29: Harsh acceleration
	0x2A: Sharp left cornering alert
	0x2B: Sharp right cornering alert
	0x2C: Collision alert
	0x30: Harsh braking
	0x32: Device unplugged alert
	0xFF: ACC OFF
	0xFE: ACC ON

Byte 2	0x01: Chinese 0x02: English 0x00: No response from the platform is required

b) Return packet (from server)

	Length	Details
Start Bit	2	0x78 0x78
Packet Length	1	Length = Protocol number + Information content + Information SN + CRC
Protocol Number	1	0x26 (UTC)
Information SN	2	The SN will be automatically added by "1" for each data sending after power-on.
CRC	2	It is the CRC-ITU value from "Packet Length" to "Information SN". If the receiver receives a packet that contains a CRC error, it ignores the error and discards the packet (See Attachment 1 for algorithm details).
Stop Bit	2	It is fixed at 0x0D 0x0A.

c) Server returns the Chinese address

		Length	Details
Start Bit		2	0x78 0x78
Packet Length		1	Length = Protocol number + Information content + Information SN + CRC
Protocol Number		1	0x17
Information Content	Length	1	It is the length of the data between the server flag bit and the information SN.
	Server flag bit	4	It is used by the server to mark the specific alert.
	ALARMSMS	8	Alarm code flag (ASCII)
	&&	2	Alarm code flag (ASCII)
	Address content	M	It is the address parsed by the server (UNICODE)
	&&	2	Separator (ASCII)
	Phone number	21	It is "0" for all uploaded alarm packets (ASCII)
	##	2	Separator (ASCII)
Information SN		2	The SN will be automatically added by "1" for each data sending after power-on.
CRC		2	It is the CRC-ITU value from "Packet Length" to "Information SN". If the receiver receives a packet that contains a CRC error, it ignores the error and discards the packet (See Attachment 1 for algorithm details).
Stop Bit		2	It is fixed at 0x0D 0x0A.

d) Server returns the English address

	Length	Details
Start Bit	2	0x79 0x79

Packet Length		2	Length = Protocol number + Information content + Information SN + CRC
Protocol Number		2	0x97
Information Content	Length	1	It is the length of the data between the server flag bit and the information SN.
	Server flag bit	4	It is used by the server to mark the specific alert.
	ALARMSMS	8	Alarm code flag (ASCII)
	&&	2	Alarm code flag (ASCII)
	Address content	M	It is the address parsed by the server (UNICODE)
	&&	2	Separator (ASCII)
	Phone number	21	It is "0" for all uploaded alarm packets (ASCII)
	##	2	Separator (ASCII)
Information SN		2	The SN will be automatically added by "1" for each data sending after power-on.
CRC		2	It is the CRC-ITU value from "Packet Length" to "Information SN". If the receiver receives a packet that contains a CRC error, it ignores the error and discards the packet (See Attachment 1 for algorithm details).
Stop Bit		2	It is fixed at 0x0D 0x0A.

III. Attachment

1. Attachment 1 CRC-ITU Algorithm in C (Fragments)

```
staticconstU16crctab16[]=
{
0X0000, 0X1189, 0X2312, 0X329B,      0X4624, 0X57AD, 0X6536, 0X74BF,
0X8C48, 0X9DC1, 0XAF5A, 0XBED3,      0XCA6C, 0XDBE5, 0XE97E, 0XF8F7,
0X1081, 0X0108, 0X3393, 0X221A,      0X56A5, 0X472C, 0X75B7, 0X643E,
0X9CC9, 0X8D40, 0XBFDB, 0XAE52,      0XDAED, 0XCB64, 0XF9FF, 0XE876,
0X2102, 0X308B, 0X0210, 0X1399,      0X6726, 0X76AF, 0X4434, 0X55BD,
0XAD4A, 0XBCC3, 0X8E58, 0X9FD1,      0XEB6E, 0XFAE7, 0XC87C, 0XD9F5,
0X3183, 0X200A, 0X1291, 0X0318,      0X77A7, 0X662E, 0X54B5, 0X453C,
0XBDCB, 0XAC42, 0X9ED9, 0X8F50,      0XFBEF, 0XEA66, 0XD8FD, 0XC974,
0X4204, 0X538D, 0X6116, 0X709F,      0X0420, 0X15A9, 0X2732, 0X36BB,
0XCE4C, 0XDFC5, 0XED5E, 0XFCD7,      0X8868, 0X99E1, 0XAB7A, 0XBAF3,
0X5285, 0X430C, 0X7197, 0X601E,      0X14A1, 0X0528, 0X37B3, 0X263A,
0XDECD, 0XCF44, 0XFDDF, 0XEC56,      0X98E9, 0X8960, 0XBBFB, 0XAA72,
0X6306, 0X728F, 0X4014, 0X519D,      0X2522, 0X34AB, 0X0630, 0X17B9,
0XEF4E, 0XFEC7, 0XCC5C, 0XDDD5,      0XA96A, 0XB8E3, 0X8A78, 0X9BF1,
0X7387, 0X620E, 0X5095, 0X411C,      0X35A3, 0X242A, 0X16B1, 0X0738,
0XFFCF, 0XEE46, 0XDCDD, 0XCD54,      0XB9EB, 0XA862, 0X9AF9, 0X8B70,
0X8408, 0X9581, 0XA71A, 0XB693,      0XC22C, 0XD3A5, 0XE13E, 0XF0B7,
0X0840, 0X19C9, 0X2B52, 0X3ADB,      0X4E64, 0X5FED, 0X6D76, 0X7CFF,
0X9489, 0X8500, 0XB79B, 0XA612,      0XD2AD, 0XC324, 0XF1BF, 0XE036,
0X18C1, 0X0948, 0X3BD3, 0X2A5A,      0X5EE5, 0X4F6C, 0X7DF7, 0X6C7E,
0XA50A, 0XB483, 0X8618, 0X9791,      0XE32E, 0XF2A7, 0XC03C, 0XD1B5,
0X2942, 0X38CB, 0X0A50, 0X1BD9,      0X6F66, 0X7EEF, 0X4C74, 0X5DFD,
0XB58B, 0XA402, 0X9699, 0X8710,      0XF3AF, 0XE226, 0XD0BD, 0XC134,
0X39C3, 0X284A, 0X1AD1, 0X0B58,      0X7FE7, 0X6E6E, 0X5CF5, 0X4D7C,
0XC60C, 0XD785, 0XE51E, 0XF497,      0X8028, 0X91A1, 0XA33A, 0XB2B3,
0X4A44, 0X5BCD, 0X6956, 0X78DF,      0X0C60, 0X1DE9, 0X2F72, 0X3EFB,
0XD68D, 0XC704, 0XF59F, 0XE416,      0X90A9, 0X8120, 0XB3BB, 0XA232,
0X5AC5, 0X4B4C, 0X79D7, 0X685E,      0X1CE1, 0X0D68, 0X3FF3, 0X2E7A,
0XE70E, 0XF687, 0XC41C, 0XD595,      0XA12A, 0XB0A3, 0X8238, 0X93B1,
0X6B46, 0X7ACF, 0X4854, 0X59DD,      0X2D62, 0X3CEB, 0X0E70, 0X1FF9,
0XF78F, 0XE606, 0XD49D, 0XC514,      0XB1AB, 0XA022, 0X92B9, 0X8330,
0X7BC7, 0X6A4E, 0X58D5, 0X495C,      0X3DE3, 0X2C6A, 0X1EF1, 0X0F78,
};

//    Calculate 16-bit CRC of the given-length data.
U16GetCrc16(constU8*pData,intnLength)
{
U16fcs=0xffff;//Initialize
while(nLength>0){
fcs=(fcs>>8)^crctab16[(fcs^*pData)&0xff];
nLength--;
pData++;
}
return    ~fcs;              //    Negate
}
```

2. Attachment 2 Services Flowchart