

# FOTA Update Procedure for NL-SW-LTE-GELS3-C

NimbeLink Corp

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# Introduction

## 1.1 Overview

This guide documents performing a Firmware Over the Air (FOTA) update for the NL-SW-LTE-GELS3-C Skywire modem using firmware files from an FTP or 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 a generic example for using a FTP server, and the included URLs are for reference only.

Section 5 provides a working example using an HTTP server, and the URLs hosted by a live server that customers can use to upgrade to the 4.3.3.0-35577 firmware. Please see Section 2 for more information about that server.

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

The modem cannot be powered down during the firmware download. Doing so will cause the download to fail, and the download will need to be restarted.

Once the file is successfully downloaded, applying the firmware update will take around 200 seconds to complete. It is not recommended to power down the modem during this process. If the modem is powered down during this process the update process will pause and then resume once power is reapplied, but this is not recommended as URC notifications about the update may be missed, the firmware update may fail, and the modem will reset several times itself during the update process.

## 1.2 Prerequisites

- 1) The FOTA process is available on the NL-SW-LTE-GELS3-C firmware and later. To confirm your firmware version, issue the command **ATI1**, and the Skywire will respond with:

```
Cinterion  
ELS31-V  
REVISION 4.3.2.0  
A-REVISION 4.3.3.0-xxxxx  
L-REVISION 3.7.6
```

OK

where **xxxxx** is the firmware version. Any version **29632** or higher is able to perform a FOTA update.

- 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 Overview

Information about NimbeLink-hosted servers is listed in this section.

If no servers are listed in this section, this means that NimbeLink is not hosting any servers and the customer is responsible for hosting the firmware files on their own server.

Please email [product.support@nimbelink.com](mailto:product.support@nimbelink.com) for any questions.

### 2.2 Server Information

As of this writing, NimbeLink is hosting the 4.3.3.0-35577 firmware file for customers to use for their FOTA update. Customers can either use this URL to download the firmware and setup their own server, or use this URL directly in the process outlined in Section 5 to complete the FOTA update for their devices.

### 2.3 Server URL

This is the URL for the hosted file:

<http://s3-us-west-2.amazonaws.com/nlmodfw/pub/els31/d621c974114f4508d9aec4167140b957.sfp>

### 2.4 File Verification

The MD5 sum of the file is:

d621c974114f4508d9aec4167140b957

Please note this is also the name of the file:

d621c974114f4508d9aec4167140b957.sfp

### 2.5 Support

If the URL is not working for you, please send an email to:

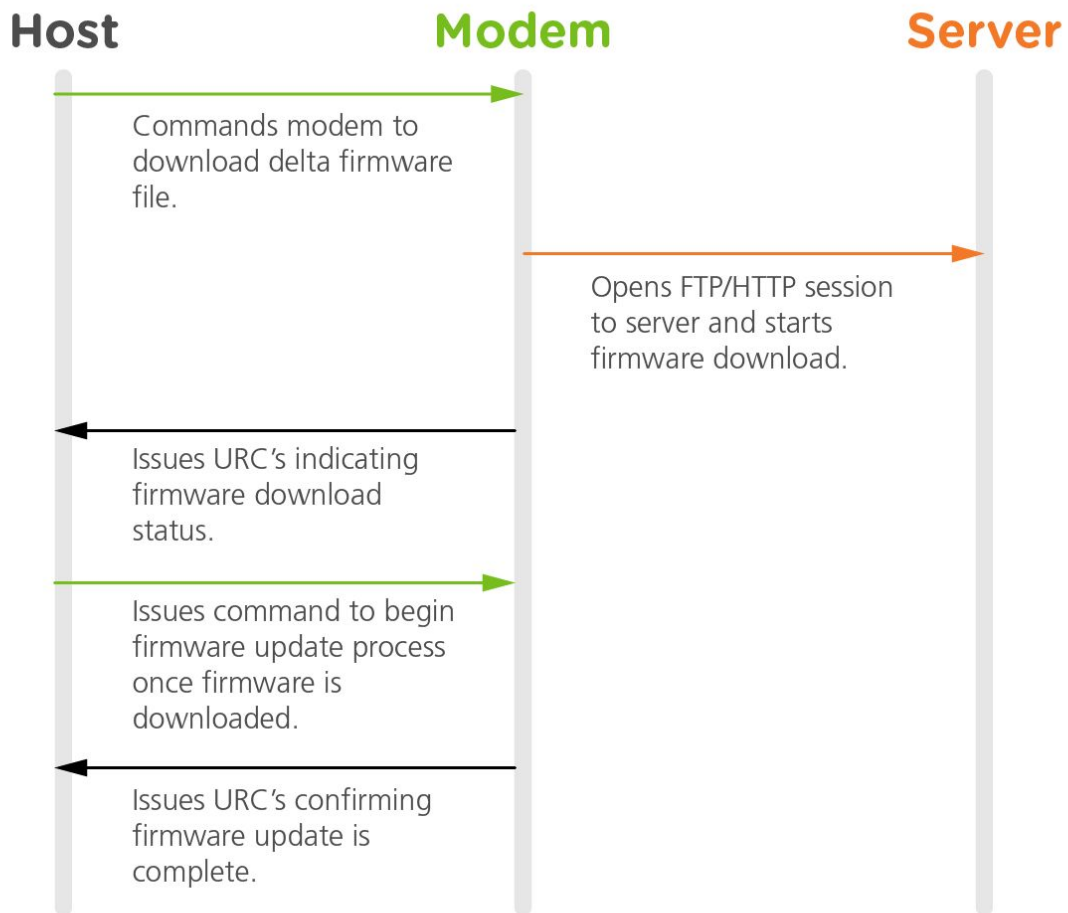
[product.support@nimbelink.com](mailto:product.support@nimbelink.com)

# 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 - FTP

### 4.1 Overview

The following section documents a generic example of performing a FOTA update over FTP. This documents the AT commands that the host system must send to the modem to perform a FOTA update for the modem. The modem must have an active SIM card and be registered on the network before starting the FOTA process.

Please note that the URLs used in Section 4 are examples only and are not live servers.

### 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. The network must allow internet access to the server hosting the file.

To check that the modem is registered on the network, you can 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.

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","VZWIMS",,,,0,0,1,1,0  
+CGDCONT: 2,"IPV4V6","VZWADMIN",,,,0,0,0,0,0  
+CGDCONT: 3,"IPV4V6","APN",,,,0,0,0,0,0  
+CGDCONT: 4,"IPV4V6","VZWAPP",,,,0,0,0,0,0  
+CGDCONT: 8,"IPV4V6","",,,,0,1,1,1,0
```

**OK**

Where **APN** is the APN that the modem should use for data connections. Lines-of-service activated on [go.nimbelink.com](http://go.nimbelink.com) use the APN **NIMBLINK.GW12.VZWENTP**. If you activated your line-of-service elsewhere, it will be a different APN. 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^SICA=1,3**. The Skywire will respond with **OK** regardless of activation status. To confirm that the context is active, you can issue **AT^SICA?**. The Skywire will respond with:

```
^SICA: 1,1  
^SICA: 2,0  
^SICA: 3,x  
^SICA: 4,0  
^SICA: 8,0
```

**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**. The Skywire will respond with:

```
+CGPADDR: 1,"IPV6 address"  
+CGPADDR: 2  
+CGPADDR: 3,"IPV4 address"  
+CGPADDR: 4  
+CGPADDR: 8
```

**OK**

where **IPV4 address** is the IP address given to you by Verizon. If there is no IP address listed after **3**, 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 using the following command:

```
AT^SFDOA="<firmware_url>"[, <reboot>[, <progress_report>[, <command_setting>]]]
```

followed by the Enter key. The modem will respond with different responses depending on the settings below.

**<firmware\_url>** is the username, password, IP address, and port of the FTP server in the following format:

```
[protocol]://username:password@server-ip:port/path/to/firmwarefile.sfp
```

**<reboot>** can be set to:



0 - No reboot after firmware is installed. You must explicitly reboot the Skywire to activate the new firmware

1 - Reboot automatically after the firmware is installed. Default setting.

**<progress\_report>** can be set to:

0 - Do not report the download progress

1 ... 100 - Reports the download progress with the unsolicited response code (URC) "**^SFDOA**": "downloading",<percentage\_downloaded>.

**<command\_setting>** can be set to:

0 - Starts upgrade in the foreground. Default setting.

1 - Starts upgrade in the background. Launches the upgrade and returns immediately with OK if the upgrade was started correctly, or with a +CME ERROR. The upgrade progress is reported through the URC "**^SFDOA**".

2 - Cancel upgrade if any, or do nothing, then return OK.

Please see the AT command manual for more information.

Here is an example with the **<progress\_report>** set to **20** and the **<reboot>** set to **1**:

```
AT^SFDOA="ftp://user:password@123.456.789.012:34/firmware.sfp",1,20
```

```
^SFDOA: "downloading",0
```

```
^SFDOA: "downloading",20
```

```
^SFDOA: "downloading",40
```

```
^SFDOA: "downloading",60
```

```
^SFDOA: "downloading",80
```

```
^SFDOA: "downloading",100
```

```
^SFDOA: "installed"
```

```
^SFDOA: "rebooting"
```

**OK**

**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 successful AT commands before attempting to confirm the firmware version.

## 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 **ATI1**. The Skywire will respond with something similar to:

```
Cinterion
```

```
ELS31-V
```

```
REVISION 4.3.2.0
```

**A-REVISION 4.3.3.0-xxxxx**  
**L-REVISION 3.7.6**

**OK**

where **xxxxx** is the firmware that you are upgrading to.

## 4.6 Example Log

The following is a log of a NL-SW-LTE-GELS3-C modem running 29632 firmware performing a locally administered FOTA update to 29979 firmware. Comments on each step are in blue text and start with "//". User-entered AT commands are in bold.

```
// Wait for boot
^SYSSTART

// Check firmware version
ATI1
Cinterion
ELS31-V
REVISION 4.3.2.0
A-REVISION 4.3.3.0-29632
L-REVISION 3.7.6

OK

// Check signal quality
AT+CESQ
+CESQ: 99,99,255,255,13,47

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","VZWIMS",,,,0,0,1,1,0
+CGDCONT: 2,"IPV4V6","VZWADMIN",,,,0,0,0,0,0
+CGDCONT: 3,"IPV4V6","NIMBLINK.GW12.VZWENTP",,,,0,0,0,0,0
+CGDCONT: 4,"IPV4V6","VZWAPP",,,,0,0,0,0,0
```

+CGDCONT: 8,"IPV4V6",,,,,,0,1,1,1,0

OK

// Activate the context

**AT^SICA=1,3**

OK

// Query the context status

**AT^SICA?**

^SICA: 1,1

^SICA: 2,0

^SICA: 3,1

^SICA: 4,0

^SICA: 8,0

OK

// Check IP address

**AT+CGPADDR**

+CGPADDR: 1,"012.345.678.901.234.567.890.123.456.789.012.345.678.9.0.1"

+CGPADDR: 2

+CGPADDR: 3,"123.456.789.012"

+CGPADDR: 4

+CGPADDR: 8

// Initiate the FOTA process

**AT^SFDOA="ftp://user:password@456.789.012.345:21/file/firmware.sfp",1,20**

^SFDOA: "downloading",0

^SFDOA: "downloading",20

^SFDOA: "downloading",40

^SFDOA: "downloading",60

^SFDOA: "downloading",80

^SFDOA: "downloading",100

^SFDOA: "installed"

^SFDOA: "rebooting"

OK

// Check new firmware version after reboot

^SYSSTART

**ATI1**

Cinterion

ELS31-V  
REVISION 4.3.3.0  
A-REVISION 4.3.3.0-29979  
L-REVISION 3.7.6

# 5. FOTA Example - Live HTTP Server

## 5.1 Overview

The following section documents performing a FOTA update using NimbeLink's HTTP server. 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 this is a live server that you can use to perform a FOTA update. You may also download the file from the server and host it on your own server if desired.

## 5.2 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, you can 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.

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","VZWIMS",,,,0,0,1,1,0  
+CGDCONT: 2,"IPV4V6","VZWADMIN",,,,0,0,0,0,0  
+CGDCONT: 3,"IPV4V6","APN",,,,0,0,0,0,0  
+CGDCONT: 4,"IPV4V6","VZWAPP",,,,0,0,0,0,0  
+CGDCONT: 8,"IPV4V6","",,,,0,1,1,1,0
```

**OK**

Where **APN** is the APN that the modem should use for data connections. Lines-of-service activated on [go.nimbelink.com](http://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.

## 5.3 Activate Context and Confirm IP Address

The FOTA process requires an active data context. You can activate the context with the command **AT^SICA=1,3**. The Skywire will respond with **OK** regardless of activation status. To confirm that the context is active, you can issue **AT^SICA?**. The Skywire will respond with:

```
^SICA: 1,1  
^SICA: 2,0  
^SICA: 3,x  
^SICA: 4,0  
^SICA: 8,0
```

**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 5.2.

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

```
+CGPADDR: 1,"IPV6 address"  
+CGPADDR: 2  
+CGPADDR: 3,"IPV4 address"  
+CGPADDR: 4  
+CGPADDR: 8
```

**OK**

where **IPV4 address** is the IP address given to you by Verizon. If there is no IP address listed after **3**, the context did not activate. Please return to the beginning of this section to try and activate the context again.

## 5.4 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^SFDOA="http://s3-us-west-2.amazonaws.com/nlmodfw/pub/els31/d621c974114f4508d9aec4167140b957.sfp",1,20
```

This setting will download the firmware from the NimbeLink-hosted URL, reboot once the update is complete, and display download progress every twenty percent completion.

For more information about available options, please see Section 4.4 of this document and the AT command manual.

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

```
AT^SFDOA="http://s3-us-west-2.amazonaws.com/nlmodfw/pub/els31/d621c97411
4f4508d9aec4167140b957.sfp",1,20
^SFDOA: "downloading",0
^SFDOA: "downloading",20
^SFDOA: "downloading",40
^SFDOA: "downloading",60
^SFDOA: "downloading",80
^SFDOA: "downloading",100
^SFDOA: "installed"
^SFDOA: "rebooting"
```

OK

**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.

## 5.5 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 **ATI1**. The Skywire will respond with:

```
Cinterion
ELS31-V
REVISION 4.3.2.0
A-REVISION 4.3.3.0-35577
L-REVISION 3.7.6
```

OK

## 5.6 Example Log

The following is a log of a NL-SW-LTE-GELS3-C modem running 29979 firmware performing a locally administered FOTA update to 35577 firmware using the NimbeLink-hosted server. Comments on each step are in blue text and start with "//". User-entered AT commands are in bold.

```
// Wait for boot
^SYSSTART

// Check firmware version
ATI1
Cinterion
ELS31-V
REVISION 4.3.2.0
A-REVISION 4.3.3.0-29979
L-REVISION 3.7.6

OK

// Check signal quality
AT+CESQ
+CESQ: 99,99,255,255,13,48

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","VZWIMS",,,,0,0,1,1,0
+CGDCONT: 2,"IPV4V6","VZWADMIN",,,,0,0,0,0,0
+CGDCONT: 3,"IPV4V6","NIMBLINK.GW12.VZWENTP",,,,0,0,0,0,0
+CGDCONT: 4,"IPV4V6","VZWAPP",,,,0,0,0,0,0
+CGDCONT: 8,"IPV4V6","",,,,0,1,1,1,0

OK

// Activate the context
AT^SICA=1,3
```



OK

// Query the context status

**AT^SICA?**

^SICA: 1,1

^SICA: 2,0

^SICA: 3,1

^SICA: 4,0

^SICA: 8,0

OK

// Check IP address

**AT+CGPADDR**

+CGPADDR: 1,"012.345.678.901.234.567.890.123.456.789.012.345.678.9.0.1"

+CGPADDR: 2

+CGPADDR: 3,"123.456.789.012"

+CGPADDR: 4

+CGPADDR: 8

// Initiate the FOTA process and reboot

**AT^SFDOA="http://s3-us-west-2.amazonaws.com/nlmodfw/pub/els31/d621c974114f4508d9aec4167140b957.sfp",1,20**

^SFDOA: "downloading",0

^SFDOA: "downloading",20

^SFDOA: "downloading",40

^SFDOA: "downloading",60

^SFDOA: "downloading",80

^SFDOA: "downloading",100

^SFDOA: "installed"

^SFDOA: "rebooting"

OK

// Modem reboots, but does not respond to AT commands. Will reboot again.

^SYSSTART

// Check new firmware version after reboot

^SYSSTART

**ATI1**

Cinterion

ELS31-V

REVISION 4.3.3.0

A-REVISION 4.3.3.0-35577  
L-REVISION 3.7.6

# 6. Troubleshooting

## 6.1 Errors When Using the NimbeLink Server

If you are having errors either during the firmware update process or when you try to download the firmware from the NimbeLink server, please send an email to:

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

for additional support.

## 6.2 Errors Downloading the Firmware

If you are receiving errors when trying to download the firmware files, first check that you have the correct firmware file. The firmware file needed has an extension:

\*.sfp

The firmware files mentioned in the "30162 - Skywire LTE CAT1 Release 2 Firmware Update" application note will not work with FOTA process.

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