

FOTA Update Procedure for Skywire Nano NL-SW-LTE-NRF9160

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-NRF9160 Skywire modem 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 should any questions or support requests arise.

Do not power down the modem 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

The FOTA process is available on the NL-SW-LTE-NRF9160. To confirm your firmware version, issue the command:

AT#APPVER?

and the Skywire will respond with:

#APPVER: vx.x.x-x-yyyyyyyyy

OK

where **vx.x.x-x** is the current firmware version.

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

Finally, you will 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

Please make sure to include the response to **AT#APPVER?** for your Skywire.

2.2 Support

Please contact Nimbelink Product Support with any additional questions.

product.support@nimbelink.com

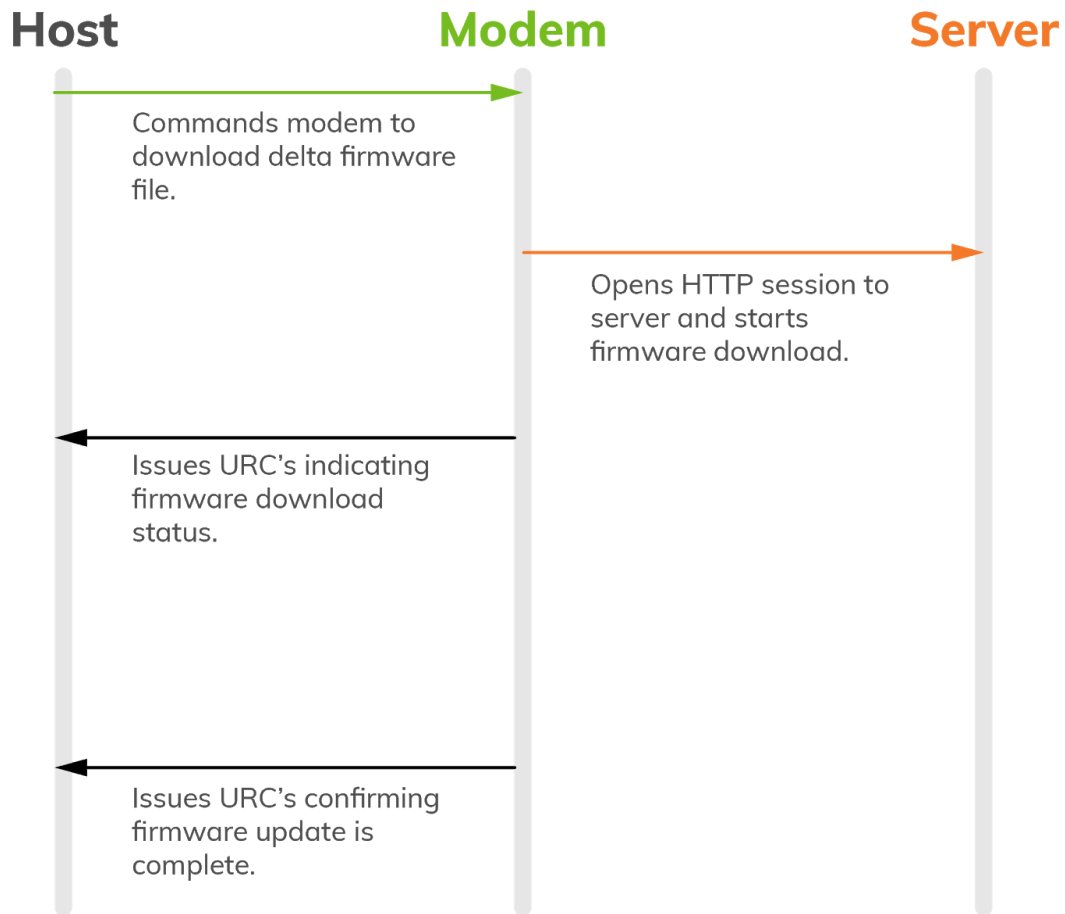
3. FOTA Process Overview

3.1 Overview

This section provides a high-level overview for performing a FOTA update. During the FOTA update, the modem will attempt to form an HTTP connection to the host server to download the file. Once the file is downloaded, the device will install the firmware and restart. If any of these steps fail, the command will return an **ERROR** response.

NimbeLink recommends that existing data sessions be gracefully closed before issuing the FOTA commands.

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-NRF9160. 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 following command:

AT+CREG?

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 and **5** means it is roaming. Both of these are acceptable values to continue. For other responses, please consult the AT command manual for more information.

Please ensure that the PDP context is configured with the following command:

AT+CGDCONT?

The modem will respond with something similar to the following:

+CGDCONT: x,"IP[V4V6]","APN","IP_ADDRESS",0,0
OK

There can be more than one **+CGDCONT:** response. **APN** is the APN that the modem should use for data connections. Verizon lines of service activated on go.nimbelink.com use the APN **NIMBLINK.GW12.VZWENTP**. AT&T lines of service activated on go.nimbelink.com will use the APN **I0T0718.COM.ATTZ**. 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 Initiate Firmware Download

Once the modem's network connection has been verified the modem can begin the download of the firmware file. Please close all existing data connections at this time, as the modem will automatically reboot after the download is complete.

Assume the URL to the firmware image is **hostname/path/to/the/firmware_image.bin**. The command to do a FOTA update is as follows:

```
AT#XFOTA="hostname","path/to/the/firmware_image.bin"
```

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

This command will download the firmware from the HTTP server, display progress, and reboot to apply the firmware update.

Note: If this command is copy-pasted into the terminal and the terminal window is small, the command may appear to have been truncated. This is not the case, and assuming the correct command was pasted, the FOTA update will go through.

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#XFOTA="hostname","path/to/the/firmware_image.bin"
```

```
OK
```

```
#XFOTA: 2,1
```

```
#XFOTA: 2,3
```

```
#XFOTA: 2,4
```

```
#XFOTA: 2,6
```

```
#XFOTA: 2,8
```

```
...
```

```
#XFOTA: 2,49
```

```
#XFOTA: 2,51
```

```
#XFOTA: 2,53
```

```
...
```

```
#XFOTA: 2,99
```

```
#XFOTA: 1
```

```
READY
```

4.4 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#APPVER?**. The Skywire will respond with:

```
#APPVER: vx.x.x-x-yyyyyyyyy
```

```
OK
```

where **vx.x.x-x** is the current firmware version.

4.5 Example Log

The following is a log of a NL-SW-LTE-NRF9160 modem performing a FOTA update from **v0.8.4-0-g0f7f976f** to **v0.8.4-fota-0-g0f7f976f** firmware. Comments on each step are in **blue text** and start with **"/"**. User-entered AT commands are in **bold** and the device's responses are in plaintext.

```
// Check firmware version
AT#APPVER?
#APPVER: v0.8.4-0-g0f7f976f
OK

// Check signal quality
AT+CESQ
+CESQ: 99,99,255,255,15,16
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: 0,"IP","nimblink.gw12.vzwentp","100.75.68.15",0,0
+CGDCONT:1,"IPV4V6","vzwadmin","10.130.194.221
2600:1014:F00F:B19A:0000:0050:A479:2D01",0,0
OK

// Enter the FOTA command
// This is not a valid FOTA URL
AT#XFOTA="hostname","path/to/the/firmware_image.bin"
OK
#XFOTA: 2,1 // The following lines signal "in process", percent complete
#XFOTA: 2,3
#XFOTA: 2,6
#XFOTA: 2,8
#XFOTA: 2,9
#XFOTA: 2,11
#XFOTA: 2,12
#XFOTA: 2,14
#XFOTA: 2,16
#XFOTA: 2,17
#XFOTA: 2,19
```


#XFOTA: 2,20
#XFOTA: 2,22
#XFOTA: 2,25
#XFOTA: 2,28
#XFOTA: 2,30
#XFOTA: 2,32
#XFOTA: 2,33
#XFOTA: 2,35
#XFOTA: 2,38
#XFOTA: 2,40
#XFOTA: 2,41
#XFOTA: 2,43
#XFOTA: 2,45
#XFOTA: 2,46
#XFOTA: 2,48
#XFOTA: 2,49
#XFOTA: 2,51
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#XFOTA: 2,57
#XFOTA: 2,59
#XFOTA: 2,61
#XFOTA: 2,62
#XFOTA: 2,64
#XFOTA: 2,67
#XFOTA: 2,69
#XFOTA: 2,70
#XFOTA: 2,72
#XFOTA: 2,73
#XFOTA: 2,75
#XFOTA: 2,77
#XFOTA: 2,78
#XFOTA: 2,80
#XFOTA: 2,82
#XFOTA: 2,83
#XFOTA: 2,85
#XFOTA: 2,86
#XFOTA: 2,88
#XFOTA: 2,90
#XFOTA: 2,93
#XFOTA: 2,94
#XFOTA: 2,96
#XFOTA: 2,98
#XFOTA: 2,99
#XFOTA: 2,99

#XFOTA: 1
READY

// Check new firmware version after reboot

AT#APPVER?

#APPVER: v0.8.4-fota-0-g0f7f976f

OK

5. Troubleshooting

5.1 Common Errors

If you receive an **ERROR** when attempting a FOTA, please check a few things:

- The hostname is in quotation marks and spelt correctly
- The path to the file is in quotation marks and spelt correctly
- The file exists within the host

If your terminal appears to hang after entering the **#XFOTA** command, you may have missed a quotation mark. For instance:

```
AT#XFOTA="hostname",path-to-file.bin"
```

In this instance, the cursor may appear to be at the beginning of the line, hovering over the **A** in **AT#**. Enter another quotation mark, press the enter key, and you should receive an **ERROR** response. Then try again, properly formatting the command.

5.2 Additional Support

If you are still having issues after trying the above or need additional assistance, please send an email to:

product.support@nimbelink.com

for additional support.