WCDMA UGxx DFOTA

User Guide

UMTS/HSPA Module Series

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About the Document

History

Revision	Date	Author	Description
1.0	2015-04-17	Jonathan WEN	Initial

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1 Introduction

Quectel provides DFOTA (Delta Firmware Upgrade Over The Air) function, which allows you to upgrade the firmware of the module over the air. It can upgrade the firmware to a new version, and upgrade back to the old version as well.

By using DFOTA, you only need to download the delta package into the module, which contains only the differences between the old and new firmware versions, thus reducing the amount of data transmitted and accelerating the speed of firmware upgrade.

This document is applicable to Quectel UGxx modules.

2 DFOTA Upgrade Procedure

The DFOTA upgrade procedure can be showed as the following Figure.

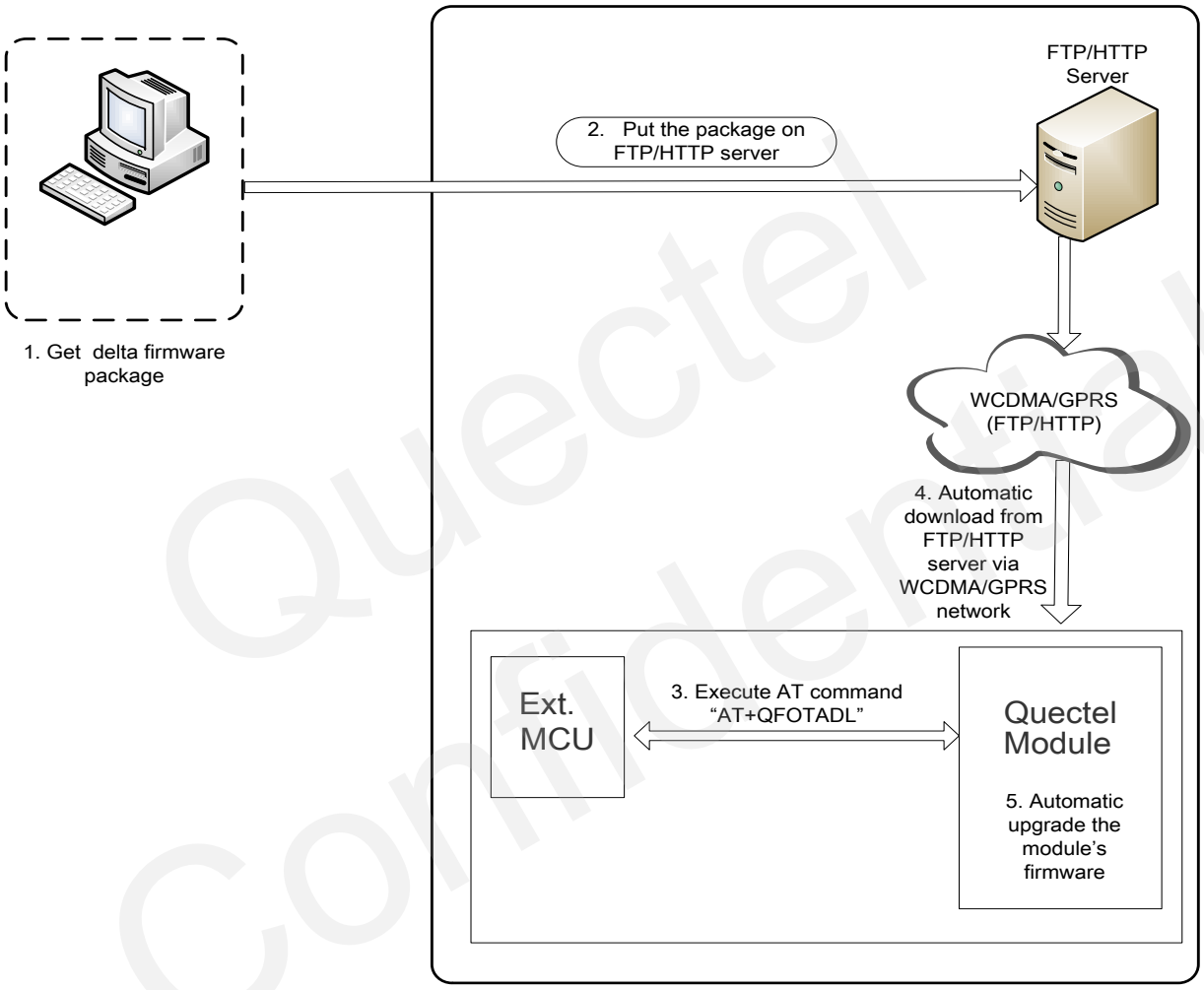

Figure 1: DFOTA Upgrade Procedure

As shown in the above figure, you need to operate three steps to upgrade the firmware:

Step 1: Get the delta firmware package from Quectel.
Step 2: Put the delta firmware on FTP/HTTP server.
Step 3: Execute AT command “AT+QFOTADL” to upgrade, then the module will operate the step 4 and step 5 automatically.

2.1. Get Delta Firmware Package

Before upgrading the device, you need to check the current firmware (the old one) by executing AT command “ATI”. You also need to know the target firmware (the new one) which needs to be upgraded. Then you need to provide the two firmware version information to Quectel or your provider to get the delta firmware package.

2.2. Put Delta Package on FTP/HTTP Server

When using the DFOTA function, you need to setup a FTP/HTTP server by yourself, for Quectel does not provide a FTP/HTTP server. Then put the delta package on the server, and record the FTP/HTTP path. The module will get the delta package from this path.

2.3. Execute AT Command to Upgrade the Firmware

After putting the delta firmware package on a FTP/HTTP server, you need to execute AT command “AT+QFOTADL”, then the module will download the firmware from FTP/HTTP server over the air and upgrade automatically. Please keep the power key low. For details, please refer to Chapter 3.

3 Description of AT Command

AT+QFOTADL command is used to upgrade firmware of the module. The power key of module must keep low.

You can use “AT+QFOTADL=“COM”,<fotasize>,<timeout>” to upload the delta firmware package to the module directly. After executing this command, the module will enter into transparent access mode, the following conditions will lead the module to exit the from the transparent access mode:

- The data uploaded reaches the <fotasize>.
- The time without any data inputted reaches <timeout>.
- When the data is transmitted, the DTR PIN (AT&D1 should be set.) is pulled high or the valid “+++” is inputted.

To prevent the “+++” from being misinterpreted as data, it should comply with the following sequence:

- Do not input any character within T1 time (1 second) before inputting “+++”.
- Input “+++” during 1s, and no other characters can be inputted during this time.
- Do not input any character within T1 time (1 second) after “+++” has been inputted.
- The current result “+QFOTADL: <uploadsize>,<checksum>” is outputted, and module exits from the transparent access mode, return OK.

When you upgrade firmware on a FTP/HTTP server, you need to activate a PDP context ID for FTP /HTTP connection. The default PDP context ID is 1, and it can be configured by AT+QCFG=“fota/cid”,<contextID>. The maximum response time of +QIND: "FOTA","FTPSTART" or +QIND: "FOTA","HTTPSTART" is 90 seconds.

If the current port is not UART, firmware can also be upgraded successfully, but the following messages will not be outputted.

+QIND: "FOTA","START"
+QIND: "FOTA","UPDATING",1
+QIND: "FOTA","UPDATING",2
...
+QIND: "FOTA","END",<err>

AT+QFOTADL Upgrade Firmware by DFOTA	
Test Command **AT+QFOTADL=?**	Response **OK**
Update firmware from COM	Response

AT+QFOTADL="COM"[,<fotasize>[,<timeout>]]	**CONNECT** TA switches to the transparent access mode, and the binary data of package can be inputted. When the total size of the inputted data reaches <fotasize> (unit: byte), or TA received "+++" or DTR (AT&D1 set) TA will return to command mode and reply with the following codes: **+QFOTADL: <uploadsize>,<checksum>** **OK** If in <timeout> seconds, no data input, TA will return to command mode and reply with the following codes: **+QFOTADL: <uploadsize>,<checksum>** **+CME ERROR: 421** If the <uploadsize> is greater than 0, TA will begin to upgrade: **+QIND: "FOTA","START"** **+QIND: "FOTA","UPDATING",1** **+QIND: "FOTA","UPDATING",2** **...** **+QIND: "FOTA","END",<err>** **RDY** Or **ERROR**
Update firmware from FTP **AT+QFOTADL=<ftpurl>**	Response **OK** **+QIND: "FOTA","FTPSTART"** **+QIND: "FOTA","FTPEND",<ftperr>** **+QIND: "FOTA","START"** **+QIND: "FOTA","UPDATING",1** **+QIND: "FOTA","UPDATING",2** **...** **+QIND: "FOTA","END",<err>** **RDY** Or **ERROR**
Update firmware from HTTP **AT+QFOTADL=<httpurl>**	Response **OK** **+QIND: "FOTA","HTTPSTART"** **+QIND: "FOTA","HTTPEND",<httperr>** **+QIND: "FOTA","START"** **+QIND: "FOTA","UPDATING",1** **+QIND: "FOTA","UPDATING",2**

	... **+QIND: "FOTA","END",<err>** **RDY** Or **ERROR**
Maximum Response Time	90 seconds

Parameter

<fotasize>	The delta firmware package size expected to be uploaded
<timeout>	The delay time in seconds of waiting data to be inputted to USB/UART. Default is 5s
<uploadsize>	The actual size of the uploaded data. Unit: byte
<checksum>	The checksum of the uploaded data
<ftpurl>	String format, max length is 255 bytes. It should be started with "FTP://", for example: “FTP://<user_name>:<password>@<serverURL>:<port>/<file_path>”
<username>	String type, the user name for authentication. The maximum size of the parameter is 50 bytes
<password>	String type, the password for authentication. The maximum size of the parameter is 50 bytes
<serverURL>	String type, the IP address or domain name of the FTP server. The maximum size of the parameter is 50 bytes
<port>	Integer type, the port of the FTP server. The default value is 21. The range is 1-65535
<file_path>	String type, the file name in FTP server. The maximum size of the parameter is 50 bytes
<ftperr>	Integer type, indicates the FTP error code. 0 means OK
<httpurl>	String format, max length is 255 bytes. It should be started with "HTTP://", for example: “HTTP://<http_server_URL>:<http_port>/<http_file_path>”
<http_server_URL>	String type, the IP address or domain name of the HTTP server
<http_port>	Integer type, the port of the HTTP server. The default value is 80. The range is 1-65535
<http_file_path>	String type, the file name in HTTP server
<httperr>	Integer type, indicates the HTTP error code. 0 means OK
<err>	Integer type, 0 means OK, else ERROR

3.1. Upgrade Firmware via FTP Server by DFOTA

If the delta package is stored on a FTP server, you can execute the “AT+QFOTADL” command, the module will upgrade the firmware automatically over the air via FTP, please keep the power key low. The example is shown as below:

```
//Upgrade firmware via FTP server.
//The FTP server address is “FTP://test:test@demo.com:21/update/delta.bin".
//Configure and activate the PDP context.
AT+QICSGP=1,1,"UNINET","","",1      //Configure PDP context 1, APN is UNINET (indicates China Unicom), user name and password is set to null.
OK
AT+QCFG="fota/cid",1                //Set the PDP context ID as 1.
OK
//Execute command AT+QFOTADL, download and upgrade module’s firmware.
AT+QFOTADL="FTP://test:test@demo.com:21/update/delta.bin"
OK
+QIND: "FOTA","FTPSTART"
+QIND: "FOTA","FTPEND",0            //Finish downloading the package from FTP server.
//Module will be rebooted and USB port will be re-initialized. If the current port is USB port, MCU should close and reopen it.
+QIND: "FOTA","START"               //Start to upgrade firmware.
+QIND: "FOTA","UPDATING",1
+QIND: "FOTA","UPDATING",2
+QIND: "FOTA","UPDATING",3
...
+QIND: "FOTA","UPDATING",100
+QIND: "FOTA","END",0               //Finish upgrading the firmware.

RDY                                 //Reboot the module, and it will be upgraded to the new version.
```

3.2. Upgrade Firmware via HTTP Server by DFOTA

If the delta package is stored on a HTTP server, you can execute the “AT+QFOTADL” command, the module will upgrade the firmware automatically over the air via HTTP, please keep the power key low. The example is shown as below:

```
//Upgrade firmware via HTTP server.

//The HTTP server address is “HTTP://www.example.com:80/delta.bin ".

//Configure and activate the PDP context.

AT+QICSGP=1,1,"UNINET","","",1      //Configure PDP context 1, APN is UNINET (indicates China
                                      Unicom), user name and password is set to null.
OK
AT+QCFG="fota/cid",1                //Set the PDP context ID as 1.
OK

//Execute command AT+QFOTADL, download and upgrade module’s firmware.

AT+QFOTADL=" HTTP://www.example.com:80/delta.bin "
OK
+QIND: "FOTA","HTTPSTART"
+QIND: "FOTA","HTTPEND",0           //Finish downloading the package from HTTP server.

//Module will be rebooted and USB port will be re-initialized. If the current port is USB port, MCU should
close and reopen it.

+QIND: "FOTA","START"               //Start to upgrade firmware.
+QIND: "FOTA","UPDATING",1
+QIND: "FOTA","UPDATING",2
+QIND: "FOTA","UPDATING",3
...
+QIND: "FOTA","UPDATING",100
+QIND: "FOTA","END",0               //Finish upgrading the firmware.

RDY
```

3.3. Upgrade Firmware via COM by DFOTA

If MCU uploads the delta firmware package to the module directly, “AT+QFOTADL” command can be executed and the module will enter transparent access mode and receive the package data. After uploading successfully, module will upgrade automatically, please keep the power key low. The example is shown as below:

```
//Upgrade firmware through COM.

AT+QFOTADL="COM",345200,5
CONNECT

//When the <uploadsize> reaches <fotasize>, module will exit from transparent access mode

+QFOTADL: 345200, b34a
```

OK

//Module will be rebooted and USB port will be re-initialized. If the current port is USB port, MCU should close and reopen it.

+QIND: "FOTA","START" //Start to upgrade firmware.
+QIND: "FOTA","UPDATING",1
+QIND: "FOTA","UPDATING",2
+QIND: "FOTA","UPDATING",3
...
+QIND: "FOTA","UPDATING",100
+QIND: "FOTA","END",0

RDY //Reboot the module, and it will be upgraded to the new version.

4 Description of AT Command

The error code <ftp_err> indicates an error related to mobile equipment or network. The detail about <ftp_err> is described in the following table.

Table 1: Summary of FTP Error Codes

<ftp_err>	Meaning
601	Unknown error
602	FTP service blocked
603	FTP service busy
604	DNS parse fail
605	Network error
606	Control connection closed
607	Data connection closed
608	Socket closed by peer
609	Timeout error
610	Invalid parameter
611	Failed to open file
612	File position invalid
613	File error
614	Service not available, closing control connection
615	Open data connection fail
616	Connection closed; transfer aborted
617	Requested file action not taken
618	Requested action aborted: local error in processing

619	Requested action not taken: insufficient system storage
620	Syntax error, command unrecognized
621	Syntax error in parameters or arguments
622	Command not implemented
623	Bad sequence of commands
624	Command parameter not implemented
625	Fail to login FTP
626	Need account for storing files
627	Requested action not taken.
628	Requested action aborted: page type unknown
629	Requested file action aborted
630	Requested file name invalid

5 Summary of HTTP Error Codes

The error code <http_err> indicates an error related to mobile equipment or network. The detail about <http_err> is described in the following table.

Table 2: Summary of HTTP Error Codes

<http_err>	Meaning
0	Operation successful
701	HTTP unknown error
702	HTTP timeout
703	HTTP busy
704	HTTP UART busy
705	HTTP does not get/post request
706	HTTP network busy
707	HTTP network open failure
708	HTTP network not configured
709	HTTP network deactivated
710	HTTP network error
711	HTTP URL error
712	HTTP empty URL
713	HTTP IP address error
714	HTTP DNS error
715	HTTP socket create error
716	HTTP socket connect error

717	HTTP socket read error
718	HTTP socket write error
719	HTTP socket close
720	HTTP data encode error
721	HTTP data decode error
722	HTTP read timeout
723	HTTP response failure
724	Incoming call busy
725	Voice call busy
726	Input timeout
727	Wait for data timeout
728	HTTP response timeout
729	Allocate memory failure
730	Invalid parameter

6 Appendix A Reference

Table 3: Related Documents

SN	Document Name	Remark
[1]	Quectel_WCDMA_UGxx_TCPIP_AT_Commands_Manual	Introduction about UGxx TCPIP AT commands
[2]	Quectel_WCDMA _UGxx_AT_Commands_Manual	UGxx AT commands manual
[3]	Quectel_WCDMA_UGxx_FTP_AT_Commands_Manual	Introduction about UGxx FTP AT commands
[4]	Quectel_WCDMA_UGxx_HTTP_AT_Commands_Manual	Introduction about UGxx HTTP AT commands

Table 4: Terms and Abbreviations

Abbreviation	Description
FTP	File Transfer Protocol
HTTP	Hyper Text Transport Protocol
PDP	Packet Data Protocol
DFOTA	Delta Firmware Upgrade over the Air
APN	Access Point Name