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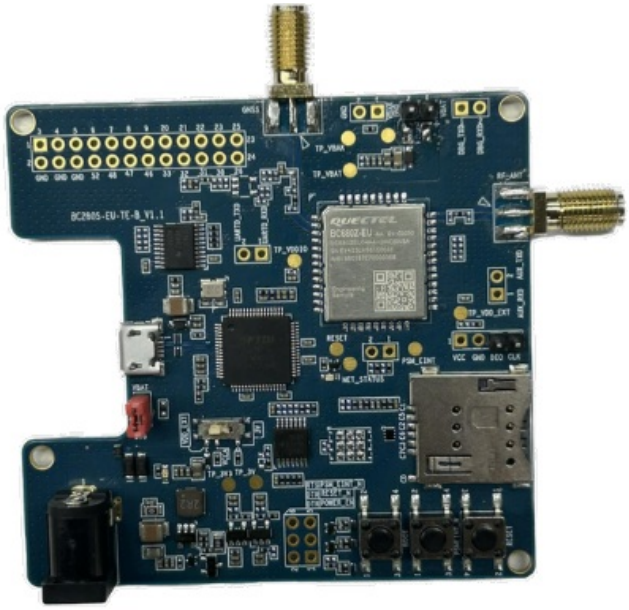
QUECTEL BC680Z-EU NB-IoT Module



Product Information

Specifications

- Product: NB-IoT Module Series
- Version: 1.0
- Date: 2025-02-26
- Status: Released

Introduction

- Quectel BC680Z-EU module supports DFOTA (Delta Firmware Over-The-Air) feature, which allows users to upgrade firmware wirelessly.
- A delta firmware package, which contains only the differences between the current and the target upgrade version, is needed before updating firmware in DFOTA. Therefore, DFOTA is time-saving and can reduce unnecessary data transmission.
- This document describes how to upgrade the firmware of Quectel BC680Z-EU module via DFOTA over HTTP.

DFOTA Implementation and User Responsibility

- Quectel follows industry best practices with regard to firmware updates for its modules by enabling users to offer DFOTA updates. Please note that Quectel does not have the ability to unilaterally push updates to users’ devices. Quectel hands full control

over the DFOTA process to users. In the process, Quectel solely provides the updated firmware but cannot initiate DFOTA updates on users' devices.

- Users can determine when to push the update to the Quectel modules using the DFOTA mechanism by configuring corresponding parameters for the update that the users host on their own infrastructures.

DFOTA Procedure

The following chart illustrates the firmware upgrade procedure via DFOTA when the firmware package is stored on an HTTP server.

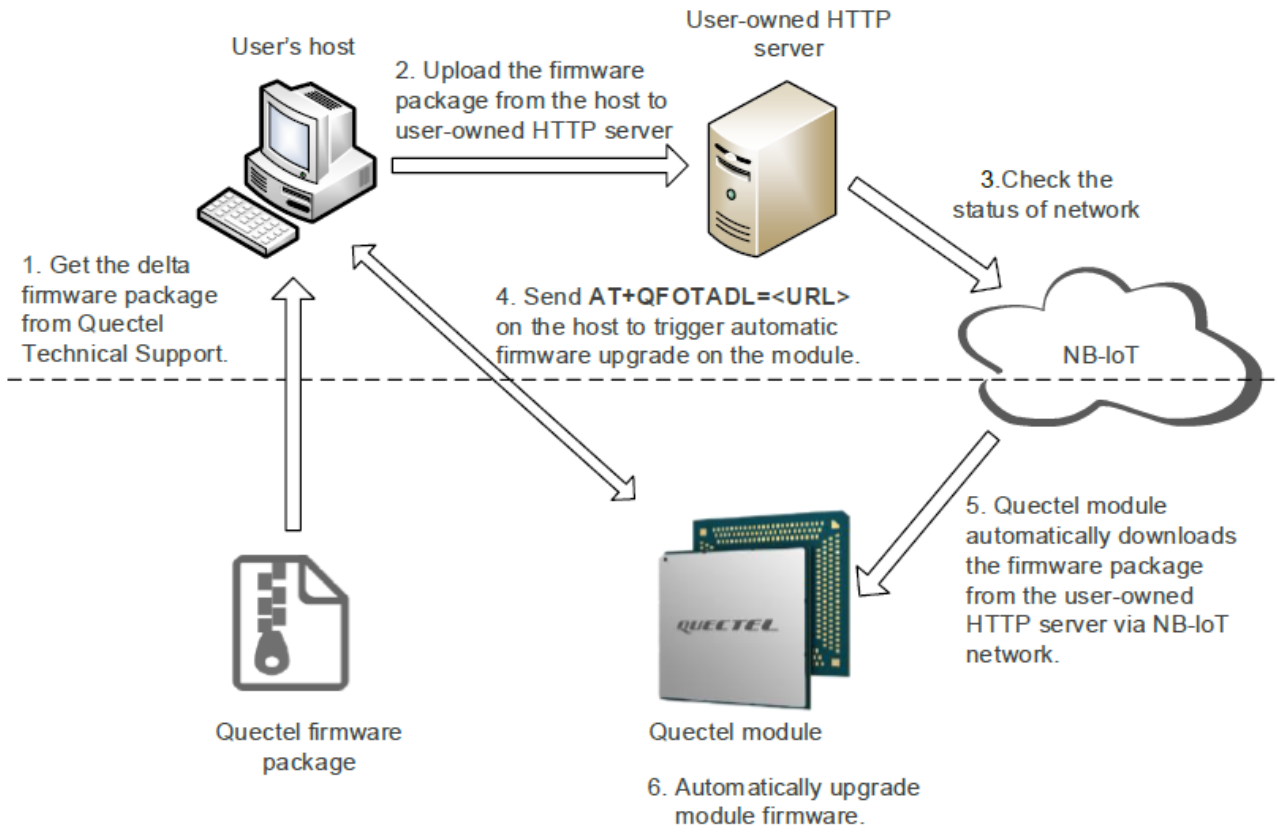


Figure 1: DFOTA Procedure over HTTP

As shown in the above figure, customers only need to perform the following steps to upgrade the firmware when the firmware package is stored on an HTTP server:

- **Step 1:** Acquire the delta firmware package from Quectel Technical Support (see Chapter 2.1 for details).
- **Step 2**: Upload the delta firmware package from the host to your HTTP server (see Chapter 2.2 for details).
- **Step 3:** Check the status of network (see Chapter 2.3 for details).

- **Step 4:** Execute AT+QFOTADL=<URL> on the host to trigger automatic firmware upgrade on the module (see Chapter 2.4 for details).
- **Step 5:** The module automatically downloads the firmware package from your HTTP server via NB-IoT network.
- **Step 6:** The module internally runs the updating program to automatically upgrade the module firmware.

NOTE

You are responsible for providing and managing the HTTP server for the firmware upgrade. Quectel does not supply the server or assist with its setup.

Acquire Delta Firmware Package

Before firmware upgrading, check the original firmware version with ATI and confirm the target firmware version, and then send the two firmware versions to Quectel Technical Support to get the corresponding delta firmware package.

Upload Delta Package to HTTP Server

- **Step 1:** Set up an HTTP server before using the DFOTA feature (Quectel does not provide such a server).
- **Step 2:** Upload the delta firmware package to your server, and save the storage path, which is to be included in AT+QFOTADL=<URL>.

NOTE

Please record the HTTP path (URL) to which the delta firmware package is uploaded for the AT+QFOTADL=<URL> command in Chapter 3.3.1.

Check Network Status

Check whether the module is registered on network or not with the following AT commands after it powers on and before the firmware upgrade.

- AT+CESQ Query signal quality
- AT+CEREG? Query network registration status
- AT+CGPADDR Query allocated IP address

For more details about the above commands, see document [1].

Execute AT Command to Upgrade the Firmware

After the network status is confirmed to be ready, execute AT+QFOTADL=<URL> on the host to initiate the automatic over-the-air download and upgrade of module delta firmware package. For more details about the DFOTA AT commands, please refer to Chapter 3.3.

Description of DFOTA AT Commands

AT Command Introduction

Definitions

- **<CR>** Carriage return character.
- **<LF>** Line feed character.
- **<…>** Parameter name. Angle brackets do not appear on the command line.
- **[…]** Optional parameter of a command or an optional part of TA information response. Square brackets do not appear on the command line. When an optional parameter is not given in a command, the new value equals its previous value or the default settings, unless otherwise specified
- **Underline** Default setting of a parameter

AT Command Syntax

All command lines must start with AT or at and end with <CR>. Information responses and result codes always start and end with a carriage return character and a line feed character: <CR><LF><response><CR><LF>. In tables presenting commands and responses throughout this document, only the commands and responses are presented, and <CR> and <LF> are deliberately omitted.

Table 1: Types of AT Commands

Command Type	Syntax	Description
Test Command	**AT+<cmd>=?**	Test the existence of the corresponding command and return information about the type, value, or range of its parameter.
Read Command	**AT+<cmd>?**	Check the current parameter value of the corresponding command.
Write Command	**AT+<cmd>=<p1>[,<p2>[,<p3>[...]]]**	Set user-definable parameter value.
Execution Command	**AT+<cmd>**	Return a specific information parameter or perform a specific action.

Declaration of AT Command Examples

The AT command examples in this document are provided to help you learn about the use of the AT commands introduced herein. The examples, however, should not be taken as Quectel's recommendations or suggestions about how to design a program flow or what status to set the module into. Sometimes multiple examples may be provided for one AT command. However, this does not mean that there is a correlation among these examples, or that they should be executed in a given sequence. The URLs, domain names, IP addresses, usernames/accounts, and passwords (if any) in the AT command examples are provided for illustrative and explanatory purposes only, and they should be modified to reflect your actual usage and specific needs.

DFOTA AT Command

AT+QFOTADL=<URL> DFOTA via HTTP Server

- The Write Command triggers the automatic firmware upgrade by the module via DFOTA.
- After a delta firmware package has been stored on an HTTP server, execute AT+QFOTADL=<URL> to trigger the automatic firmware download and upgrade process of DFOTA. When the firmware upgrade is complete, the module will return result code 0 and reboot automatically, otherwise it will return an error, exit from DFOTA and continue to run on the original firmware.

AT+QFOTADL=<URL> **DFOTA via HTTP Server**

Test Command **AT+QFOTADL=?**	Response **+QFOTADL=<URL>**
	OK
	If there is any error: • **ERROR** • Or • **+CME ERROR: <err>**
Write Command **AT+QFOTADL=<URL>**	Response **OK**
	+QIND: “FOTA”,”HTTPSTART”
	+QIND: “FOTA”,”DOWNLOADING”,<percent>
	+QIND: “FOTA”,”DOWNLOADING”,<percent>

	… • **+QIND: “FOTA”,”HTTPEND”, <download_result>** • **+QIND: “FOTA”,”START”** • **REBOOT_CAUSE_SECURITY_FOTA_UPGRADE OK** • **+QIND: “FOTA”,”END”,<upgrade_result>** If there is any error: • **ERROR** • Or • **+CME ERROR: <err>**
Maximum Response Time	5 s
Characteristics	• The command takes effect immediately. • Remain invalid after deep-sleep wakeup. The configuration is not saved to NVRAM.

Parameter

- **<URL>** String type. The URL that the delta firmware package stored on the HTTP server. The 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 owned and operated by you.
- **<HTTP_port>** Integer type. The port of the HTTP server. Range: 1–65535. Default value: 80.
- **<HTTP_file_path>** String type. The file path in HTTP server.
- **<download_result>** Integer type. The code of download result.
  - 0 Downloaded successfully.

    - Other values Download failed. See Chapter 6 for more details. <percent> Integer type. The download or upgrade progress in percentage.
- **<upgrade_result>** Integer type. The code of upgrade result. 0 Upgraded successfully.
    - Other values Upgrade failed. See Chapter 6 for more details.
- **<err>** Error code. See “Table 6: Error Codes in +CME ERROR” of document [1] for details.

DFOTA Related URCs

+QIND: “FOTA”,”HTTPSTART” Notify the Start of HTTP Download

+QIND: “FOTA”,”HTTPSTART” Notify the Start of HTTP Download	
+QIND: “FOTA”,”HTTPSTART”	The URC notifies that the download over HTTP starts.

+ QIND: “FOTA”,”DOWNLOADING” Notify HTTP Download Progress

+QIND: “FOTA”,”DOWNLOADING” Notify HTTP Download Progress	
+QIND: “FOTA”,”DOWNLOADING”,<percent>	The URC notifies the HTTP download progress.

Parameter

<percent> Integer type. The download progress in percentage.

+QIND: “FOTA”,”HTTPEND” Notify HTTP Download Result

+QIND: “FOTA”,”HTTPEND” Notify HTTP Download Result	
+QIND: “FOTA”,”HTTPEND”,<download_result>	The URC notifies the HTTP download result.

Parameter

- <download_result> Integer type. The code of download result.
- 0 Downloaded successfully.
- Other values Download failed. See Chapter 6 for details.

4.4. +QIND: “FOTA”,”START” Notify the Start of Upgrade

+QIND: “FOTA”,”START” Notify the Start of Upgrade	
+QIND: “FOTA”,”START “	The URC notifies the start of upgrade.

4.5. +QIND: “FOTA”,”END” Notify Upgrade Result

+QIND: “FOTA”,”END” Notify Upgrade Result	
+QIND: “FOTA”,”END”,<upgrade_result>	The URC notifies the upgrade result.

Parameter

<upgrade_result>
Integer type. The code of upgrade result.

- 0 Upgraded successfully.
- Other values Failed to Upgrade. See Chapter 6 for details.

Examples

DFOTA via HTTP Server Under NB-IoT Network

- //You can perform the firmware upgrade after storing the delta firmware package on your HTTP server.
- //”http://192.168.0.2:65163/DFOTA/BC680ZEU04AAR01A03_TO_A04.bin” is used as an example URL below (The URL is provided for illustrative purpose only. Please replace it with a valid URL that corresponds to your HTTP server and firmware package).

- AT+CEREG? //Query network registration status. +CEREG:0,1 OK
- //Execute AT+QFOTADL=<URL> to enable automatic firmware upgrade via DFOTA, and then the module will start to download the delta firmware package and upgrade firmware automatically.
- AT+QFOTADL="http://192.168.0.2:65163/DFOTA/BC680ZEU04AAR01A03_TO_A04.bin" OK
- +QIND: "FOTA","HTTPSTART" //Download starts.
- +QIND: "FOTA","DOWNLOADING",7% //Download process.
- +QIND: "FOTA","DOWNLOADING",14%
- +QIND: "FOTA","DOWNLOADING",21%
- +QIND: "FOTA","DOWNLOADING",28% …
- +QIND: "FOTA","DOWNLOADING",86%
- +QIND: "FOTA","DOWNLOADING",93%
- +QIND: "FOTA","DOWNLOADING",100%
- +QIND: "FOTA","HTTPEND",0 //The package from HTTP server is successfully downloaded
- +QIND: "FOTA","START" //Upgrade starts.
- REBOOT_CAUSE_SECURITY_FOTA_UPGRADE //Reboot after the upgrade is complete. OK
- +QIND: "FOTA","END",0 //The firmware is successfully upgraded

Summary of Result Codes

This chapter introduces the result codes related to Quectel modules or the network. The details about <download_result> and <upgrade_result> are described in the following tables.

Table 2: Summary of <download_result> Codes

<download_result> Description

- 0 Downloaded successfully
- 1 Unknown error
- 2 DNS parse failed
- 12 Download failed

- 13 Network disabled
- 99 Network unavailable
- 100 Memory write failed
- 101 Insufficient memory

Table 3: Summary of <upgrade_result> Codes

<upgrade_result> Description

- 0 Upgraded successfully
- 255 Invalid delta packet firmware

Appendix References

Table 4: Related Documents

Document Name
[1] Quectel_BC680Z-EU_AT_Commands_Manual

Table 5: Terms and Abbreviations

Abbreviation Description

- DFOTA Delta Firmware Over-The-Air
- DNS Domain Name Server
- HTTP Hyper Text Transport Protocol
- IP Internet Protocol
- NB-IoT Narrowband Internet of Things
- URL Uniform Resource Locator

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- Or our local offices. For more information, please visit: http://www.quectel.com/support/sales.htm.
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About the Document

Revision History

Version Date Author Description

- – 2025-01-09 Kriss YU Creation of the document
- 1.0 2025-02-26 Kriss YU First official release

FAQ

- **Q: Where can I find technical support?**
  - A: For technical support, please visit the Technical Support page on the Quectel website or email support@quectel.com.
- **Q: How can I contact Quectel headquarters?**
  - A: You can contact Quectel headquarters at the following address: Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai 200233, China. Tel: +86 21 5108 6236.

Documents / Resources

	QUECTEL BC680Z-EU NB-IoT Module [pdf] User Guide BC680Z-EU, BC680Z-EU NB-IoT Module, NB-IoT Module, Module

References

- User Manual

BC680Z-EU, BC680Z-EU NB-IoT Module, Module, NB-IoT Module,

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—Previous Post
QUECTEL BC680Z-EU Compact LTE Cat Module User Guide
Next Post—
QUECTEL BG95xA LPWA Module Instruction Manual

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