

# Skywire<sup>®</sup> NL-SW-LTE-QBG96 and NL-SW-LTE-QBG95 FOTA Guide

NimbeLink Corp

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# 1. Introduction

## 1.1 Overview

This guide documents performing a Firmware Over the Air (FOTA) update for the NL-SW-LTE-QBG96 and NL-SW-LTE-QBG95 Skywire modems using firmware files from an HTTP server and the modem's internal AT commands.

The FOTA process is a device-initiated firmware update triggered by the host system. The Skywire will download the firmware file from the specified server and apply the update.

Section 4 provides an example using an HTTP server. Please see Section 2 for more information about acquiring the desired firmware delta and hosting an HTTP server.

Please email [product.support@nimbelink.com](mailto:product.support@nimbelink.com) should any questions or support requests arise.

Once the file is successfully downloaded, applying the firmware update will take around 200 seconds to complete. During the update process the modem may reset itself several times.

The modem cannot be powered down during the firmware download or when applying the firmware update. Doing so will cause the FOTA process to fail, and the download will need to be restarted.

## 1.2 Prerequisites

- 1) The FOTA process is available on the NL-SW-LTE-QBG96 and NL-SW-LTE-QBG95. To confirm your firmware version, issue the command **AT+QGMR**, and the Skywire will respond with:

For QBG96:

**BG96MAR02A07M1G\_xx.xxx.xx.xxx**

For QBG95:

**BG95M3LAR02A03\_xx.xxx.xx.xxx**

**OK**

Where **BG96MAR02A07M1G** or **BG95M3LAR02A03** is the radio firmware version, and **xx.xxx.xx.xxx** is the Quectel Application firmware version.

- 2) You will need to have FOTA functionality built-in to your application, as an AT command must be issued.

- 3) Finally, you'll need an active data plan and data connection in order to perform the update.

## 2. Firmware Availability

### 2.1 Server Information

As of this writing, NimbeLink is not hosting any HTTP servers for their FOTA update. Customers must set up their own HTTP server to complete the FOTA update for their devices.

Please contact NimbeLink Product Support to get the FOTA files by emailing:

[product.support@nimbelink.com](mailto:product.support@nimbelink.com)

Please make sure to include the response to **AT+QGMR** for your Skywire.

### 2.2 Support

Please contact Nimbelink Product Support with any additional questions.

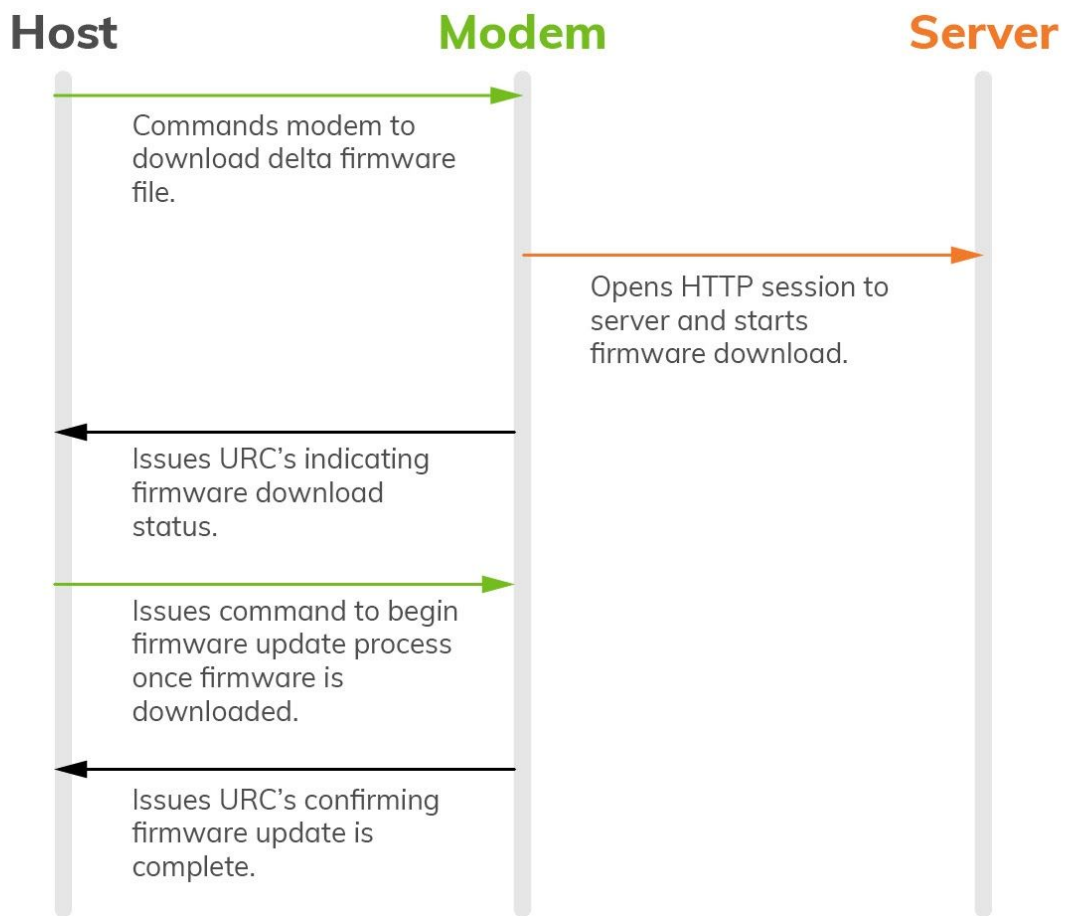
[product.support@nimbelink.com](mailto:product.support@nimbelink.com)

# 3. FOTA Process Overview

## 3.1 Overview

This section provides a high-level overview for performing a FOTA update. During the device initiated firmware update, the system host device will issue AT commands to the modem to trigger the modem to download the firmware file and then apply the update.

## 3.2 Flow chart



# 4. FOTA Example - HTTP

## 4.1 Overview

The following section documents performing a FOTA update using an HTTP server for the NL-SW-LTE-QBG96 and NL-SW-LTE-QBG95. This documents the AT commands that the host system must send to the modem to perform a FOTA update to the modem. The modem must have an active SIM card and be registered on the network before starting the FOTA process.

Please note that unless otherwise noted in Section 2 you must host the firmware file on your own server for FOTA.

## 4.2 Verify Connection

The FOTA process requires the modem to be registered on the network, and have a correctly configured PDP context in accordance with the carrier's required settings.

To check that the modem is registered on the network, issue the **AT+CREG?** command. The modem will respond with something similar to:

**+CREG: 0,x**

**OK**

where **x** is a number indicating registration status. **1** means that the Skywire is registered on the network. For other responses, please consult the AT command manual for more information.

Users should configure their PDP context using the command:

**+CGDCONT=1,"IPV4V6","Your\_APN"**

The terminal will respond with **OK**.

To determine your APN contact your network provider.

Next, users should check that the PDP contexts are properly configured with the **AT+CGDCONT?** command. The modem will respond with the following:

**+CGDCONT: 1,"IPV4V6","APN","0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0",0,0,0,0**

**OK**

Where **APN** is the APN that the modem should use for data connections.

Lines-of-service activated on go.nimbelink.com use the APN

**NIMBLINK.GW12.VZWENTP**. If you activated your line-of-service elsewhere, it will be different. Please contact a representative of where you purchased your line-of-service to get the APN.

## 4.3 Activate Context and Confirm IP Address

The FOTA process requires an active data context. You can activate the context with the command **AT+QIACT=1**, the terminal will respond with **OK**. To confirm that the context is active, you can issue **AT+CGACT?**. The Skywire will respond with:

**+CGACT: 1,x**

**OK**

where **x** is the activation status. A status of **1** means that the context is active. If your status is **0**, please try the activation command again. If it continues to stay **0**, please confirm your APN and start over at Section 4.2.

Next, confirm that you have an IP address using the command **AT+CGPADDR=1**. The Skywire will respond with:

**+CGPADDR: 1,IPV4 ADDRESS,IPV6 ADDRESS**

**OK**

where **IPV4 ADDRESS** is the IP address given to you by Verizon. You may have an IPV6 address, as well. If there is no IP address listed after **1**, the context did not activate. Please return to the beginning of this section to try and activate the context again.

## 4.4 Initiate Firmware Download

Once the modem's network connection has been verified the modem can begin the download of the firmware file.

For this example, we will use the following AT command:

**AT+QFOTADL="https://your\_webserver.com/path/to/firmware\_image.bin"**

*Please note that none of the addresses used in conjunction with this command in this document are valid HTTP links.*

This setting will download the firmware from the HTTP server, reboot once the update is complete, and display download progress every twenty percent completion.

For more information about available options, please see the AT command manual.

Once you issue the AT command, you should see the following output:

**AT+QFOTADL="https://your\_webserver.com/path/to/firmware\_image.bin"**

**+QIND: "FOTA","HTTPSTART"**

**+QIND: "FOTA","HTTPEND"**

**+QIND: "FOTA","START"**

**+QIND: "FOTA","UPDATING",5%**

**+QIND: "FOTA","UPDATING",11%**

...  
+QIND: "FOTA","UPDATING",100%  
+QIND: "FOTA","RESTORE",5%  
+QIND: "FOTA","RESTORE",14%

...  
+QIND: "FOTA","RESTORE",100%  
+QIND: "FOTA","END",0

POWERED DOWN

RDY

*Important Note: The Skywire may reboot multiple times during the update process. If you are not able to issue AT command to the Skywire, the modem may reboot again. Wait until you are able to issue AT commands.*

## 4.5 Verify Firmware Version

Once the firmware package is downloaded and installed, and the Skywire has rebooted, you can query the firmware version using the command **AT+QGMR**. The Skywire will respond with:

For QBG96:  
**BG96MAR02A07M1G\_xx.xxx.xx.xxx**

For QBG95:  
**BG95M3LAR02A03\_xx.xxx.xx.xxx**

OK

Where the series of x's should be the desired firmware version.

## 4.6 Example Log for NL-SW-LTE-QBG96

The following is a log of a NL-SW-LTE-QBG96 modem running 01.007.01.007 firmware performing a locally administered FOTA update to 01.010.01.010 firmware using an HTTP server. Comments on each step are in blue text and start with "//". User-entered AT commands are in bold.

```
// Wait for boot
APP RDY

// Check firmware version
AT+QGMR
BG96MAR02A07M1G_01.007.01.007

OK

// Check signal quality
AT+QCSQ
+QCSQ: "CAT-M1",-46,-81,111,-13

OK

// Check that the modem is registered on the network
AT+CEREG?
+CEREG: 0,1

OK

// Check that the modem has the correct APN configuration
AT+CGDCONT?
+CGDCONT:
1,"IPV4V6","NIMBLINK.GW12.VZWENTP","0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0",0,0,0,0

OK

// Activate the context
AT+CGACT=1,1
OK
AT+QIACT=1
OK

// Query the context status
AT+CGACT?
+CGACT: 1,1
```

OK

// Check IP address

**AT+QIACT?**

+CGPADDR: 1,"xxx.xx.xx.xxx"

OK

// Initiate the FOTA process and reboot

// This is not a valid FOTA URL

**AT+QFOTADL="https://your\_webserver.com/path/to/firmware\_image.bin"**

+QIND: "FOTA", "HTTPSTART"

+QIND: "FOTA", "HTTPEND"

+QIND: "FOTA", "START"

+QIND: "FOTA", "UPDATING", 5%

+QIND: "FOTA", "UPDATING", 11%

+QIND: "FOTA", "UPDATING", 21%

+QIND: "FOTA", "UPDATING", 55%

+QIND: "FOTA", "UPDATING", 78%

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

+QIND: "FOTA", "RESTORE", 5%

+QIND: "FOTA", "RESTORE", 14%

+QIND: "FOTA", "RESTORE", 21%

+QIND: "FOTA", "RESTORE", 45%

+QIND: "FOTA", "RESTORE", 59%

+QIND: "FOTA", "RESTORE", 74%

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

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

POWERED DOWN

// Check new firmware version after reboot

RDY

**AT+QGMR**

BG96MAR02A07M1G\_01.010.01.010

OK

## 4.7 Example Log for NL-SW-LTE-QBG95

The following is a log of a NL-SW-LTE-QBG95 modem running 01.007.01.007 firmware performing a locally administered FOTA update to 01.010.01.010 firmware using an HTTP server. Comments on each step are in blue text and start with "//". User-entered AT commands are in bold.

```
// Wait for boot
APP RDY

// Check firmware version
AT+QGMR
BG95M3LAR02A03_01.004.01.004

OK

// Check signal quality
AT+QCSQ
+QCSQ: "CAT-M1",-46,-81,111,-13

OK

// Check that the modem is registered on the network
AT+CEREG?
+CEREG: 0,1

OK

// Check that the modem has the correct APN configuration
AT+CGDCONT?
+CGDCONT:
1,"IPV4V6","NIMBLINK.GW12.VZWENTP","0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0",0,0,0,0

OK

// Activate the context
AT+CGACT=1,1
OK
AT+QIACT=1
OK

// Query the context status
AT+CGACT?
+CGACT: 1,1
```

OK

// Check IP address

**AT+QIACT?**

+CGPADDR: 1,"xxx.xx.xx.xxx"

OK

// Initiate the FOTA process and reboot

// This is not a valid FOTA URL

**AT+QFOTADL="https://your\_webserver.com/path/to/firmware\_image.bin"**

+QIND: "FOTA", "HTTPSTART"

+QIND: "FOTA", "HTTPEND"

+QIND: "FOTA", "START"

+QIND: "FOTA", "UPDATING", 5%

+QIND: "FOTA", "UPDATING", 11%

+QIND: "FOTA", "UPDATING", 21%

+QIND: "FOTA", "UPDATING", 55%

+QIND: "FOTA", "UPDATING", 78%

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

+QIND: "FOTA", "RESTORE", 5%

+QIND: "FOTA", "RESTORE", 14%

+QIND: "FOTA", "RESTORE", 21%

+QIND: "FOTA", "RESTORE", 45%

+QIND: "FOTA", "RESTORE", 59%

+QIND: "FOTA", "RESTORE", 74%

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

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

POWERED DOWN

// Check new firmware version after reboot

RDY

**AT+QGMR**

BG95M3LAR02A03\_01.009.01.009

OK

# 5. Troubleshooting

## 5.1 Errors With Downloading Firmware

If you are receiving errors when trying to download the firmware files, first check that you have the correct firmware file. The delta image will usually be delivered to the customer inside of a zip file which will need to be unzipped. The individual FOTA delta firmware files have the extension:

\*.bin

If you have the correct firmware, and are still experiencing issues, please verify that the URL is correct and try again.

If you need additional support, please send an email to NimbeLink's product support team at [product.support@nimbelink.com](mailto:product.support@nimbelink.com) with details of the problem and our support team will assist you.

## 6. Document Version Information

<b>Version</b>	<b>Notes</b>	<b>Date</b>
5	-Updated file format per new Quectel formatting.	2020-09-02
6	-Updated to include the NL-SW-LTE-QBG95.	2021-02-11