



SIM7020 Series_FOTA_Application Note

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About Document

Document Information

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1.00	July11, 2018	Yong Lu	First Release.

Related Documents

[1] SIM7020 Series AT Command Manual V1.0.pdf

This document applies to the following products:

Name	Type	Size (mm)	Comments
SIM7020C	NB1	17.6*15.7	Band 1/3/5/8
SIM7020E	NB1	17.6*15.7	Band 1/3/5/8/20/28
SIM7030	NB1	16*18	Band 1/3/5/8
SIM7060	NB1+GNSS	30*30	Band 5/8

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1 Introduction of FOTA Architecture

FOTA is the abbreviation of firmware upgrade over the Air.

FOTA provides a method which allows device to update the core firmware over the air. Considering the specialty and variety of modern usage, SIMCOM refines the whole FOTA procedure. Customers can use AT interface to accomplish SIM7020 Firmware upgrade according to their own condition.

Here is general process to get the delta file from SIMCom.

- 1) Once customer requires the delta file from base line version, just contact SIMCom.
- 2) SIMCom will generate delta file based on the requirements and upload it to FOTA server. SIMCom uses third party FOTA server and maintains the server.
- 3) Customer just needs to trigger FOTA process in application level to target new version.

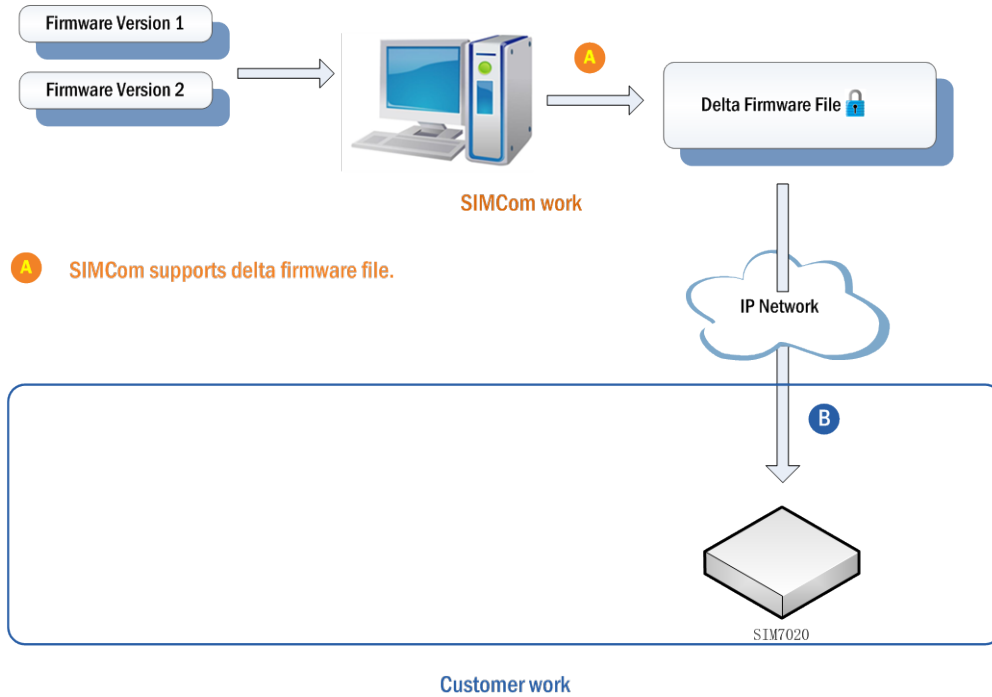
The size of the delta file (differential firmware package file between two versions) depends on the difference between the two firmware versions.

Here are two methods for upgrading firmware using delta file.

1.1 Update Over the air

Delta file could be downloaded over cellular network. The speed is different under different network.

Broken-point Continuingly-transferring mechanism is supported during differential package transfer procedure.



A SIMCom supports delta firmware file.

B SIM7020 gets the delta firmware file from IP network and update.

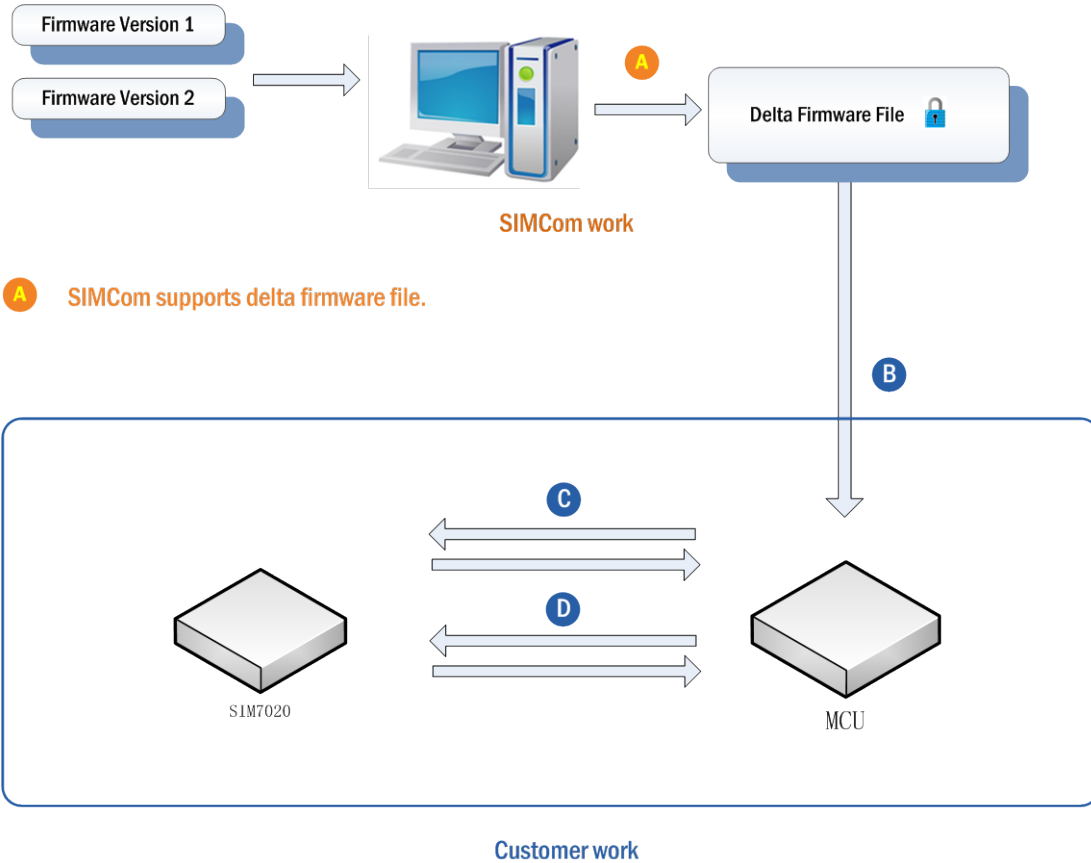
1.2 Update through the hardware interface

Supposed delta file will be transferred via UART or USB interface from external controller. Below is the flow diagram.

After delta file transferred to module specified memory space, external controller can trigger one AT command to start the update process. Module will reboot itself after the process is finished successfully.

*Note

The module will continue upgrading the firmware after reboot once terminated accidentally in previous loop. Below is the block diagram for this method.



- B** MCU gets the delta firmware file from SIMCOM directly
- C** MCU writes the delta firmware file to the fixed place of SIM7020 by AT commands.
- D** MCU requires SIM7020 to update by sending AT commands.

2 FOTA Related AT commands

This chapter describes AT commands related to FOTA.

2.1 AT+CFOTA FOTA Operation

AT+CFOTA FOTA Operation	
AT+CFOTA=<mode>[,<len>,<md5>]	<p>Response OK</p> <p>If error is related to ME functionality: +CME ERROR: <err></p> <p>Parameters</p> <p><mode></p> <ol style="list-style-type: none"> 1 Download and update differential package by TCP 2 Download differential package by TCP ,not update 3 Update differential package after <mode>=2 4 Report update result to FOTA server 5 Update differential package after local download <p><len>The update differential package length</p> <p><md5>The update differential package MD5 check value</p>
Parameter Saving Mode	NO_SAVE
Reference	<p>Note</p> <ol style="list-style-type: none"> 1. When <mode>=1 or 2 The PDP connect should be OK. Domain name resolution should be OK. 2. When <mode>=5 need parameter<len>and<md5> local download need use AT+CFLE and AT+CFLW.

2.2 AT+CFLE FLASH ERASE

AT+CFLE FLASH ERASE	
AT+CFLE=<mode>,<addr>,<num>	<p>Response OK</p> <p>If error is related to ME functionality: +CME ERROR: <err></p>

	<p>Parameters</p> <p><mode> 0 Erase FOTA update partition 1 Erase Flash reserved partition</p> <p><addr> 0 FOTA partition addr is fixed when <mode>=0 138346496-138412032(0x083F0000-0x08400000) Flash reserved partition valid address area, the value should be decimal format</p> <p><num> 1-145 flash block number when<mode>=0 1-16 flash block number when<mode>=1</p>
Parameter Saving Mode	NO_SAVE
Reference	<p>Note</p> <ol style="list-style-type: none"> 1. FOTA partition 0x0830F000-0x083A5000,600KB 2. FOTA update partition 0x08313000- 0x083A4000,580KB 3. FLASH reserved partition 0x083F0000-0x08400000,64KB 4. The size one flash block is 4KB

2.3 AT+CFLW FLASH WRITE

AT+CFLW FLASH WRITE	
<p>AT+CFLW=<mode> >,<addr>,<len>,< offset>,<timeout ></p>	<p>Response</p> <p>">",</p> <p>Then enter data mode for inputting data until <len> is meet,and write data to flash</p> <p>OK</p> <p>If<timeout> expired ,cancel the operation</p> <p>ERROR</p> <p>If error is related to ME functionality:</p> <p>+CME ERROR: <err></p> <p>Parameters</p> <p><mode> 0 Erase FOTA update partition 1 Erase Flash reserved partition</p> <p><addr> 0 FOTA partition addr is fixed when <mode>=0 138346496-138412032(0x083F0000-0x08400000) Flash reserved partition valid address area, the value should be decimal format</p> <p><len> The data-length for writing, maximum 512 bytes each time</p> <p><offset>The offset added for writing not exceeding 580KB when <mode>=0</p>

	not exceeding 64KB when <mode>=1 <timeout> Timeout for writing, unit: s , maximum 100s
Parameter Saving Mode	NO_SAVE
Reference	Note 1. Before write flash ,should erase flash first

2.4 AT+CFLR FLASH READ

AT+CFLR FLASH READ	
AT+CFLR=<addr>, <len>	Response OK If error is related to ME functionality: +CME ERROR: <err>
	Parameters <addr> 138346496-138412032(0x083F0000-0x08400000) Flash reserved partition valid address area, the value should be decimal format <len> The data-length for reading, maximum 512 bytes each time
Parameter Saving Mode	NO_SAVE
Reference	Note 1. FOTA update partition not support read.

3 Bearer Configuration

Usually module will register PS service automatically.

3.1 PDN Auto-activation

AT Command	Response	Description
AT+CPIN?	+CPIN:READY	Check SIM card status

	OK	
AT+CSQ	+CSQ: 20,0	Check RF signal
	OK	
AT+CGREG?	+CGREG: 0,1	Check PS service
	OK	
AT+CGACT?	+CGACT: 1,1	Activated automatically
	OK	
AT+COPS?	+COPS: 0,0,"CHN-UNICOM",9	Check operator info CHN-UNICOM is operator's name 9 is NB-IOT network
	OK	
AT+CGCONTRDP	+CGCONTRDP: 1,5,"shnbiot","10.250.0.213.255.255.255.0"	Get APN and IP address from network
	OK	

3.2 APN Manual configuration

If not attached, could configure correct APN setting.

AT Command	Response	Description
AT+CFUN=0	+CPIN: NOT READY	Disable RF
	OK	
AT*MCGDEFCONT="IP","3GNET"	OK	Configure new APN
AT+CFUN=1	OK	Enable RF
	+CPIN: READY	
AT+CGREG?	+CGREG: 0,1	Inquiry PS service
	OK	
AT+CGCONTRDP	+CGCONTRDP: 1,5,"3GNET","10.250.0.253.255.255.255.0"	Attached PS domain and got IP address automatically
	OK	

4 Update over the air

4.1 Updating successfully

Below is an example to acquire differential firmware file by using SIM7020 TCP function:

AT Command	Response	Description
AT+IPR=115200	OK	Active URC report by setting the baud rate
AT+CGACT?	+CGACT: 1,1	PDP connection
	OK	
AT+CSUB	V01	Check FW sub version
	OK	
AT+CFOTA=1	OK	Download and update differentialpackage(DNS resolution should work)
	+CFOTA: Start to download new package	Start to download
	+CFOTA: Download completed	Download completed
	+CFOTA: Start to update,please wait for reset	Module reset (the upgrade session takes around 10min)
	*MATREADY: 1	
	+CFUN: 1	
	+CFOTA: Update successfully	Update successfully
	+CPIN: READY	
AT+CFOTA=4	OK	Report update result to FOTA server after restart and network is OK.
AT+CSUB	V02	Check FW sub version
	OK	

4.2 Updating failed

No update package error

AT Command	Response	Description
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AT+IPR=115200	OK	Active URC report
AT+CGACT?	+CGACT: 1,1	PDP connection
	OK	
AT+CSUB	V01	Check FW sub version
	OK	
AT+CFOTA=1	OK	
	+CFOTA: No update package	No update package or connecting FOTA server fail
Download pause error		
AT+CFOTA=1	OK	
	+CFOTA: Download pause	Download pause error
Download fail error		
AT+CFOTA=1	OK	
	+CFOTA: Download fail	Download fail error
Update fail		
AT+CFOTA=1	OK	
	+CFOTA: Start to download new package	Start to download
	+CFOTA: Download completed	Download completed
	+CFOTA: Start to update,please wait for reset	Module reset
	*MATREADY: 1	
	+CFUN: 1	
	+CFOTA: Update fail	Update fail
	+CPIN: READY	

5 Update through hardware interface

Below is an example to write differential firmware file into SIM7020 by using CFOTA command.

AT Command	Response	Description
AT+CFLE=0,0,1	OK	Erase FOTA update partition,the third parameter value is the number of the block which needs to be erased. The size of the differential package here is 313 bytes, so it is 1 block
AT+IPR=115200	OK	Active URC report by setting the baud rate
AT+CFLW=0,0,313,0,30	> OK	Write data and enter data mode Upload the differential package
AT+CSUB	V01 OK	Check FW sub version
AT+CFOTA=5,313,f1351d44d9a338c867046ebf16ec62d1	+CFOTA: Start to update, please wait for reset OK *MATREADY: 1 +CFUN: 1 +CFOTA: Update successfully	Start to update (the upgrade session takes around 10min) Restart Update successfully
AT+CFOTA=4	OK	Report update result to FOTA server after restart and network is OK.
AT+CSUB	V02 OK	Check FW sub version

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