

EP06&EG06&EM06 DFOTA User Guide

LTE-A Module Series

Rev. EP06&EG06&EM06_DFOTA_User_Guide_V1.0

Date: 2018-08-31

Status: Released



Our aim is to provide customers with timely and comprehensive service. For any assistance, please contact our company headquarters:

Quectel Wireless Solutions Co., Ltd.

7th Floor, Hongye Building, No.1801 Hongmei Road, Xuhui District, Shanghai 200233, China

Tel: +86 21 5108 6236

Email: info@quectel.com

Or our local office. For more information, please visit:

<http://www.quectel.com/support/sales.htm>

For technical support, or to report documentation errors, please visit:

<http://www.quectel.com/support/technical.htm>

Or Email to: support@quectel.com

GENERAL NOTES

QUECTEL OFFERS THE INFORMATION AS A SERVICE TO ITS CUSTOMERS. THE INFORMATION PROVIDED IS BASED UPON CUSTOMERS' REQUIREMENTS. QUECTEL MAKES EVERY EFFORT TO ENSURE THE QUALITY OF THE INFORMATION IT MAKES AVAILABLE. QUECTEL DOES NOT MAKE ANY WARRANTY AS TO THE INFORMATION CONTAINED HEREIN, AND DOES NOT ACCEPT ANY LIABILITY FOR ANY INJURY, LOSS OR DAMAGE OF ANY KIND INCURRED BY USE OF OR RELIANCE UPON THE INFORMATION. ALL INFORMATION SUPPLIED HEREIN IS SUBJECT TO CHANGE WITHOUT PRIOR NOTICE.

COPYRIGHT

THE INFORMATION CONTAINED HERE IS PROPRIETARY TECHNICAL INFORMATION OF QUECTEL WIRELESS SOLUTIONS CO., LTD. TRANSMITTING, REPRODUCTION, DISSEMINATION AND EDITING OF THIS DOCUMENT AS WELL AS UTILIZATION OF THE CONTENT ARE FORBIDDEN WITHOUT PERMISSION. OFFENDERS WILL BE HELD LIABLE FOR PAYMENT OF DAMAGES. ALL RIGHTS ARE RESERVED IN THE EVENT OF A PATENT GRANT OR REGISTRATION OF A UTILITY MODEL OR DESIGN.

Copyright © Quectel Wireless Solutions Co., Ltd. 2018. All rights reserved.

About the Document

History

Revision	Date	Author	Description
1.0	2018-08-31	Ramos ZHANG/ Mayra XU	Initial

Contents

About the Document.....	2
Contents.....	3
Table Index.....	4
1 Introduction	5
2 Firmware Upgrade Procedure via DFOTA.....	6
2.1. Get Delta Firmware Package	7
2.2. Put Delta Package on FTP/HTTP(S) Server.....	7
2.3. Execute AT Command to Upgrade the Firmware	7
3 Description of DFOTA AT Commands.....	8
3.1. AT+QFOTADL=<ftpURL> Upgrade Firmware When Delta Package is Stored on an FTP Server	8
3.2. AT+QFOTADL=<httpURL> Upgrade Firmware When Delta Package is Stored on an HTTP(S) Server	10
3.3. AT+QFOTADL=<file_name> Upgrade Firmware When Delta Package is Stored on the Local File System.....	11
4 Abnormalities and Important Note.....	13
4.1. Abnormalities.....	13
4.1.1. Wrong Delta Firmware Package	13
4.1.2. Failure of Firmware Upgrade.....	13
4.2. Important Note.....	14
5 Summary of Error Codes	15
6 Appendix A References.....	16

Table Index

TABLE 1: SUMMARY OF <FTP_ERR>, <HTTP_ERR> AND <ERR> CODES	15
TABLE 2: TERMS AND ABBREVIATIONS	16

1 Introduction

Quectel EP06&EG06&EM06 modules support DFOTA (Delta Firmware Upgrade Over-the-air) function, which allows customers to upgrade the firmware over the air. It can upgrade the firmware to a new version and revert to the old version as well.

Before firmware upgrading, customers only need to prepare the firmware package which contains the differences between the original and target firmware versions. This reduces the amount of data transmitted and accelerates the speed of firmware upgrade.

This document is applicable to Quectel EP06&EG06&EM06 modules.

2 Firmware Upgrade Procedure via DFOTA

The following chart illustrates the firmware upgrade procedure via DFOTA.

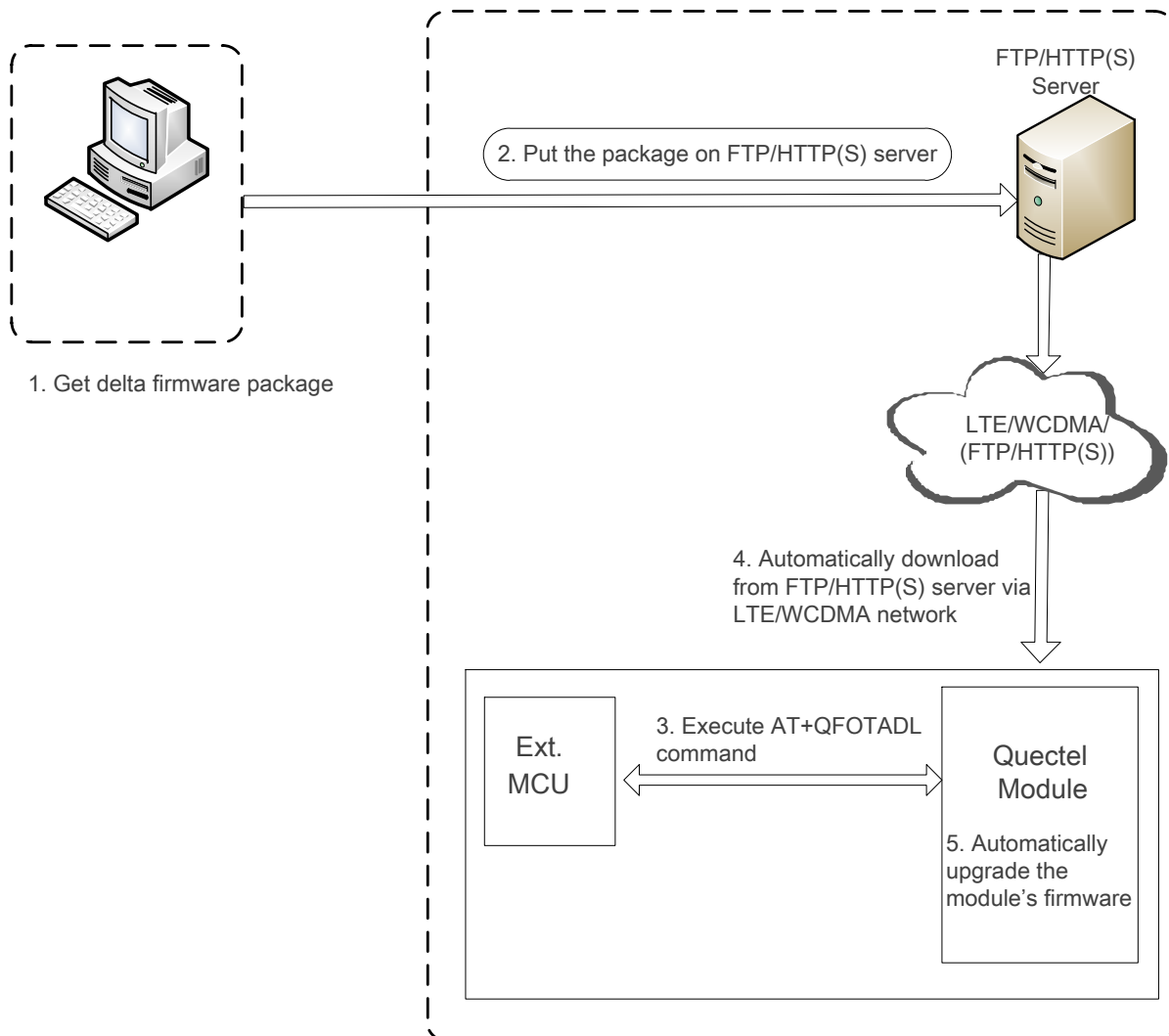


Figure 1: Firmware Upgrade Procedure via DFOTA

As shown in the above figure, customers only need to perform the following steps to upgrade the firmware.

- Step 1:** Get the delta firmware package from Quectel.
- Step 2:** Put the delta firmware on FTP/HTTP(S) server.
- Step 3:** Execute AT+QFOTADL command. Then the module will automatically download the package from FTP/HTTP(S) server via LTE/WCDMA network (**Step 4**) and finally automatically upgrade the module's firmware (**Step 5**).

2.1. Get Delta Firmware Package

Before upgrading, customers need to check the current firmware version (the original version) by executing ATI command, and also need to know the target firmware version. Then the two firmware versions should be provided for Quectel or the module supplier in order to get the delta firmware package.

2.2. Put Delta Package on FTP/HTTP(S) Server

When using the DFOTA function, customers need to set up an FTP/HTTP(S) server by themselves, for Quectel does not provide such a server. Then please put the delta firmware package on the server, and record the FTP/HTTP(S) path. The module will get the delta package from the path after executing corresponding AT command.

2.3. Execute AT Command to Upgrade the Firmware

After putting the delta firmware package on the FTP/HTTP(S) server, customers need to execute AT+QFOTADL command. Then the module will download the firmware package from the FTP/HTTP(S) server over the air and upgrade the firmware automatically. For more details, please refer to **Chapter 3**.

3 Description of DFOTA AT Commands

AT+QFOTADL command enables automatic firmware upgrade for the module via DFOTA. After executing the command, the module will automatically download the package from FTP/HTTP(S) server, reboot automatically and then enter into recovery mode. When the upgrade package is checked OK and the firmware upgrade is successful, the module will reboot and enter into normal mode.

AT+QFOTADL Upgrade Firmware via DOFTA

Test Command	Response
AT+QFOTADL=?	OK

3.1. AT+QFOTADL=<ftpURL> Upgrade Firmware When Delta Package is Stored on an FTP Server

If the delta firmware package is stored on an FTP server, AT+QFOTADL=<ftpURL> should be executed to enable automatic firmware upgrade via DFOTA. Then the module will download the delta package from the FTP server over the air and upgrade the firmware automatically.

AT+QFOTADL=<ftpURL> Upgrade Firmware When Delta Package is Stored on an FTP Server

Write Command	Response
AT+QFOTADL=<ftpURL>	OK +QIND: "FOTA", "FTPSTART" +QIND: "FOTA", "FTPEND", <ftp_err> +QIND: "FOTA", "START" +QIND: "FOTA", "UPDATING", <percent> +QIND: "FOTA", "UPDATING", <percent> ... +QIND: "FOTA", "END", <err>
	If there is any error, response: ERROR

Parameter

<ftpURL>	String type. The URL of the FTP server. The maximum 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.
<password>	String type. The password for authentication.
<serverURL>	String type. The IP address or domain name of the FTP server.
<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 on FTP server.
<ftp_err>	Integer type. The FTP error code. 0 means the upgrade is successful. Please refer to Chapter 5 for details.
<percent>	Integer type. The upgrade progress in percentage.
<err>	Integer type. 0 means firmware upgrade successful. Any other value means an error. Please refer to Chapter 5 for details.

Example

```
//Upgrade the firmware when the delta firmware package is stored on an FTP server.
//The FTP server address is "ftp://test:test@124.74.41.170:21/Jun/update-v12-to-v13.zip".
//Execute AT+QFOTADL command to enable automatic firmware upgrade via DFOTA, and then the
module will start to download the delta package and upgrade firmware automatically.
AT+QFOTADL="ftp://test:test@124.74.41.170:21/Jun/update-v12-to-v13.zip"
OK
+QIND: "FOTA","FTPSTART"           //Start to download the delta package from the FTP server.
+QIND: "FOTA","FTPEND",0           //Finish downloading the delta package.

//The module will reboot automatically and the USB port will be re-initialized. If the current port is USB port,
then the MCU should close and reopen it.
+QIND: "FOTA","START"               //Start to upgrade the firmware.
+QIND: "FOTA","UPDATING",1
+QIND: "FOTA","UPDATING",2
...
+QIND: "FOTA","UPDATING",100
+QIND: "FOTA","END",0              //The firmware is upgraded successfully.
```

3.2. AT+QFOTADL=<httpURL> Upgrade Firmware When Delta Package is Stored on an HTTP(S) Server

If the delta firmware package is stored on an HTTP(S) server, AT+QFOTADL=<httpURL> command should be executed to enable automatic firmware upgrade via DFOTA. Then the module will download the delta package from the HTTP(S) server over the air and upgrade the firmware automatically.

AT+QFOTADL=<httpURL> Upgrade Firmware When Delta Package is Stored on an HTTP(S) Server

Write Command	Response
AT+QFOTADL=<httpURL>	<p>OK</p> <p>+QIND: "FOTA", "HTTPSTART"</p> <p>+QIND: "FOTA", "HTTPEnd", <http_err></p> <p>+QIND: "FOTA", "START"</p> <p>+QIND: "FOTA", "UPDATING", <percent></p> <p>+QIND: "FOTA", "UPDATING", <percent></p> <p>...</p> <p>+QIND: "FOTA", "END", <err></p> <p>If there is any error, response:</p> <p>ERROR</p>

Parameter

<httpURL>	String type. The maximum length is 255 bytes. It should be started with "http://" or "https://". 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(S) server.
<http_port>	Integer type. The port of the HTTP(S) server. The default value is 80. The range is 1-65535.
<http_file_path>	String type. The file name in HTTP(S) server.
<http_err>	Integer type. The HTTP(S) error code. 0 means upgraded successfully. Please refer to Chapter 5 for details.
<percent>	Integer type. The upgrade progress in percentage.
<err>	Integer type. 0 means firmware upgrade successful. Any other value means an error. Please refer to Chapter 5 for details.

Example

```
//Upgrade the firmware when the delta firmware package is stored on an HTTP server.
//The HTTP server address is "http://www.quectel.com:100/update.zip".
//Execute AT+QFOTADL command to enable automatic firmware upgrade via DFOTA, and then the
```

module will start to download the delta package and upgrade firmware automatically.

AT+QFOTADL="http://www.quectel.com:100/update.zip"

OK

+QIND: "FOTA","HTTPSTART" //Start to download the delta package from the HTTP server.

+QIND: "FOTA","HTTPEND",0 //Finish downloading the delta package.

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

+QIND: "FOTA","START" //Start to upgrade the firmware.

+QIND: "FOTA","UPDATING",1

+QIND: "FOTA","UPDATING",2

...

+QIND: "FOTA","UPDATING",100

+QIND: "FOTA","END",0 //The firmware is upgraded successfully..

3.3. AT+QFOTADL=<file_name> Upgrade Firmware When Delta Package is Stored on the Local File System

If the delta firmware package has already been stored in the module's file system, AT+QFOTADL=<file_name> command should be executed to enable automatic firmware upgrade via DFOTA. Then the module will download the delta package from the local file system and upgrade the firmware automatically.

AT+QFOTADL=<file_name> Upgrade Firmware When Delta Package is Stored on the Local File System

Write Command	Response
AT+QFOTADL=<file_name>	OK
	+QIND: "FOTA","START"
	+QIND: "FOTA","UPDATING",<percent>
	+QIND: "FOTA","UPDATING",<percent>
	...
	+QIND: "FOTA","END",<err>
	If there is any error, response: ERROR

Parameter

<file_name>	String type. The maximum length is 90 bytes. It should be started with "/data/ufs/" in UFS.
<percent>	Integer type. The upgrade progress in percentage.
<err>	Integer type. 0 means firmware upgrade successful. Any other value means an error. Please refer to Chapter 5 for details.

Example

```
//Upgrade the firmware when the delta firmware package is stored on the local file system.
```

```
AT+QFOTADL="/data/ufs/update-v13-to-v12.zip"
```

```
OK
```

```
+QIND: "FOTA", "START" //Start to upgrade the firmware.
```

```
+QIND: "FOTA", "UPDATING", 1
```

```
+QIND: "FOTA", "UPDATING", 2
```

```
...
```

```
+QIND: "FOTA", "UPDATING", 100
```

```
+QIND: "FOTA", "END", 0 //The firmware is upgraded successfully.
```

4 Abnormalities and Important Note

4.1. Abnormalities

4.1.1. Wrong Delta Firmware Package

After executing AT+QFOTADL command and the delta firmware package is downloaded, the module will reboot automatically and then enter into recovery mode. The module checks the upgrade package first, if there is something wrong with the package, the URC (+QIND: "FOTA","END",<err>) of an error code (504, 505 or 510) will be reported, then the module will reboot automatically, enter into recovery mode and re-check the package for maximally five times. If the package is still wrong after five retries, the module will reboot and enter into normal mode. In such case, please confirm the delta firmware package and re-put it on FTP/HTTP(S) server.

4.1.2. Failure of Firmware Upgrade

After the upgrade package is checked OK, then it starts to upgrade firmware. If it is failed to upgrade the firmware, the URC (+QIND: "FOTA","END",<err>) of an error code (502, 511, 520-530 or 540-546) will be reported, then the module will reboot automatically, enter into recovery mode and retry to upgrade for maximally five times. If upgrade is still unsuccessful after five retries, the module will stop firmware upgrade and restore to the original version.

NOTE

During an upgrading process, once the delta firmware package is downloaded, the module can only retry for maximally five times in total, among which retry times for package checking and firmware upgrading are both included.

As mentioned in **Chapter 2**, it is a completely automatic process after executing AT+QFOTADL command. Therefore, any +QIND: "FOTA","END",<err> URCs sent from the module to the Ext. MCU can be ignored.

4.2. Important Note

The URC of +QIND: "FOTA", "START" indicates the firmware upgrade process really starts. If the Ext. MCU receives this URC after executing AT+QFOTADL command, please **do NOT power off the module** until the firmware is upgraded successfully and +QIND: "FOTA", "END", 0 is received. Then the module will reboot and enter into normal mode automatically.

During upgrading process, if the Ext. MCU does not receive any URC in four minutes after the last URC is returned, then the module can be rebooted.

Meanwhile, it is recommended to set a flag on Ext. MCU to mark the task of the firmware upgrading and clean it after successful upgrading.

5 Summary of Error Codes

The error code indicates an error related to mobile equipment or network. The details about <ftp_err>, <http_err> and <err> are described in the following table.

Table 1: Summary of <ftp_err>, <http_err> and <err> Codes

<ftp_err>	Meaning
0	FTP download operation successful
601	FTP unknown error
<http_err>	Meaning
0	HTTP(S) download operation successful
701	HTTP(S) unknown error
<err>	Meaning
0	Firmware upgrade successful
502	The upgrade process exits for some unpredictable errors.
504	Something wrong with the upgrade package file
505	Something wrong with the upgrade package file
510	The patch does not match the source file in the module, need to check whether the upgrade package is wrong.
511	The file system has no enough space for upgrading.
520-530, 540-546	Firmware upgrade failed

6 Appendix A References

Table 2: Terms and Abbreviations

Abbreviation	Description
DFOTA	Delta Firmware Upgrade Over the Air
Ext. MCU	External Microprogrammed Control Unit
FTP	File Transfer Protocol
GPRS	General Packet Radio Service
HTTP(S)	Hyper Text Transport Protocol (Secure)
LTE	Long Term Evolution
UFS	User File System
WCDMA	Wideband Code Division Multiple Access