SIM7020 Series_FOTA _Application Note

LPWA Module
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SIMCom Wireless Solutions Limited
Building B, SIM Technology Building, No.633 Jinzhong Road, Changning District, Shanghai P.R. China
Tel: +86 21 31575100
Email: simcom@simcom.com

For more information, please visit:
https://www.simcom.com/download/list-863-en.html

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About Document

Version History

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<tr>
<td>V1.00</td>
<td>2018.9.21</td>
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Scope

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1 Introduction

1.1 Purpose of the document

Based on module AT command manual, this document will introduce FOTA application process.

Developers could understand and develop application quickly and efficiently based on this document.

1.2 Related documents


1.3 Conventions and abbreviations

In this document, the GSM engines are referred to as following term:
ME (Mobile Equipment);
MS (Mobile Station);
TA (Terminal Adapter);
DCE (Data Communication Equipment) or facsimile DCE (FAX modem, FAX board);

In application, controlling device controls the GSM engine by sending AT Command via its serial interface. The controlling device at the other end of the serial line is referred to as following term:
TE (Terminal Equipment);
DTE (Data Terminal Equipment) or plainly "the application" which is running on an embedded system;
2 FOTA Introduction

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.

2.1 Update over the air

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

Broken-point Continuously-transferring mechanism is supported during differential package transfer procedure.
2.2 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.

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

There have some AT commands to download through HTTP.
3 FOTA Related AT commands

This chapter describes AT commands related to FOTA.

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<td>Flash Write</td>
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<td>Flash Read</td>
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For detail information, please refer to “SIM7020 Series_AT Command Manual”.
4 Bearer Configuration

Usually module will register PS service automatically.

4.1 PDN Auto-activation

//Example of PDN Auto-activation.

```
AT+CPIN?          //Check SIM card status
+CPIN: READY
OK

AT+CSQ           //Check RF signal
+CSQ: 27,99
OK

AT+CGREG?        //Check PS service. 1 indicates PS has attached.
+CGREG:0,1
OK

AT+CGACT?        //PDN active success
+CGACT:1,1
OK

AT+COPS?         //Query Network information, operator and network mode 9, NB-IOT network
+COPS:0,0,"CHN-UNICOM",9
OK

AT+CGCONTRDP     //Attached PS domain and got IP address automatically
+CGCONTRDP: 1,5,"shnbiot","10.250.0.213.255.255.255.0"
OK
```
4.2 APN Manual Configuration

//Example of APN Manual configuration.

AT+CFUN=0  // Disable RF
+CPIN: NOT READY
OK

AT*MCGDEFCONT="IP","3GNET"  // Set the APN manually
OK

AT+CFUN=1  // Enable RF
OK
+CPIN:READY

AT+CGREG?  // Inquiry PS service
+CGREG:0,1
OK

AT+CGCONTRDP  // Attached PS domain and got IP address automatically
+CGCONTRDP:
1,5,"3GNET","10.250.0.253.255.255.255.0"
OK
5 FOTA Examples

5.1 Update over the air

5.1.1 Updating successfully

AT+IPR=115200
OK
AT+CGACT?
+CGACT: 1,1
OK
AT+CGMR
+CGMR: 1752B05SIM7020C
OK
AT+CFOTA=1
+CFOTA: Start to download new package
OK
+CFOTA: Download completed
+CFOTA: Start to update, please wait for reset
*MATREADY: 1
+CFUN: 1
+CFOTA: Update successfully
+CPIN: READY
AT+CFOTA=4
5.1.2 Updating failed

No update package error

AT+IPR=115200
OK
AT+CGACT?
+CGACT: 1,1
OK
AT+CGMR
1752B05SIM7020C
OK
AT+CFOTA=1
OK
+CFOTA: No update package

Download pause error

AT+CFOTA=1
OK
+CFOTA: Download pause

Download fail error

AT+CFOTA=1
OK
+CFOTA: Download fail

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
5.2 Update through hardware interface

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

```
AT+CFLE=0,0,1  //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
OK
AT+IPR=115200  //Active URC report by setting the baud rate
OK
AT+CFLW=0,0,313,0,30  //Write data and enter data mode
> Upload the differential package
OK
AT+CGMR  //Check FW version
1752B05SIM7020C
OK
AT+CFOTA=5,313,f1351d44d9a338c867046ebf16ec62d1  //Start to update (the upgrade session takes around 10min)
+CFOTA: Start to update, please wait for reset
OK  //Restart
*MATREADY: 1
+CFUN: 1
+CFOTA: Update successfully  //Update successfully
AT+CFOTA=4  //Report update result to FOTA server after restart and network is OK.
OK
AT+CGMR  //Check FW version
1752B06SIM7020C
OK
```
5.3 Update through HTTP

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

```at
AT+CHTTPCREATE="http://117.131.85.139:5265"
//Create a http client instance
+CHTTPCREATE: 0
OK

AT+CHTTPCON=0
//Establish the HTTP Connection
OK

AT+CHTTPTOFS=0,"/HTTP_test/test3-bin/SIM7020C_V1-SIM7020C_V2-1537247570.bin"
//Write differential firmware file SIM7020C_V1-SIM7020C_V2-1537247570.bin into SIM7020
OK

+CHTTPNMIH: 0,200,287,Content-Type: application/octet-stream
Content-Length: 31047
Accept-Ranges: bytes
Server: HFS 2.3 beta
Set-Cookie: HFS_SID=0.699653631309047;
path=/;
Last-Modified: Tue, 18 Sep 2018 05:14:19 GMT
Content-Disposition: attachment;
filename="SIM7020C_V1-SIM7020C_V2-1537247570.bin";

+CHTTPTOFSOK: 0,31047,31047

AT+CGMR
1752B06SIM7020C
OK

AT+IPR=115200
//Active URC report by setting the baud rate
OK

AT+CFOTA=5,31047,86060c29c18b2981f8b87de61c1765b7
+CFOTA: Start to update, please wait for reset
//Start to update (the upgrade session takes around 10min)
OK

Restart
```
*MATREADY: 1
+CFUN: 1
+CFOTA: Update successfully  //Update successfully
AT+CGMR  //Check FW version
1752B06SIM7020C_20180918
OK