



SIM7000 Series_FOTA _Application Note

LPWA Module

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About Document

Version History

Version	Date	Owner	What is new
V1.00	2020.02.26	Wenjie.Lai	First Release
V1.01	2020.07.28	Wenjie.Lai	All

Scope

This document applies to the following products

Name	Type	Size(mm)	Comments
SIM7000E/C/A/G	Cat-M1(/NB1/EGPRS)	24*24	
SIM7000E-N SIM7000C-N	NB1	24*24	

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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] SIM7000 Series_AT Command Manual

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 way 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 ATC interface provided by SIM7000 Series, and accomplish SIM7000 Series Firmware upgrading according to their own condition.

Before firmware updating, a delta firmware package which contains only the differences between the source and the target firmware versions has to be obtained. By this way, the amount of data transmitted and the time taken can be reduced.

SIMCom defines the upgrading process:

- 1) Get the delta file from SIMCOM.
- 2) Put the delta file on HTTP(S) or FTP server or FS.
- 3) Get delta file to module directory "/fota/update.zip".
- 4) Executing AT+CFOTA=1 to update the firmware.
- 5) Query FOTA result and module firmware version.

3 AT Commands for FOTA

Command	Description
AT+CFOTA	FOTA Operation

3.1 AT+CFOTA FOTA Operation

AT+CFOTA FOTA Operation	
Write Command AT+CFOTA=<mode>	Response OK
	If error is related to ME functionality: +CME ERROR: <err>
Read Command AT+CFOTA?	Parameters <mode> <ul style="list-style-type: none"> 1 Format the data area to be written, it is mandatory for writing data 0 Clean the flag
	Response +CFOTA:<status> OK
	Parameters <status> <ul style="list-style-type: none"> 1 The module is updating. 2 start to recovery modem 3 fail in recovery modem 4 start to recovery AP 5 fail in recovery AP 6 The module updates successfully 7 The module updating fails 8 Clean the flag

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+CGDCONT=1,"IP","" //Configure APN for registration when needed
OK
AT+CSQ //Check RF signal
+CSQ: 27,99

OK
AT+CGATT? //Check PS service.
+CGATT: 1 //1 indicates PS has attached.

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

OK
AT+CGNAPN //Query the APN delivered by the network after the
//CAT-M or NB-IOT network is successfully
//registered.
+CGNAPN: 1,"ctnb" // "ctnb" is APN delivered by the CAT-M or NB-IOT
//network. APN is empty under the GSM network.

OK
AT+CNCFG=1,"ctnb","cdma","1234" //Before activation please use AT+CNCFG to set
//APN\user name\password if needed.

OK
AT+CNACT=1 //Activate network
OK

```

```
+APP PDP: ACTIVE
AT+CNACT? //Get local IP
+CNACT: 0,1,"10.94.36.44"

OK
```

4.2 APN Manual configuration

If not attached automatically, could configure correct APN setting.

//Example of APN Manual configuration.

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

OK
AT+CGDCONT=1,"IP","ctnb" //Set the APN manually
OK
AT+CFUN=1 //Enable RF
OK

+CPIN: READY
AT+CGATT? //Check PS service.
+CGATT: 1 //1 indicates PS has attached.

OK
AT+CGNAPN //Query the APN delivered by the network after the
//CAT-M or NB-IOT network is successfully
//registered.
+CGNAPN: 1,"ctnb" // "ctnb" is APN delivered by the CAT-M or NB-IOT
//network. APN is empty under the GSM network.
OK
AT+CNCFG=1,"ctnb","cdma","1234" //Before activation please use AT+CNCFG to set
//APN\user name\password if needed.

OK
AT+CNACT=1 //Activate network
OK

+APP PDP: ACTIVE
AT+CNACT? //Get local IP
```

+CNACT: 0,1,"10.94.36.44"

OK

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5 FOTA Examples

5.1 SIMCom supports delta firmware file

When customer needs to upgrade the onsite SIM7000 Series Firmware from Version A to Version B, they can send the upgrade requirement to SIMCom via their module provider. SIMCom will provide related delta firmware file according to the information of Version A and Version B provided by customer. The size of the delta firmware file depends on the difference of Version A and Version B.

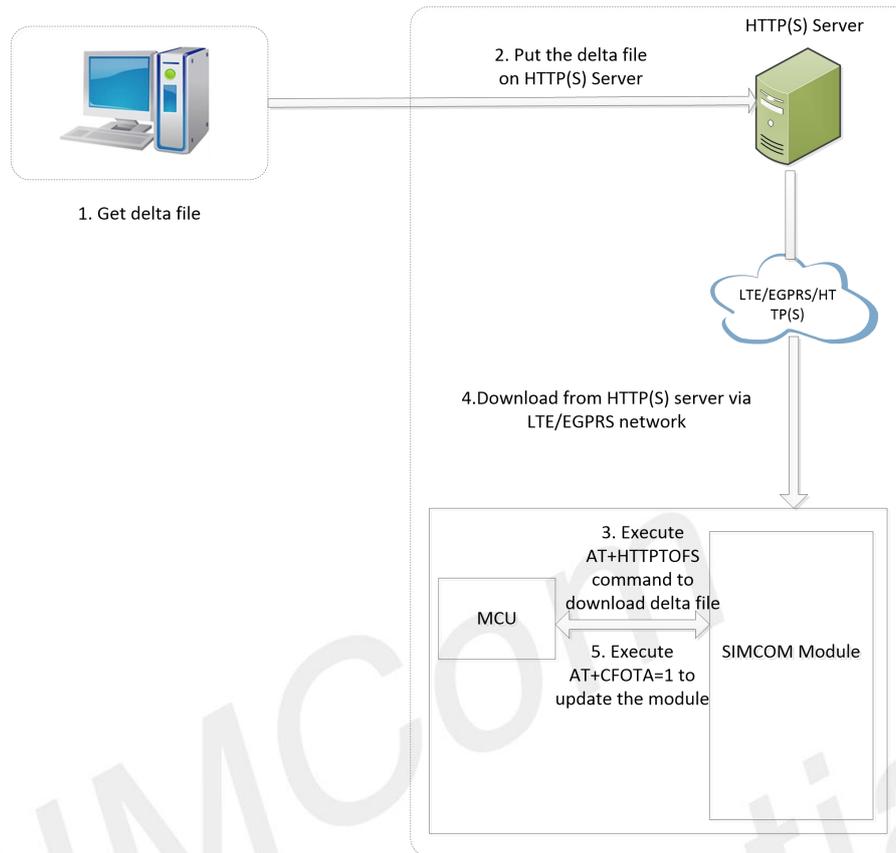
5.2 The module gets the delta firmware file

Local delta package name must be update.zip, otherwise cause to upgrade is failed.

5.2.1 Download delta firmware file from HTTP server

Customers usually use MCU to connect with SIM7000 Series, therefore customer's MCU needs to get the delta firmware file first. This procedure is diversified, it may be by GPRS, or other methods. If GPRS method is used, customers can consider using HTTP to download delta firmware file from the customer's server. If MCU acquires delta firmware file by GPRS method, customer may start a session via SMS or other methods.

SIMCom defines the upgrading process:



As shown in the above figure, the following steps must be done to update the firmware when the delta file is put on the HTTP(S) server:

- 1) Get the delta file from SIMCOM
- 2) Put the delta file on HTTP(S) server.
- 3) Execute AT+HTTPSTOFS command.
- 4) The module starts to download the delta file automatically.
- 5) After the delta file is downloaded, executing AT+CFOTA=1 to update the firmware.

Here SIMCom provides an example to acquire delta firmware file by using SIM7000 Series HTTP function:

//FOTA examples of download delta firmware file from HTTP server

```

AT+CNACT=1,1 //Open GPRS session.
OK
AT+HTTPSTOFS="http://112.74.93.163:12345/V1 //Open the HTTP get session.
_V2/update.zip","/fota/update.zip"
OK
+HTTPSTOFS: 200,109285
  
```

5.2.2 Download delta firmware file from FTP server

Here SIMCom provides an example to acquire delta firmware file by using SIM7000 Series FTP function:

```
//FOTA examples of download delta firmware file from FTP server

AT+CNACT=1,1 //Open GPRS session.
OK
AT+FTPCID=1 //Configure the FTP session.
OK
AT+FTPSERV="112.74.93.163"
OK
AT+FTPUN="tmf"
OK
AT+FTPPW="tmf123"
OK
AT+FTPGETNAME="update.zip" //Configure FOTA download filename
OK
AT+FTPGETPATH="/"
OK
AT+FTPEXTGET=2,1,"update.zip" //Configure FTP download /fota/ and downloading
OK
AT+FTPTOFSST //Get FTP download status
+FTPTOFSST: 1,0,10 //Download success

OK

+FTPEXTGETFILE: 1,0
```

5.2.3 Download delta firmware file through USB/AT port

Customers usually use MCU to connect with SIM7000 Series, therefore customer's MCU needs to get the delta firmware file first. This procedure is diversified, it may be by AT port, or other methods. If AT port method is used, customers can consider using AT command to download delta firmware file.

Here SIMCom provides an example to acquire delta firmware file by AT port:

```
//FOTA Examples of download delta firmware file through USB/AT port
Step 1:
```

```

AT+CFSINIT //Initialize the FS AT command
OK

Step 2:
AT+CFSWFILE=1,"update.zip",0,10000,10000 //Set file parameters and get ready to write the
DOWNLOAD data to the beginning of the file "update.zip " in
//It is ready to receive data from UART, and DCD /custapp/ folder, which size is 10000 bytes.
has been set to low.
... // data //Begin to download data to UART.
OK //All data has been received over, and //Data transfer is finished
DCD is set to high.

Step 3:
AT+CFSWFILE=1,"update.zip",1,10000,10000 //Set file parameters and get ready to write the
DOWNLOAD data to the end of the file "update.zip" in /custapp/
// It is ready to receive data from uart, and DCD folder, which size is 10000 bytes. The size is
has been set to low. determined by the remaining size of the delta file.
... // data //Begin to download data to UART.
OK //All data has been received over, and //Data transfer is finished
DCD is set to high.

Step 4:
Repeat Step 3 until the delta file is all sent to the
modem.

Step 5:
AT+CFSTERM //Terminate the FS command
OK

```

5.3 MCU requires the module to update by sending AT commands

After writing the delta firmware file into SIM7000 Series flash memory successfully, MCU should send instruction to module by AT command to start the update. Once getting the instruction, the module will automatically reset itself and then enter FOTA upgrading process. After upgrading finished, the module will restart again automatically.

//FOTA examples of update the firmware

```

AT+CFOTA=1 //Set the flag bit for FOTA update, and reset
module automatically..
OK //The module enters into FOTA upgrading

```

process, which will last several minutes.

```
+CFOTA: "Start to update"  
+CFOTA: "Updating",0  
.....  
+CFOTA: "Update successfully, please wait for  
reset"  
Or  
+CFOTA: "Update failed, please wait for reset"
```

5.4 MCU read the update status by AT commands

If upgrading process is finished, the module will restart again automatically. Customer can use AT command to inquire the update result.

//FOTA examples of update status

AT+CFOTA?

//Inquire the update result by command CFOTA.
6 means updated and succeeded; 7 means
updated but failed.

+CFOTA: 6

OK

AT+GMR

//Inquire the firmware version by AT+GMR.

Revision:1529B04SIM7000G

OK