

# BC20 DFOTA User Guide

## NB-IoT/GNSS Module Series

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# About the Document

## History

Revision	Date	Author	Description
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# 1 Introduction

Quectel BC20 module supports DFOTA (Delta Firmware Upgrade Over-the-air) feature, which allows customers to upgrade or downgrade firmware wirelessly.

Before firmware upgrading or downgrading, customers only need to get a delta firmware package, which contains only the differences between the source and the target firmware versions. By this way, the amount of data transmitted and the time taken can be reduced.

This document mainly describes how to upgrade the firmware of Quectel BC20 module via DFOTA.

## 2 Firmware Upgrade Procedure via DFOTA

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

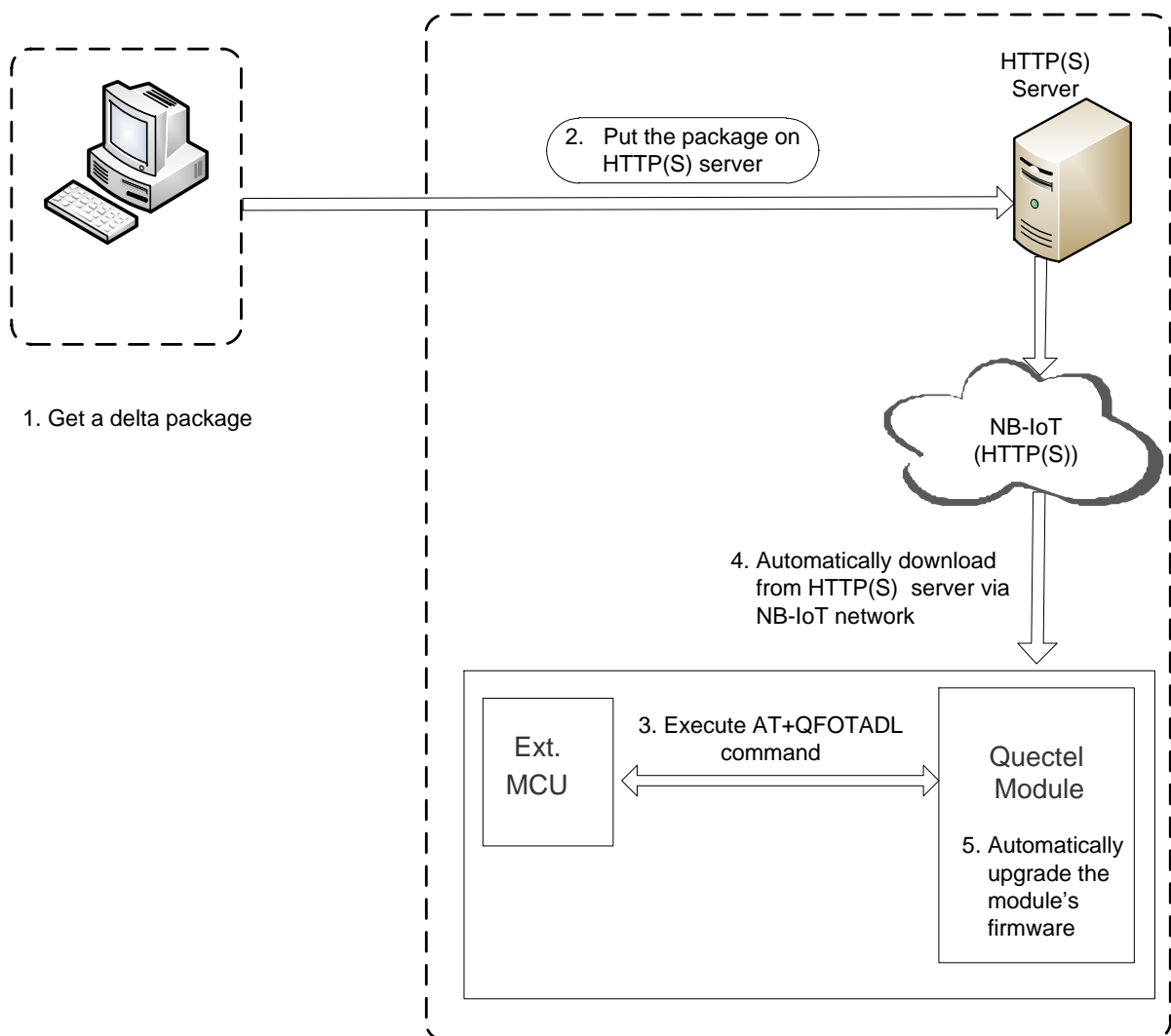


Figure 1: Firmware Upgrade Procedure via DFOTA

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

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

## 2.1. Get a Delta Firmware Package

Before upgrading, customers need to check the source firmware version by executing **ATI** command and get to know the target firmware version, then customers should send the two firmware versions to Quectel or the module supplier so as to get a delta package.

## 2.2. Put the Delta Firmware Package on HTTP(S) Server

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

## 2.3. Check Network Status

After the module is started up, please make sure it is registered on network before firmware upgrading. The relevant AT commands are listed below:

- **AT+CESQ:** Query signal quality
- **AT+CEREG?:** Query network registration status
- **AT+CGPADDR=1:** Query allocated IP address for the default PDN

For more details about the above commands, please refer to *Quectel\_BC20\_AT\_Commands\_Manual*.

## 2.4. Execute AT Command to Upgrade the Firmware

After network status confirmation, customers need to execute **AT+QFOTADL** command. Then the module will download the delta package from the HTTP(S) server wirelessly 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 module via DFOTA. After executing the command, the module will automatically download the package from HTTP(S) server. After finishing the package download, the module will automatically upgrade the module's firmware. If firmware is upgraded successfully, the module will reboot, otherwise it will return an error and exit from DFOTA.

### 3.1. AT+QFOTADL Upgrade Firmware When the Delta Firmware Package is Stored on HTTP(S) Server

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

AT+QFOTADL Upgrade Firmware When Delta Firmware Package is Stored on HTTP(S) Server	
Test Command <b>AT+QFOTADL=?</b>	Response <b>OK</b>
Write Command <b>AT+QFOTADL=&lt;httpURL&gt;</b>	Response <b>OK</b> <b>+QIND: "FOTA","HTTPSTART"</b> <b>+QIND: "FOTA","DOWNLOADING",&lt;percent&gt;</b> <b>+QIND: "FOTA","DOWNLOADING",&lt;percent&gt;</b> ... <b>+QIND: "FOTA","HTTPPEND",&lt;http_err&gt;</b> <b>+QIND: "FOTA","START"</b> <b>+QIND: "FOTA","UPDATING",&lt;percent&gt;</b> <b>+QIND: "FOTA","UPDATING",&lt;percent&gt;</b> ... <b>+QIND: "FOTA","END",&lt;err&gt;</b>  If there is any error, response: <b>ERROR</b> Or <b>+CME ERROR: &lt;err&gt;</b>

Maximum Response Time

300ms

## Parameter

<b>&lt;httpURL&gt;</b>	String format. The max length is 255 bytes. It should be started with "HTTP://" or "HTTPS://", for example: "HTTP://<http_server_URL>:<http_port>/<http_file_path>".
<b>&lt;http_server_URL&gt;</b>	String type. The IP address or domain name of the HTTP(S) server.
<b>&lt;http_port&gt;</b>	Integer type. The port of the HTTP(S) server. Default value: 80. Range: 1-65535.
<b>&lt;http_file_path&gt;</b>	String type. The file name in HTTP(S) server.
<b>&lt;http_err&gt;</b>	Integer type. The HTTP(S) <b>&lt;err&gt;</b> code. 0 means upgraded successfully. Any other value means an error. Please refer to <b>Chapter 5</b> for more details.
<b>&lt;percent&gt;</b>	Integer type. The download or upgrade progress in percentage.
<b>&lt;err&gt;</b>	Integer type. 0 means upgraded successfully. Any other value means an error. Please refer to <b>Chapter 5</b> for more details.

## NOTES

- If the module is powered down during "UPDATING", the module will automatically enter into forced upgrade mode. When it is powered up next time, it will proceed to update. The upgrade interface is shown as below:  
**+QIND: "FOTA","START"**  
**+QIND: "FOTA","UPDATING", 1%**  
**+QIND: "FOTA","UPDATING", 2%**  
 ...  
**+QIND: "FOTA","END",0**
- The HTTPS is not supported currently.

# 4 Example

## 4.1. Upgrade Firmware from HTTP Server by DFOTA

//Upgrade firmware when the delta firmware package is stored on an HTTP server.

//The HTTP server address is "http://www.quectel.com:100/update.zip".

OK

**AT+CESQ;+CEREG?;+CPIN?;+COPS?** //Query signal quality and network registration status.

+CESQ: 47,6,255,255,0,54

+CEREG: 0,1

+CPIN: READY

+COPS: 0,2,"46011",9

OK

//Execute **AT+QFOTADL** command 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://www.quectel.com:100/update.zip"**

OK

+QIND: "FOTA","HTTPTART"

+QIND: "FOTA","DOWNLOADING", 1%

+QIND: "FOTA","DOWNLOADING", 2%

...

+QIND: "FOTA","DOWNLOADING", 100%

+QIND: "FOTA","HTTPEND",0

//Finish downloading the package from HTTP server.

+QIND: "FOTA","START"

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

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

...

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

+QIND: "FOTA","END",0

//Finish upgrading the firmware.

# 5 Summary of Error Codes

This chapter introduces the error codes related to mobile equipment or network. The details about **<http\_err>** and **<err>** are described in the following tables.

**Table 1: Summary of <http\_err> Codes**

<b>&lt;http_err&gt;</b>	<b>Description</b>
0	Downloaded successfully
12	HTTP(S) download failed
13	Network deactivated
20	Network activating

**Table 2: Summary of <err> Codes**

<b>&lt;err&gt;</b>	<b>Description</b>
0	Upgraded successfully
1	Unknown error
2	FOTA is busy
254	Delta firmware package mismatch
255	Delta firmware package invalid

# 6 Appendix A References

**Table 3: Related Documents**

SN	Document Name	Remark
[1]	Quectel_BC20_AT_Commands_Manual	AT Commands Manual for BC20

**Table 4: Terms and Abbreviations**

Abbreviation	Description
DFOTA	Delta Firmware Upgrade Over-the-Air
HTTP(S)	Hyper Text Transport Protocol (Secure)
NB-IoT	Narrow Band Internet of Things