CV200 @Tracker Air Interface

Firmware Update Protocol

Telematics Dual-Lens LTE CAT6 DASH CAM

QSZTRACCV200FTAN0101

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Contents

0. Revision History

Version	Date	Author	Description of Change
1.00	2023-03-16	Daniel Yang	Initial
1.01	2023-06-15	Daniel Yang	1. Added <Update Type> 11 to the +RESP:GTUPD. 2. Modified <Update Type> description.

1. Scope

This document describes the firmware update over the air for CV200. It enables the end users to update the firmware of CV200 remotely without bringing their devices to the service center. Thus, the service provider of CV200 can conveniently promote new features or carry out debugging for the end users to improve the customer experience.

For the firmware updating, three kinds of equipment are involved:

- The terminal: CV200 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 stores the packages of the update.

Note:

The file server and the backend server could host on the same machine.

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

- The time and the method that the backend server initiates the updating
- The deployment method of the update package
- How to set up 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-command:0)** command to the device. In this command, the device is informed of where and how to download the update package.

➢ **Start: AT+GTUPD=**

Example: **AT+GTUPD=cv200,0,0,10,2,,,ftp://test:12345678@217.14.46.21:32768/henry/CV200_MCU_R01A01V01.enc,,0,,,,0001$** **AT+GTUPD=cv200,0,0,10,0,,,http://210.18.45.10:9154/cv200/deltabin/CV200_MCU_R01A01V01,,0,,,,0001$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default Value**
Password	4~6	'0'-'9','a'-'z', 'A'-'Z'	cv200
Sub-Command	1	0	0
Max Download Retry	1	0 – 3	0
Download Timeout	<=2	5 – 30 min	10
Download Protocol	1	0|2	0
Download User Name	<=6	'0'-'9','a'-'z', 'A'-'Z'	
Download Password	<=6	'0'-'9','a'-'z','' 'A'-'Z'	
Download URL	100	legal URL	
Reserved	0		
Update Type	1	0|1|11	0
Reserved	0		
Reserved	0		
Reserved	0		
Serial Number	4	0000-FFFF	
Tail Character	1	$	$

✧ <*Password*>: The valid character of password is '0'-9', 'a'-'z', 'A'-'Z'. The default value is "cv200".

✧ <*Sub-Command*>: Sub-Command of AT+GTUPD. 0 means to start the firmware update.

✧ <*Max Download Retry*>: Specifies the maximum times of retrying to download the update package upon downloading failure.

✧ <*Download Timeout*>: If downloading is not finished within this time, it will be regarded that the downloading failed.

✧ <*Download Protocol*>: The protocol used to download the package.

0: HTTP.

2: FTP

- <*Download User Name*>: If the file server uses authentication, specify the user name here.
- <*Download Password*>: If the file server uses authentication, specify the password here.
- <*Download URL*>: It specifies the URL to download the package.
- <*Update Type*>: It specifies the firmware type of updating.
  - 0: APK
  - 1: MCU
  - 11: Platform
- <*Reserved*>: Reserved for future extension
- <*Serial Number*>: The serial number will be sent back to the backend server in ACK as a reference of the command. It is in hexadecimal format. It begins with 0000 and increases by one every time. The serial number rolls back after "FFFF".
- <*Tail Character*>: A character to indicate the end of the command. And it must be "$".

2.1.2. Stop the Firmware Update

Before the update package has been downloaded to the device, the user can use **AT+GTUPD (sub-command:1)** command to cancel current firmware updating. If update package downloading finishes, this command will be ignored by the device.

➢ **Stop: AT+GTUPD=**

Example: **AT+GTUPD=cv200,1,,,,,0001$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default Value**
Password	4~6	'0'-'9','a'-'z','A'-'Z'	cv200
Sub-Command	1	1	
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Serial Number	4	0000-FFFF	
Tail Character	1	$	$

- <*Sub-Command*>: *Sub-Command* of AT+GTUPD. 1 means to cancel current firmware updating.

2.1.3. Acknowledgement

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

- **+ACK:GTUPD,**

Example: **+ACK:GTUPD,DF0101, 222225555588888,,0001,20150201000002,11F0$**			
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 represent the device type. "DF" means CV200. The middle two characters represent the major version number of the protocol and the last two characters represent the minor version number of the protocol. And all the version numbers are hex digits. For example, "0102" means version 1.02.
- <*Unique ID*>: The terminal's IMEI
- <*Device Name*>: An ASCII string for the name of the device
- <*Serial Number*>: The <*Serial Number*> in the **AT+GTUPD** command
- <*Send Time*>: The local time of the terminal to send the message
- <*Count Number*>: A self-increasing count number in each acknowledgment message. It counts from 0000 and increases by 1 every time. And it rolls back after "FFFF".

2.2. Report

During the process of firmware updating, the device reports its status (including the information of update confirmation, package downloading and firmware updating) to the backend server by message **+RESP:GTUPD** at different phases.

2.2.1. Update Confirmation

The device sends information of update confirmation 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,DF0107, 222225555588888,cv200,100,0,20200910012700,0000$**			
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'	
Code	3	1X0|1X1|1X2|1X3	
Reserved	0		
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000-FFFF	
Tail Character	1	$	$

✧ <*Code*>: The confirmation information

- 1X0: The update command is confirmed by the device.
- 1X1: The update command is refused because the download is busy or the parameters are wrong.
- 1X2: The update process is canceled by the backend server.
- 1X3: The update process is refused because the battery is low.

Note: X means <*Update Type*>.

2.2.2. Package Downloading

The device sends information of package downloading 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,DF0107,222225555588888,cv200,200,0,20200910012700,0000$**			
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'	
Code	3	2X0|2X1|2X2|2X3	
Download Times	1	0|1|2|3|4	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000-FFFF	
Tail Character	1	$	$

- ✧ <*Code*>: The downloading information
  - 2X0: The device starts to download the package.
  - 2X1: The device finishes downloading the package successfully.
  - 2X2: The device fails to download the package.
  - 2X3: 203 or 213. The update process is refused because of an incorrect firmware version.

Note: X means <*Update Type*>.

- ✧ <*Download Times*>: The count number of the package download.

2.2.3. Firmware Updating

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,DF0107,222225555588888,cv200,300,0,20200910012700,0000$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z', '0' – '9'}	
Unique ID	14	MEID	
Device Name	<=10	'0'-'9','a'-'z','A'-'Z'	
Code	3	3X0|3X1|3X2|3X3	
Reserved	0		
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000-FFFF	
Tail Character	1	$	$

- ✧ <*Code*>: The updating information
  - 3X0: The device starts to update the firmware.
  - 3X1: The device finishes updating the firmware successfully.
  - 3X2: The device fails to update the firmware.
  - 3X3: The update process does not start because the battery is low.

Note: X means <*Update Type*>.

3. Firmware Update Process

The firmware update process includes four steps: initiation of the update process, confirmation of the update process, downloading of the update package and updating of the firmware.

3.1. Initiation of the Update Process

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

The backend server decides when and how to initiate the firmware update process of the devices it controls. As the response message receiver and the controller, the backend server has all the information (including the current firmware version (to know via **AT+GTRTO** command) of the devices, the version of the latest available firmware and the location of the proper update packages) it needs to start an update process.

3.2. Confirmation of the Update Process

After receiving the **AT+GTUPD (sub-command:0)** command, the device will first check the current battery capacity. If the battery capacity cannot support the update process, it will report **+RESP:GTUPD (code: 1X3)** 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 in a non-interactive mode. In which, the end user can no longer make phone calls and all incoming calls will be rejected automatically until the update process finishes. In the meantime, the device will ignore all the commands and stop all the reports not related to the update process.

3.3. Downloading of the Update Package

When the update command is confirmed, the device will use the information sent by the backend server to download the update package. If the downloading fails, it will retry as the specified times in <Max Download Retry>. If all downloading attempts fail, the updating process will be aborted and the device will automatically reboot to go back to normal working state. The update process proceeds to the next step if the downloading is successful. Either way, the device will send **+RESP:GTUPD** with downloading information to the backend server.

Before downloading the package, the user can send **AT+GTUPD (sub-command:1)** command to cancel current update process. This is the only chance to abort the updating during the update process.

3.4. Updating 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: 3X3)** 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:3X0)** to the backend server to inform the starting of the updating. After the updating, whether successful or not, the device will reboot automatically. After that, it will send **+RESP:GTUPD** with updating information to the backend server and work as usual.

3.5. An Example of Successful Updating