GTK Lite 4G PROTOCOL

GPS Tracker
Communication Protocol
V2.0

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REVISION HISTORY

Version	Date	Description	Author	Reviewer
V1.0.0	28/08/2024	Initial Release	Gustavo Fontes	
V2.0.0	24/10/2024	adjusts size alarm/language.	Gustavo Fontes	

1. COMMUNICATION PROTOCOL

This document defines the instructions for using the GPS vehicle tracker platform. The reference interface protocol outlined here only applies to data transfer between the platform and the server.

2. TERM / MEANINGS

Terms	Explanation
A-GPS	Assisted GPS
ACC	Accessory (Ignition of vehicle)
APN	Access Point Name
CAN	Controller Area Network
CID	Cell Tower Identifier
CRC	Cyclic Redundancy Check
DIN	Digital Input
GMT	Greenwich Mean Time
GPRS	General Packet Radio Service
GPS	Global Positioning System
GSM	Global System for Mobile Communication
ICCID	Integrated Circuit Card Identifier
IMEI	International Mobile Equipment Identity
IMSI	International Mobile Subscriber Identity
LAC	Location Area Code
LBS	Location Based Services
MCC	Mobile Country Code
MNC	Mobile Network Code
MNC	Mobile Network Code
NITZ	Network Identity and Time Zone
NTP	Network Time Protocol
RNC	Radio Network Controller

SMS	Short Message Service
OBD	On-Board Diagnostics
OTA	Over The Air
TCP	Transport Control Protocol
TFTP	Trivial File Transfer Protocol
UDP	User Datagram Protocol
UTC	Universal Coordinated Time
VIN	Vehicle Identification Number

3. DESCRIPTION

After startup, the device automatically turns “on” and registers with the LTE / GSM network. After that, it will attempt to create an IP network connection. If such a connection is unavailable, it will still allow connection through SMS or the USB port. Configuration parameters are stored in flash memory and are automatically applied on the device.

The commands can be executed on any available connection as these connections are not exclusive. Commands and responses have identical syntax.

Device has robust lockup protection provided by use of a dedicated hardware watchdog that cycles power and resets the system if a lockup is detected.

The device has more features as follows:

- Multiple location services (GNSS, LBS).
- Supporting A-GPS.
- Low power consumption.
- Using a 3-axis accelerometer.
- Automatic time sync (GPS, NITZ, AGPS, NTP).

4. AVAILABLE INTERFACES

4.1 Interface

The device has three external interfaces:

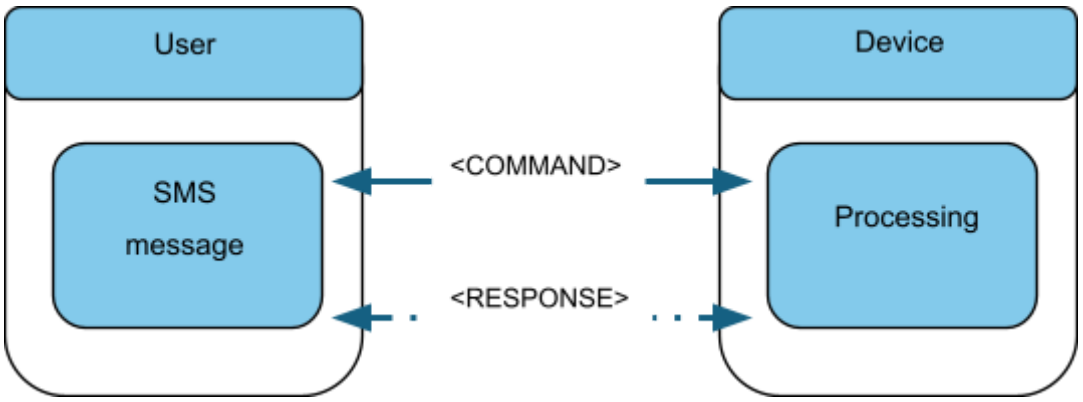
- Message over GSM (SMS)
- Data connection (GPRS)
- USB connection (USB)

All of them can be used to communicate with devices.

4.2 SMS

The commands, described in this document, are available in text format. They can be sent in their raw format from user to the device. After that, the results will be returned to the user also in their raw format.

The workflow is as follows:



4.3 IP (network connection)

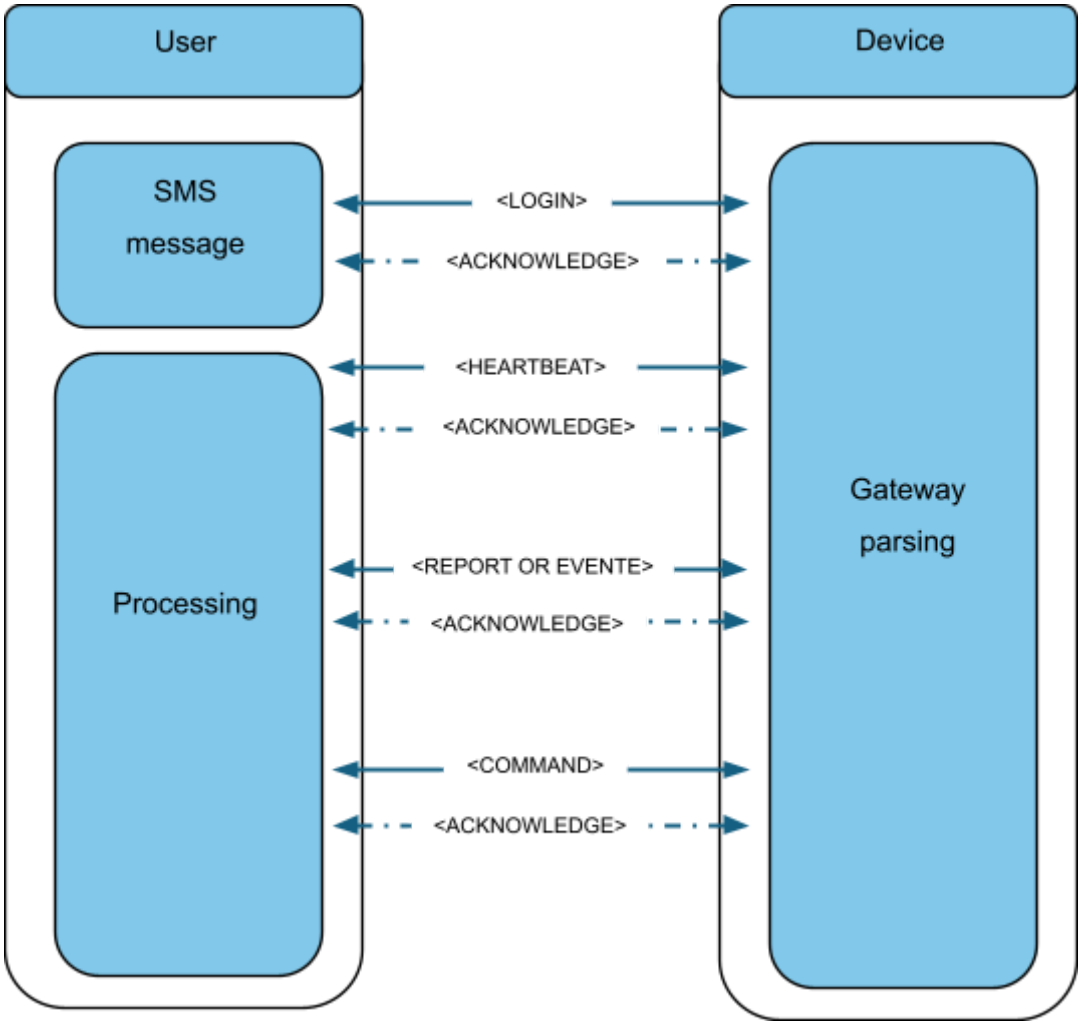
The protocol, described in this document, defines the data packages between server and device. It is based on IP connection over the device's modem. After an IP connection is established between server and device, the data packages are allowed to be exchanged between them.

There are two categories of data packages. One is that device report something to server and server acknowledges it. Another is that server request something and device responses it. The format of data packages will be showed in the following chapters.

The commands, described in this document, have the specific package and

be sent from server to device. The result is another specific package returned from device to server.

Whole workflow is as follows:



When the device is powered up or the session is disconnected (device reconnects), it attempts to establish a new connection to the server. After being connected, the device sends a login package to the server at first.

All other packages will not be sent until the device receives the acknowledgement of the login package from the server.

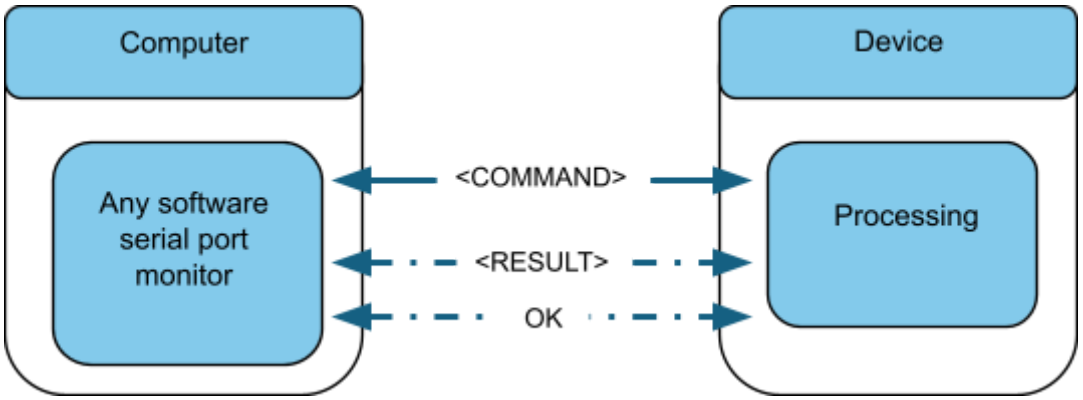
After the connection is established successfully, the heartbeat package will be sent periodically in a specific interval. The reason is to keep the connection and to detect the availability of connection.

If all acknowledgements of three consecutive heartbeat packages are not received, the current session will be disconnected, and a new one will be established.

While the connection is valid, the device will send packages according to different events. The primary packet is the location report which describes the location of the device, and the other packets are alarms configured.

4.4 USB communication

The USB port support commands by serial port as workflow below:



5. DATA TYPES

In this chapter, we discuss common data types used in protocol.

5.1 Integer

Integer is the most important data type in protocol. Most data are represented in an integer, e.g. the data length, the package type, the satellites number, etc.

The positive integers are represented in their binary value in unsigned format.

There are 3 integer types:

- unsigned 8 bits integer, from 0 to 255
- unsigned 16 bits integer, from 0 to 65535
- unsigned 32 bits integer, from 0 to 4294967295

The byte order of an integer can be Big Endian or Little Endian depending on the package.

5.2 String

All strings are coded in UTF-8.

Most strings in the package have a limited length, e.g. password, name, etc. We use a fixed size space to contain them. If the size of space is more than the length of the string, rest bytes will be zero. The length of the string is never more than the size of space.

Only a few strings have a variable length. When they appear in a package, their length must be able to be calculated based on other data fields. The byte order of a string is always from the first byte to the last byte.

5.3 Time

All times are encoded as a 6 Byte integer. All of them are represented in UTC time (GMT). In other words, they are the time in time zone 0. Below is a table showing how the time is represented:

Format	Length [Byte]	Example
Year	1	0x13
Month	1	0x01
Day	1	0x08
Hour	1	0x09
Minute	1	0x1E
Second	1	0x0A

Example: 2019-01-08 09:30:10

Calculated as follows:

- 19 (Decimal) = 13(Hexadecimal)
- 01 (Decimal) = 01(Hexadecimal)
- 08 (Decimal) = 08(Hexadecimal)
- 09 (Decimal) = 09(Hexadecimal)
- 30 (Decimal) = 1E(Hexadecimal)
- 10 (Decimal) = 0A(Hexadecimal)

Then the value is: **0x13 0x01 0x08 0x09 0x1E 0x0A**

5.5 Course & Status

Two bytes are consumed, defining the running direction of GPS. The value ranges from 0° to 360° measured clockwise from north of 0°.

BYTE1	Bit7	Digital Input status
	Bit6	Digital Output Status
	Bit5	GPS real-time/differential positioning
	Bit4	GPS having been positioning or not
	Bit3	East Longitude, West Longitude
	Bit2	South Latitude, North Latitude
	Bit1	Course
	Bit0	
BYTE2	Bit7	
	Bit6	
	Bit5	
	Bit4	
	Bit3	
	Bit2	
	Bit1	
	Bit0	

6. PARSING DATA

For parsing the latitude and longitude we will use the Location package as sample. The method used for calculating the latitude and longitude is described below:

6.1 Latitude

Four bytes are consumed, defining the latitude value of location data. The range of the value is 0 ~ 162000000, indicating a range of 0°~ 90°. The conversion method thereof is as follow: Converting the value of latitude and longitude output by GPS module into a decimal based on minute; multiplying the converted decimal by 30000; and converting the multiplied result into hexadecimal.

Example: 22°32.7658‟ = (22X60+32.7658) x 30000 = 40582974, then converted into a hexadecimal number 40582974 (Decimal) = 26B3F3E (Hexadecimal)
at last, the value is: 0x02 0x6B 0x3F 0x3E.

6.2 Longitude

Four bytes are consumed, defining the longitude value of location data. The range of the value is 0 ~ 324000000, indicating a range of 0° ~ 180°. The conversion method thereof is as follows: Converting the value of latitude and longitude output by GPS module into a decimal based on minute; multiplying the converted decimal by 30000; and converting the multiplied result into hexadecimal.

6.3 GPS Information

The field is 1 Byte displayed by two hex digits, wherein the first one is for the length of GPS information and the second one for the number of the satellites joined in positioning.

Example: if the value is 0xCD, it means the length of GPS information is 12 and the number of the positioning satellites is 13. (C = 12Bit Length , D = 13 satellites)

6.4 GSM Signal Degree.

The GSM information range: 0 ~ 100; The stronger the number, the greater the

GSM signal

- 0: no signal
- 100: signal is full

6.5 Battery Voltage Level

The range is 0~6 defining the Battery voltage is from low to high.

- 0：Lowest power and power off
- 1：Not enough power to dial a call or send messages.
- 2：Low power and alarm
- 3：Lower power but can work normally
- 3~6：Work in good condition

6.6 Battery Voltage

For example：External Voltage 4.1V，as：0x01 0x9A
For exemple：External Voltage 3.8V，as：0x01 0x7C

6.7 External Voltage

For example：External Voltage 30.00V，As：0x0B 0xB8
For example：External Voltage 11.85V，As：0x04 0xA1

7. NETWORK PROTOCOL

7.1 TCP/IP

TCP is a transmission protocol based on an IP network. It establishes a stream-like tube between device and server, and provides reliable, ordered, and error-checked delivery of a stream of octets. Any data enters the tube, and they will arrive at their destination with correct content in correct order. As a result, the packages, described in the following chapters, are injected into the TCP session without any extra encapsulation.

Its disadvantage is also its stream-like feature. The delivered data may be split and recombined during transmitting (MTU of network). So, in order to recover the original package, the destination must detect the package head, specifically the length of the package, then get the package body. As a result, the destination must save all partial packages. Only when a whole package is recognized, the destination can process it.

A TCP tube is as below:

…	Package 1	Package 2	…	Package N	…

8. PACKAGES

The communication is transferred asynchronously in bytes. In general, the structure of a package is described as below:

Data package length: (10+N) Byte

Name	Byte	Description
Star bit	2	0x78 0x78
Package Length	1	Package Length is the total size of Sequence and Content
Protocol number	1	Package identifier
Information content	N	Package sequence number — Unsigned 16 bits integer
Information serial number	2	Sequential Number
Error checking	2	CRC
End Bit	2	0xDA 0x0A

8.1 Start Bit

Fixed value, hexadecimal number **0x78 0x78**

8.2 Package Length

Length = protocol number + Information content + Information serial number + error checking, (5+N) Byte in all, as the information Content is uncertain length data.

8.3 Protocol number

Refer to different "information content" and correspond to the protocol number, **as** table:

Type	Value
Login Information	0x01
Location Data	0x32
Status Information (The heartbeat packets)	0x13

Alarm data	0x16
Server send command to device	0x80

8.4 Information content

The specific contents are determined by the protocol numbers corresponding to different applications.

8.5 Information serial number

After turning on the device, it will send the first item of GPRS data (including heartbeat package and GPS/LBS data package); the serial number of this item is “1”. After that, the serial number will be added on by 1 automatically at every sending process (including heartbeat package and GPS/LBS data package).

8.6 Error Checking

Device or server can judge the accuracy of data received with identifying code. Sometimes, because of the electronic noise or other interference, data will be changed a little in the transit process. In this case, identifying code can make sure the core or associated core do nothing with such kind of wrong data, which will strengthen the security and efficiency of the system. This identifying code adopts CRC-ITU identifying method. The CRC-ITU value is from "Package Length' to "Information Serial Number" in the protocol (including "Package Length" and "Information Serial Number ").

If the receiver receives CRC wrong calculating information, then ignore it and discard this data package.

8.7 End bit

Fixed value by hexadecimal **0x0D 0x0A**

9. Data packEt sent from device to server

9.1 Login information packet (0x01)

The login information packet is used to be sent to the server with the device ID to confirm whether the established connection is normal or not. Content for 8 BYTE, A total of 18 bytes.

9.1.1 Device Sending Login information Packet to Server

Name	Bytes	Description
Start Bit	2	0x78 0x78
Length	1	Package Length from protocol number to error checksum - Unsigned 8 bits integer
Protocol Number	1	Package identifier - 0x01
Device ID	8	Device IMEI 15 digits Example: if the IMEI is 123456789012345 The IMEI Contents is: 0x01 0x23 0x45 0x67 0x89 0x01 0x23 0x45
Information Serial Number	2	Package sequence number - Unsigned 16 bits integer
Error Check	2	error checksum
End Bit	2	0x0D 0x0A

9.1.2. Server Responds to the Login information Packet.

Name	Byte	Description
Start Bit	2	0x78 0x78
Length	1	Package Length from protocol number to error checksum - Unsigned 8 bits integer
Protocol Number	1	Package identifier - 0x01
Information Serial Number	2	Package sequence number - Unsigned 16 bits integer
Error Check	2	error checksum
End Bit	2	0x0D 0x0A

The response packet from the server to the device: the protocol number in the response packet is identical to the protocol number in the data packet sent by the device.

Example of login package and the response:

From device:

78780D010865080044015069003A53F20D0A

From server:

78780501003A568C0D0A

9.2. Location data Packet (0x32)

Location data package is the most important package. It transfers the position and other information of the device to the server. Its structure is:

9.2.1 Device Sending Location Data Packet to Server

Name		Byte	Description
Start Bit		2	0x78 0x78
Packet Length		1	Package Length from protocol number to error checksum - Unsigned 8 bits integer
Protocol Number		1	Package identifier - 0x32
GPS information	Date time	6	Time
	Quantity of GPS satellites	1	GPS Information
	Latitude	4	Convert to a decimal and divide 1800000
	Longitude	4	Convert to a decimal and divide 1800000
	Speed	1	km/h
	Course, Status	2	Course & Status
LBS information	MCC	2	Mobile Country Code - Unsigned 16 bits integer
	MNC	1	Mobile Network Code - Unsigned 8 bits integer
	LAC	2	Location Area Code - Unsigned 16 bits integer
	Cell ID	4	Cell ID with RNC - Unsigned 32 bits integer
ACC		1	ACC Status ACC low: 00, ACC high: 01
Data Upload Mode		1	0x04 Re-upload the last GPS point when back to static. 0x05 Upload the last effective point when the network recovers.
GPS Real-Time Re-upload		1	0x00Realtimeupload. 0x01Re-upload
Mileage		4	The unit defaults to km
External Voltage		2	External Voltage, measured in a unit of 0.01V

Acc on time	4	ACC cumulative time in seconds
Firmware Version	2	If the current version is V1.03, the version information content is 0x0067=103
Information Serial Number	2	Package sequence number - Unsigned 16 bits integer
Error Check	2	Error checksun
End Bit	2	0x0D 0x0A

9.2.1.1 MCC

The country code to which a mobile user belongs, i.e., Mobile Country Code.

Example: Chinese MCC is 460 in decimal, or 0x01 0xCC in Hex (that is, a decimal value of 460 converting into a hexadecimal value, and 0 is added at the left side because the converted hexadecimal value is less than four digits). Herein the range is 0x0000 ~ 0x03E7.

9.2.1.2 MNC

Mobile Network Code (MNC)

Example: Chinese MNC is 0x00.

9.2.1.3 LAC

Location Area Code (LAC) included in LAI consists of two bytes and is encoded in hexadecimal. The available range is 0x0001-0xFFFE, and the code group 0x0000 and 0xFFFF cannot be used.

5.3.2. Server Responds the Location Data Packet

Name	Byte	Description
Start Bit	2	0x78 0x78
Length	1	Package Length from protocol number to error checksum - Unsigned 8 bits integer
Protocol Number	1	Package identifier - 0x32
Receive Serial Number	2	Serial number of the packet received
Information Serial Number	2	Package sequence number - Unsigned 16 bits integer
Error Check	2	error checksum
End Bit	2	0x0D 0x0A

The response packet from the server to the device: the protocol number in the response packet is identical to the protocol number in the data packet sent by the device.

Example of login package and the response:

From device:

78782E17180217121736CD021EF55504B49FE30058DA00000000000000

00460637018B05D10000094A000029EA002620540D0A

From server:

7878051700260002DF2D0D0A

9.4. Heartbeat Packet (0x13)

Status information packet is a data packet to maintain the connection between the device and the server.

9.4.1 Device Sending Status information Packet to Server

Name		Byte	Description
Start Bit		2	0x78 0x78
Packet Length		1	Package Length from protocol number to error checksum - Unsigned 8 bits integer
Protocol Number		1	Package identifier - 0x13
Status information	Device Information	1	Status Device
	Battery Voltage Level	1	Battery Voltage Level
	GSM Signal Strength	1	GSM Signal Degree
	Alarm/Language	2	Alarm type and language
Information Serial Number		2	Package sequence number - Unsigned 16 bits integer
Error Check		2	Error checksun
End Bit		2	0x0D 0x0A

9.4.2. Server Responds to the Status information Packet.

Name	Byte	Description
Start Bit	2	0x78 0x78
Length	1	Package Length from protocol number to error checksum - Unsigned 8 bits integer
Protocol Number	1	Package identifier - 0x17
Information Serial Number	2	Package sequence number - Unsigned 16 bits integer
Error Check	2	Error checksum
End Bit	2	0x0D 0x0A

The response packet from the server to the device: the protocol number in the response packet is identical to the protocol number in the data packet sent by the device.

9.5. Alarm Packet (0x16)

An Alarm Packet will be sent to the server when a specific event occurs. Its structure is:

9.5.1 Device Sending Alarm Packet to Server

Name		Byte	Description
Start Bit		2	0x78 0x78
Packet Length		1	Package Length from protocol number to error checksum - Unsigned 8 bits integer
Protocol Number		1	Package identifier — 0x16
GPS information	Date time	6	Time
	Quantity of GPS satellites	1	GPS Information
	Latitude	4	0 ~ 90.0 degree: Unsigned 32 bits integer from 0 to 162000000
	Longitude	4	0 ~ 180.0 degree: Unsigned 32 bits integer from 0 to 324000000
	Speed	1	Unsigned 16 bits integer (in km/h)
	Course, Status	2	Course & Status
LBS information	LBS	1	LBS - Unsigned 8 bits integer
	MCC	2	Mobile Country Code - Unsigned 16 bits integer
	MNC	1	Mobile Network Code - Unsigned 8 bits integer
	LAC	2	Location Area Code - Unsigned 16 bits integer
	Cell ID	3	Cell ID with RNC - Unsigned 24 bits integer
Status information	Device Information	1	Status Device
	Battery Voltage Level	1	Battery Voltage Level
	GSM Signal Strength	1	GSM Signal Degree
	Alarm/Language	2	Alarm type and language
Information Serial Number		2	Package sequence number - Unsigned 16 bits integer
Error Check		2	Error checksun
End Bit		2	0x0D 0x0A

9.5.1.1 Alarm Type/Language

The alarm type is listed as below:

Alarm	0x02: Power Cut Alarm
	0x03: Shock Alarm
	0x0E:External voltage-low voltage alarm
	0x50 Input activated
	0xFE: ACC On Alarm
	0xFF: ACC Off Alarm
Language	0x01: Chinese 0x02: English

9.5.1.2 Device Information

One byte is consumed defining various status information of the device.

Bit	Code Meaning
Bit7	1: Output Activated 0: Output Deactivated
Bit6	1: GPS is On 0: GPS is Off
Bit3-5	100: SOS 011: Low Battery 010: Shock 000: Normal
Bit2	1: Charge On 0: Charge Off
Bit1	1: Acc High 0: Acc Low
Bit0	1: Activated 0: Deactivated

9.4.2. Server Responds to the Alarm Packet.

Name	Byte	Description
Start Bit	2	0x78 0x78
Length	1	Package Length from protocol number to error checksum - Unsigned 8 bits integer
Protocol Number	1	Package identifier - 0x16
Received Serial Number	2	Serial Number of package received
Information Serial Number	2	Package sequence number - Unsigned 16 bits integer
Error Check	2	error checksum
End Bit	2	0x0D 0x0A

The response packet from the server to the device: the protocol number in the response packet is identical to the protocol number in the data packet sent by the device.

Example of alarm package and the response:

From device:

78783116180217132E10C9021EF4EC04B49FF10019110900000000000000005006310202018B0000000009EC00003D40023070B10D0A

From server:

7878051602300001C3F60D0A

10. Data Packet Sent From Server to Device

10.1. Packet Sent by Server(0x80)

Name	Byte	Description
Start Bit	2	0x78 0x78
Packet Length	1	Package Length from protocol number to error checksum - Unsigned 8 bits integer
Protocol Number	1	Package identifier - 0x80
Length of Command	1	Server Flag Bit + Length of Command Content Example: measured in bytes, 0x0A means the content of command occupied ten bytes.
Server Flag Bit	4	It is reserved to the identification of the server.
Command Content	M	It is represented in ASCIIplat of string, and the command content is compatible with text message command.
Serial Number	2	Package sequence number - Unsigned 16 bits integer
Error Check	2	error checksum
End Bit	2	0x0D 0x0A

10.2. Packet Replied by Device (0x15)

Name	Byte	Description
Start Bit	2	0x78 0x78
Length	1	Package Length from protocol number to error checksum - Unsigned 8 bits integer
Protocol Number	1	Package identifier - 0x15
Length of Command	1	Server Flag Bit + Length of Command Content Example: measured in bytes, 0x0A means the content of command occupied ten bytes.
Server Flag Bit	4	It is reserved to the identification of the server.
Command Content	M	It is represented in ASC II of string, and the command content is compatible with text message command.
Language	2	0x0001 Chinese - 0x0002 English

Information Serial Number	2	Package sequence number - Unsigned 16 bits integer
Error Check	2	error checksum
End Bit	2	0x0D 0x0A

Example of alarm package and the response:

Typed command:

CLEARD#

From device:

787811800B00000000434C4541524423000176D60D0A

From server:

78781B151300000000434C454152443D537563636573732100010000C2F5F0D0A

11. CRC-ITU LOOKUP TABLE ALGORITHM CODE

```
static const U16 crctab16[ ] =
{
    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 the 16-bit CRC of data with predetermined length.
U16 GetCrc16(const U8* pData, int nLength)
{
  U16 fcs = 0xffff;   // initialization
  while(nLength>0)
{
    fcs = (fcs >> 8) ^ crctab16[(fcs ^ *pData) & 0xff];
    nLength--;
    pData++;
  }
  return ~fcs; // negated
}
```

12. COMMANDS LIST

Below is the list of GTK Lite SMS commands. The commands sent by the server have the same syntax as the SMS commands.

Sent by Server:

TIMER,60,1800#

Command Hexadecimal:

78781A80120102030454494D45522C36302C313830302300020001010100D0A

SMS:

TIMER,60,1800#

To send commands via Serial Port, the following syntax is used:

Command sent by serial

- ATSMS:STATUS#\r\n
- ATSMS:RELAY,1#\r\n
- ATSMS:TIMER,60,1800#\r\n

APN		
Text command	**Parameter**	**Sample**
APN Setting	APN,[apn],[username], [password]	1：APN,multigetrak.br,arqia,arqia# 2：APN,conexão.getrak.com.br#
Command Description	APN differs according to the local telecom operators： APN request password, please refer to Sample 1, and Sample 2 for no password.	
Command Feedback	Successful reply: APN,OK! Fail reply: APN,FAIL!	

SERVER		
Text command	**Parameter**	**Sample**
SERVER Parameter	SERVER, 0,[DNS],[Port],1#	SERVER,0,gtklite4g.getrak.com.br,13013, 1#
Command Description	Change the IP and port when move to a new server port：10~60000	
Command Feedback	Successful reply: SERVER OK! Fail reply: SERVER FAIL!	

TIMER		
Text command	**Parameter**	**Sample**
TIMER Parameter setting	TIMER,[ACC on timer, ACC Off time]#	TIMER,60,3600#
Command Description	1. Time scope：0, 10~300 seconds time interval； 2. 0, no data uploading； 3. The default value is 60 seconds ！	
Command Feedback	Successful reply: TIMER OK! Fail reply: TIMER FAIL!	

RELAY		
Text command	**Parameter**	**Sample**
RELAY Parameter	RELAY,0#	Recover oil and power
RELAY Parameter	RELAY,1#	Normal lock Blocks the vehicle if the speed drops below 20 km/h regardless of the ignition status
Command	Successful reply: Relayer enable OK! or Relayer disable OK!	

Feedback	

GMT		
Text command	**Parameter**	**Sample**
GMT	GMT,[location, time zone],[time zone]#	GMT,E,8# GMT,E,5,30#
Command Description	1. Eastern Hemisphere, E; 2. Western Hemisphere: W Time zone: between 0 and 12	
Command Feedback	Successful reply: GMT OK! Fail reply: GMT FAIL!	

SPEED		
Text command	**Parameter**	**Sample**
SPDALM Parameter	SPEED,[state],[timer],[speed],0#	SPEED,ON,10,120,0# SPEED,OFF#
Command Description	state - ON / OFF Timer - 5-600s speed - 1-255km/h	
Command Feedback	Successful Setting: SPEED,OK! Fail Setting: SPEED FAIL!	

RESET		
Text command	**Parameter**	**Sample**
RESET	RESET#	RESET#
Command Description	Reset the device	

Command Feedback	Successful Setting：RESET OK ！

FACTORY		
Text command	**Parameter**	**Sample**
FACTORY	FACTORY#	FACTORY#
Command Description	Sending this command will restore the parameters set by the user and restore to the factory default state;	
Command Feedback	Successful Setting：FACTORY OK! Fail Setting：FACTORY FAIL!	

POWERALM		
Text command	**Parameter**	**Sample**
POWER,[value low Battery],[value low voltage external]#	POWERALM,A,M,T1,T2,#	POWERALM,ON,0,10,10,#
Command Description	A = ON/OFF; M = 0 TCP Only	
Command Feedback	Successful Setting: POWERALM:ON,0,10,10 Fail Setting: POWERALM FAIL!	

HBT		
Text command	**Parameter**	**Sample**
HBT	HBT,Minute#	HBT,5#
Command Description	This command is used to set the heartbeat packet updata time interval; Min: 1 to 60 minutes, the default is 3 minutes;	
Command Feedback	Successful Setting：HBT OK! FAIL Setting：HBT FAIL!	

WHERE		
Text command	**Parameter**	**Sample**
WHERE#		WHERE#
Command Description	Check the location link of Google map	
Command Feedback	<09-19 14:18>http://maps.google.com/maps?q=-27.597960,-48.618837	

VERSION		
Text command	**Parameter**	**Sample**
VERSION		VERSION#
Command Description	The command is to check the software version	
Command Feedback	GTKLITE4G_10D6J_B44_V1.06 2024-08-29	

PARAM		
Text command	**Parameter**	**Sample**
PARAM	PARAM#	PARAM#
Command Description	The command is to check the settings and the default parameter.	
Command Feedback	IMEI:868022036334980;TIMER:60,3600;SENDS:2;HBT:180Sec;Defense:3;	

STATUS		
Text command	**Parameter**	**Sample**
STATUS	STATUS#	STATUS#
Command Description	The command is designed for checking the device's working status.	

Command Feedback	Battery:3.65V;GPRS:Offline;GSM Signal Level:24;ACC:ON;GPS:Fail positioning;GPS Signal Level:35,15,0,0,0,0;Defense:OFF;Relay:1;

ACCVIRTUAL		
Text command	**Parameter**	**Sample**
ACCVIRTUAL	ACCVIRTUAL,[X],[Y]#	ACCVIRTUAL,0,13.8# ACCVIRTUAL,1,13# ACCVIRTUAL,1,0#
Command Description	Set Virtual ACC X - 0-1 - enable or disable vibration mode; Y - 0-30 - Voltage value. 0 disable voltage mode;	
Command Feedback	Successful Setting：ACCVIRTUAL:0,13.8# FAIL Setting：ACCVIRTUAL : FAIL!	

SLEEP		
Text command	**Parameter**	**Sample**
SLEEP	SLEEP,[T],[M]#	SLEEP,3,2# SLEEP,4,1#
Command Description	T = Time to enter in sleep mode after acc turn off, in minutes. M = sleep mode - 0 do not use sleep mode; 1 light sleep, turn off only gnss; 2 deep sleep, turn off gnss and tcp connection;	
Command Feedback	Successful Setting : SLEEP:3,2 FAIL Setting：SLEEP FAIL	

BATALM		
Text command	**Parameter**	**Sample**

BATALM	BATALM,[state],[0]	BATALM,ON,0#
Command Description	state = ON/OFF 0 = only TCP alarm	
Command Feedback	Successful Setting：BATALM:ON,0	

MILEAGE		
Text command	**Parameter**	**Sample**
MILEAGE	MILEAGE,[km]#	MILEAGE,100#
MILEAGE	MILEAGE#	MILEAGE#
Command Description	Set or query value of odometer	
Command Feedback	Successful Setting：MILEAGE:100 FAIL Setting：MILEAGE FAIL	

HORIMETER		
Text command	**Parameter**	**Sample**
ACCONT	ACCONT,[time]#	HORIMETER,1000#
Command Description	Set the ACC ON cumulative time, S: 0~999999999 seconds.	
Command Feedback	Successful Setting：HORIMETER OK!	

ACCALM		
Text command	**Parameter**	**Sample**
ACCALM	ACCALM,[MODE],0#	ACCALM,ON,0# ACCALM,OFF#

Command Description	Set the ACC alarm ON, Turn on the ACC alarm; OFF, Turn off the ACC alarm;
Command Feedback	Successful Setting：ACC ALARM:OK! or ACC ALARM:OFF

UPGRADE		
Text command	**Parameter**	**Sample**
YCSJ	YCSJ,[addr],CRC#	YCSJ,http://139.9.60.174/update/GTKLITE4G_10D6J_B44_V106.bin,0F#
Command Description	addr - address of the file, using http protocol. CRC = CheckSum of the file, xor 256.	
Command Feedback	Successful Setting：UPGRADE OK NewVersion: GTKLITE4G… FAIL Setting：UPGRADE FAIL…	

GPSFILTER		
Text command	**Parameter**	**Sample**
GPSFILTER	GPSFILTER,[t]#	GPSFILTER,10#
Command Description	t = Time to init reporting real GPS fix state.	
Command Feedback	Successful Setting：GPSFILTER: 10 FAIL Setting：GPSFILTER FAIL…	