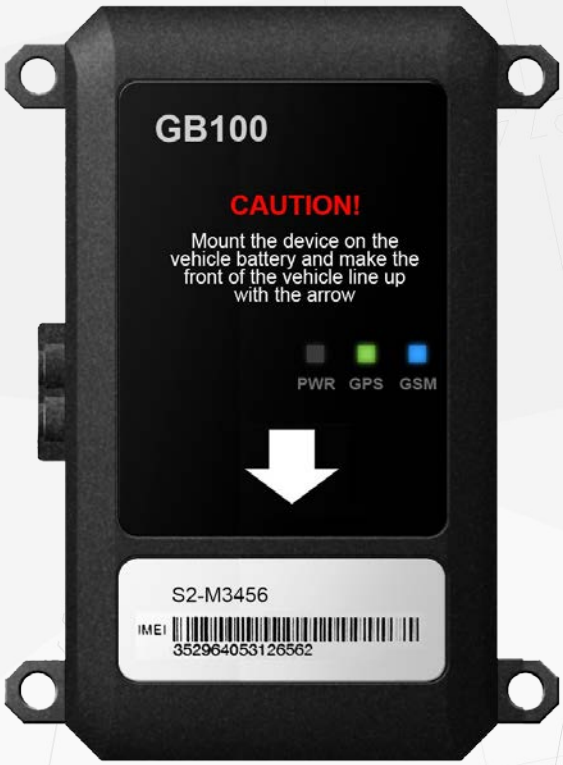
GB100P @Track Air Interface Firmware Update

GSM/GPRS/GNSS Tracker

TRACGB100PFTAN001

Version: 1.00



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Contents

0. Revision History

Version	Date	Author	Description of Change
1.00	2018-01-22	Navy Zhang	Initial

1. Scope

This document describes the firmware update over the air for GB100P. This enables the end users to update the firmware of GB100P remotely without having to bring their device to the service centre. Thus the service provider of GB100P could conveniently push new features or bug fix to the end users and promote the customer experience.

During the firmware update, the following equipment is involved:

- ✧ the terminal: GB100P whose firmware is to be updated
- ✧ the backend server: the server which remotely controls the terminal and receives report from the terminal
- ✧ the file server: the server which hosts the packages of the update

The file server and the backend server could be hosted on the same machine.

This document describes the process of the firmware update and the necessary message exchanged during the update, while the information below is not covered:

- ✧ The timing and the strategy that the backend server initiates the update.
- ✧ The deployment method of the update package.
- ✧ How to setup a file server.
- ✧ The communication between the backend server and the file server.

2. Message

2.1. Command and Acknowledgement

The command **AT+GTUPD** is used to start and stop the firmware update remotely.

2.1.1. Start the Firmware Update

To start the firmware update, the backend server sends **AT+GTUPD (sub:0)** command to the device. Upon receiving this command, the device is informed of where to download the update package and how to download the package.

➢ **Start: AT+GTUPD=**

Example: **AT+GTUPD=GB100P,0,0,20,0,,,http://fota.queclink.com/GB100P_0101_0201.bin,,0,,,0001$**			
Parameter	**Length(byte)**	**Range/Format**	**Default**
password	4 - 6	'0'-'9', 'a'-'z', 'A'-'Z'	gb100p
sub-command	1	0	
max download retry	1	0 – 3	0
download timeout	2	10 – 30 min	20
download protocol	1	0	0
reserved	0		
reserved	0		
download URL	<=100	legal URL	
reserved	0		
update type	1	0|1	0
reserved	0		
reserved	0		
serial number	4	0000-FFFF	
tail character	1	$	$

- <*password*>: The valid characters for the password include '0'-'9', 'a'-'z', and 'A'-'Z'. The default value is "gb100p".
- <*sub-command*>: The sub-command of **AT+GTUPD**. 0 means "Start the firmware update".
- <*max download retry*>: It specifies the maximum number of retries to download the update package upon download failure.
- <*download timeout*>: It specifies the expiration timeout of a single download. If the download expires, it is considered to be failure.
- <*download protocol*>: The protocol used to download the package. Only HTTP is supported now. Set it to 0.
- <*download URL*>: It specifies the URL to download the package.

- <*reserved*>: Reserved for future extension.
- <*update type*>: It specifies the firmware type to be updated. 0 means “BB firmware”, and 1 means “MCU firmware”.
- <*serial number*>: As shown in the example above, the exact serial number will be sent back to the platform in ACK. It is in hexadecimal format. It should begin from 0000 and increases by 1 every time. It should roll back after “FFFF”.
- <*tail character*>: A character to indicate the end of the command. It must be ‘$’.

2.1.2. Stop the Firmware Update

Before the device finishes downloading the update package, the backend server could use the **AT+GTUPD (sub:1)** command to cancel the current firmware update. If the package is downloaded successfully, this command is ignored.

➢ **Stop: AT+GTUPD=**

Example: **AT+GTUPD=GB100P,1,,,,,0001$**			
Parameter	**Length(byte)**	**Range/Format**	**Default**
password	4 - 6	‘0’-‘9’, ‘a’-‘z’, ‘A’-‘Z’	gb100p
sub-command	1	1	
reserved	0		
reserved	0		
reserved	0		
reserved	0		
serial number	4	0000-FFFF	
tail character	1	$	$

- <*sub-command*>: The sub-command of **AT+GTUPD**. 1 means “Cancel the current firmware update process”.

2.1.3. Acknowledgement

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

➢ **+ACK:GTUPD,**

Example: **+ACK:GTUPD,4C0102,135790246811220,,0001,20180226020025,000A$**			
Parameter	**Length(byte)**	**Range/Format**	**Default**
protocol version	6	XX0000 – XXFFFF, X∈{'A' – 'Z', '0' – '9'}	
unique ID	15	IMEI	
device name	<=10	‘0’-‘9’, ‘a’-‘z’, ‘A’-‘Z’	
serial number	4	0000-FFFF	

send time	14	YYYYMMDDHHMMSS	
count number	4	0000-FFFF	
tail character	1	$	$

- <*protocol version*>: The protocol version that the terminal conforms to. The first two characters XX indicate the device type. **4C** means GB100P. The middle two characters represent the major version number and the last two characters represent the minor version number. Both the major version number and the minor version number are hex digits. For example, **0100** means version 1.00.
- <*unique ID*>: The terminal's IMEI.
- <*device name*>: An ASCII string which represents the name of the device.
- <*serial number*>: The <*serial number*> in the **AT+GTUPD** command.
- <*send time*>: The terminal local time to send the message.
- <*count number*>: The self-increasing count number will be included in every acknowledgment message. The count begins from 0000 and increases by 1 every time. It will roll back after "FFFF".

2.2. Report

During the firmware update process, the device reports its status to the backend server via the message **+RESP:GTUPD** upon entering different phases, including the update confirmation information, package download information and firmware update information.

2.2.1. Update Confirmation

The device sends update confirmation information to the backend server if:

- the update command is confirmed by the device
- the update command is refused by the device
- the update process is canceled by the backend server
- the update command is refused because the battery is low

➢ **Confirmation: +RESP:GTUPD,**

Example: **+RESP:GTUPD,450100,135790246811220,,,100,,20090101000000,11F0$**			
Parameter	**Length(byte)**	**Range/Format**	**Default**
protocol version	6	XX0000 – XXFFFF, X∈{'A' – 'Z', '0' – '9'}	
unique ID	15	IMEI	
VIN	17	'0' - '9' 'A' - 'Z' except 'I', 'O', 'Q'	
device name	<=10	'0'-'9', 'a'-'z', 'A'-'Z'	
code	3	100|101|102|103|110|111|112|113	
reserved	0		

send time	14	YYYYMMDDHHMMSS	
count number	4	0000-FFFF	
tail character	1	$	$

✧ <*code*>: It indicates the confirmation information.
- 100/110: The update command is confirmed by the device.
- 101/111: The update command is refused by the device.
- 102/112: The update process is canceled by the backend server or refused because of an incorrect URL.
- 103/113: The update process is refused because the battery is low.

Note: If the value of <*update type*> in the command **AT+GTUPD** is 1, the value of <*code*> will be 110/111/112/113.

2.2.2. Package Download

The device sends package download information to the backend server if:
✧ the device starts to download the package
✧ the device finishes downloading the package successfully
✧ the device fails to download the package

➢ **Downloading: +RESP:GTUPD,**

Example: **+RESP:GTUPD,450100,135790246811220,,,200,1,20090101000000,11F0$**			
Parameter	**Length(byte)**	**Range/Format**	**Default**
protocol version	6	XX0000 – XXFFFF, X∈{'A' – 'Z', '0' – '9'}	
unique ID	15	IMEI	
VIN	17	'0' - '9' 'A' - 'Z' except 'I', 'O', 'Q'	
device name	<=10	'0'-'9','a'-'z','A'-'Z'	
code	3	200|201|202|210|211|212	
download times	1	1|2|3|4	
send time	14	YYYYMMDDHHMMSS	
count number	4	0000-FFFF	
tail character	1	$	$

✧ <*code*>: It indicates the download information.
- 200/210: The device starts to download the package.
- 201/211: The device finishes downloading the package successfully.
- 202/212: The device fails to download the package.

✧ <*download times*>: The count number of the package download.

Note: If the value of <*update type*> in command **AT+GTUPD** is 1, the value of <*code*> will be

210/211/212.

2.2.3. Firmware Update

The device sends firmware updating information to the backend server if:

- ✧ the device starts to update the firmware
- ✧ the device finishes updating the firmware successfully
- ✧ the device fails to update the firmware
- ✧ the update process does not start because the battery is low

➢ **Updating: +RESP:GTUPD,**

Example: **+RESP:GTUPD,450100,135790246811220,,,300,,20090101000000,11F0$**			
Parameter	**Length(byte)**	**Range/Format**	**Default**
protocol version	6	XX0000 – XXFFFF, X∈{'A' – 'Z', '0' – '9'}	
unique ID	15	IMEI	
VIN	17	'0' - '9' 'A' - 'Z' except 'I', 'O', 'Q'	
device name	<=10	'0'-'9', 'a'-'z', 'A'-'Z'	
code	3	300|301|302|303|310|311|312|313	
reserved	0		
send time	14	YYYYMMDDHHMMSS	
count number	4	0000-FFFF	
tail character	1	$	$

- ✧ <*code*>: It indicates the update information.
  - 300/310: The device starts to update the firmware
  - 301/311: The device finishes updating the firmware successfully
  - 302/312: The device fails to update the firmware
  - 303/313: The update process does not start because the battery is low

Note: If the value of <*update type*> in the command **AT+GTUPD** is 1, the value of <*code*> will be 310/311/312/313.

3. Firmware Update Process

The firmware update process includes four steps.

3.1. Initiation of the Update Process

The backend server sends the **AT+GTUPD (sub:0)** command to the device to initiate the update process. Along with this command, the backend server sends necessary information for the device to start the update process.

It's the backend server's duty to decide when and how to initiate the firmware update process to all the devices it controls. As the response message collector and the controller, the backend server has all the information it needs to start an update process including the current firmware versions of the devices it controls (retrieved with the **AT+GTRTO** command), the version of the latest available firmware and the location of the proper update packages.

3.2. Confirmation of the Update Process

Upon receiving the **AT+GTUPD (sub:0)** command, the device will first check the current battery capacity. If the battery capacity can not support the update process, it will report **+RESP:GTUPD (code: 103)** to notify the backend server that the update process is to be aborted because of low battery. If the battery capacity is ample, the device will send **+RESP:GTUPD** with confirmation information to the backend server. Then the update process proceeds to the next step.

If the update command is confirmed, the device will go into a non-interactive mode. That is, the end user can no longer make phone call, and all incoming calls are rejected automatically until the update process finishes. At the meantime, the device will ignore all the commands received from the backend server if it is not related to the update process. Also the device will stop all the reports that are not related to the update process.

3.3. Download of the Update Package

If the update command is confirmed, the device will use the information sent by the backend server to download the update package. If the download fails, the device will retry the specified times. If all attempts fail, the updating process is aborted and the device will automatically reboot to go back to the normal working mode. If the download succeeds, the update process proceeds to the next step. Either way, the device will send **+RESP:GTUPD** with download information to the backend server.

Before the package is downloaded, the backend server could send **AT+GTUPD (sub:1)** command to cancel the current update process. This is the only chance to abort during the update process.

3.4. Update of the Firmware

After downloading the package successfully, the device will check the battery capacity again. If the battery cannot support the update process, the device will report **+RESP:GTUPD (code: 303)** to notify the backend server that the update process is to be aborted because of low battery. If the battery capacity is ample, the device will send **+RESP:GTUPD (code:300)** to the backend server to inform of the start of the updating. Then it uses the update package to update the firmware. After the update, whether it succeeds or fails, the device will reboot automatically. After the device boots up, it sends **+RESP:GTUPD** with update information to the backend server and works as usual.

3.5. An Example of Successful Update