MULTITECH®

Subject: Verizon Requirement – Firmware Over The Air (FOTA) - Scripting

Products: MultiTech MTC-MVW1, MTC-MNA1, MTC-LNA4, MTSMC-MVW1, MTSMC-MNA1, MTSMC-LVW3, MTCM-LNA3, MTQ-LVW3, and MTCAP-LNA3 Series

Cellular Radio Modules:

For MVW1 (Cat M1): ME910C1-NV
For MNA1 (Cat M1): ME910C1-NA
For LNA4 (Cat 4): LE910-NA V2
For LNA3 (Cat 1): LE910-NA1
For LVW3 (Cat 1): LE910-SV1

At times, your device may require a critical update to radio firmware for devices connecting to the network. To stay compliant to Verizon's LTE requirements you must implement FOTA. Failure to perform a critical update could result in losing access to the Verizon network.

MultiTech has developed a script for customers to use in order to initiate a FOTA update from the (the customer's) local host processor (pull FOTA).

MultiTech LTE Category M1, Cat 1, and Cat 4 devices for Verizon will allow the customer to initiate a FOTA update from a remote server (push FOTA) as required and communicated by Verizon.

If your device does not include local processing capabilities, you will be required to upgrade when that release becomes available.

Below is an example of a FOTA process for an LTE cellular module (the same steps would work for other LTE devices just using different file names) you could implement in your host system. You may implement the process below or implement your own FOTA solution.

In the example below, your host system application periodically accesses a file placed on an FTP server of your choosing and reads file contents to determine if a firmware update is required. Contact MultiTech at support.multitech.com for test delta files and to review your process prior to deployment.

Cellular Module FOTA Script Example Process

1. Set up an FTP server to contain a folder for future module firmware files.
2. Assign a unique username/password to access the FTP server.
3. Create and place a file on your FTP server named firmwarecheck.csv to be downloaded and read by your cellular radio module FTP client host application. Include the following types of information in the file. You can include additional information as needed.

    a. The firmware version and build your LTE device should currently be using.

b. Path on current FTP server where firmware update file resides.

c. The date/time interval at which the host application should next perform a FOTA check in.

d. FTP server IP address which the host application should access during next FOTA check in.

e. Credentials for the FTP server where host application should next perform a FOTA check in.

4. Before deploying devices with your Telit cellular radio module, create code in the host system code to perform the following sequence at a defined interval (nightly, weekly, daily, monthly).

a. Issue following command to your cellular radio module to configure socket connection settings:
AT#SCFG=1, 3, 300, 90, 600, 50

b. If data APN has not previously been programmed, issue the following command:
AT+CGDCONT=3, "IPV4V6", "Correct APNFor Account "
If the data APN has been previously programmed, go to Step 4.c.

c. Issue the following command to check for signal presence:
AT+CSQ

d. Issue the following command to check for registration presence:
AT+CEREG?

e. If signal and registration are present, issue the following command to establish data connection:
AT#SGACT=3, 1
If signal and registration are not present, check antenna for proper connection and SIM for correct orientation.

f . Issue following command to create FTP session:
AT#FTPOPEN="204. 26. 122. 49", "username", "password", 1, 3

g. Have the host application issue the following command to download the firmwarecheck.csv file, read its contents, and take actions based on those contents:
AT#FTPGET="firmwarecheck. csv"

h. Have host system issue the following command to Telit radio module to determine current firmware file version and firmware build:
AT+GMR

i. If version/build indicated in response is the same as indicated in firmwarecheck.csv:
Go to Step 4.r.

j. If current firmware version is older than version indicated in firmwarecheck.csv:
Continue to next step.

k. Issue the following command to Telit radio module to download the file indicated in the firmwarecheck.csv file and wait for OK response (which indicates the file has been downloaded):
AT#FTPGETOTA="Name- Of - Firmware- File- Here. bin", 0

l. After file is downloaded issue following command to close FTP session:
AT#FTPCLOSE

m After closing FTP, issue following command to disconnect data session:
AT#SGACT=3, 0

n. After closing data session, issue following command to apply downloaded file:

AT#OTAUP=0   (Apply firmware without unsolicited progress update)

AT#OTAUP=0,1 (Apply firmware with unsolicited progress update via [OTA] indications – See log example below)

o. Before continuing, wait for your Telit radio module to reset a total of three times and/or wait a fixed period of time to ensure module has enough time to apply downloaded firmware. The time needed varies depending on the size of your firmware file.

p. Issue the following command to determine current firmware version.
AT+GMR

q. If version matches value indicated in firmwarecheck.csv:
Go to Step 4.t.

If version does not match value indicated in firmwarecheck.csv issue, appropriate commands listed earlier as needed in order to attempt to download and process the firmware file again.

r . Issue following command to close FTP session:
AT#FTPCLOSE

s. Issue following command to close data session:
AT#SGACT=3, 0

t. End Process

Notes:

- Before deploying the device, thoroughly test your chosen FOTA implementation for functionality.
- Before performing any module firmware update to devices in the field, first thoroughly test the new module firmware to ensure compatibility with your existing application.
- In the above example you might consider placing on the FTP server one file for every IMEI you deploy. Then have host application read module IMEI to determine which IMEI file on the FTP server to read. This would allow you to control which specific IMEIs you want to update by changing the contents of the file on server for the device IMEI.

FOTA Client Example Session Log

Example of changing MultiTech –LVW3 device from firmware version 20.00.016 to version 20.00.015
```
[Fri Sep 13 19:19:49.345 2019] LE910-SV1
[Fri Sep 13 19:19:49.345 2019]
[Fri Sep 13 19:19:49.345 2019] OK
[Fri Sep 13 19:19:49.872 2019] AT+GMR
[Fri Sep 13 19:19:49.952 2019] 20.00.016
```

```
[Fri Sep 13 19:19:49.952 2019]
[Fri Sep 13 19:19:49.952 2019] OK
[Fri Sep 13 19:19:51.103 2019] AT+CGSN
[Fri Sep 13 19:19:51.216 2019] 3566100700xxxxx (portion of
IMEI removed)
[Fri Sep 13 19:19:51.216 2019]
[Fri Sep 13 19:19:51.216 2019] OK
[Fri Sep 13 19:19:51.295 2019] AT#CCID
[Fri Sep 13 19:19:51.408 2019] #CCID: 891480000014xxxxxxxx
(portion of ICCID removed)
[Fri Sep 13 19:19:51.408 2019]
[Fri Sep 13 19:19:51.408 2019] OK
[Fri Sep 13 19:19:51.487 2019] AT#SCFG=1,3,1460,90,600,50
[Fri Sep 13 19:19:51.872 2019] OK
[Fri Sep 13 19:19:52.399 2019] AT+CSQ
[Fri Sep 13 19:19:52.479 2019] +CSQ: 16,3
[Fri Sep 13 19:19:52.479 2019]
[Fri Sep 13 19:19:52.479 2019] OK
[Fri Sep 13 19:19:53.007 2019] AT+CEREG?
[Fri Sep 13 19:19:53.118 2019] +CEREG: 0,1
[Fri Sep 13 19:19:53.118 2019]
[Fri Sep 13 19:19:53.118 2019] OK
[Fri Sep 13 19:19:53.647 2019] AT#SGACT=3,1
[Fri Sep 13 19:19:54.414 2019] #SGACT: 166.165.78.37
[Fri Sep 13 19:19:54.414 2019]
[Fri Sep 13 19:19:54.414 2019] OK
[Fri Sep 13 19:19:54.942 2019]
AT#FTPOPEN="205.40.122.49","username","password",1 (actual
username/password removed)
[Fri Sep 13 19:19:56.081 2019] OK
[Fri Sep 13 19:19:56.605 2019] AT#FTPTYPE=0
[Fri Sep 13 19:19:56.892 2019] OK
[Fri Sep 13 19:19:57.421 2019] AT#FTPGET="firmwarecheck.csv"
[Fri Sep 13 19:19:58.170 2019] CONNECT
[Fri Sep 13 19:19:58.760 2019]
20.00.016,UpdPkg_LE910_SV1_1G_20.00.015.0_20.00.016.1.bin,1,20
19-10-01,204.26.122.49,username,password
[Fri Sep 13 19:19:59.165 2019] NO CARRIER
[Fri Sep 13 19:20:01.749 2019]
AT#FTPGETOTA="UpdPkg_LE910_SV1_1G_20.00.016.1_20.00.015.0.bin"
,1
[Fri Sep 13 19:20:04.042 2019]
###############################################################
###############################
[Fri Sep 13 19:20:16.945 2019] OK
[Fri Sep 13 19:20:17.503 2019] AT#FTPCLOSE
[Fri Sep 13 19:20:17.794 2019] OK
```

```
[Fri Sep 13 19:20:18.319 2019] AT#SGACT=3,0
[Fri Sep 13 19:20:18.495 2019] OK
[Fri Sep 13 19:20:19.024 2019] AT#OTAUP=0,1
[Fri Sep 13 19:20:24.254 2019] OK
[Fri Sep 13 19:20:31.136 2019] [OTA] FW Update...
[Fri Sep 13 19:20:32.177 2019] [OTA] Percentage: 1
[Fri Sep 13 19:20:32.260 2019] [OTA] Percentage: 2
[Fri Sep 13 19:20:32.341 2019] [OTA] Percentage: 3
[Fri Sep 13 19:20:32.420 2019] [OTA] Percentage: 4
[Fri Sep 13 19:20:32.485 2019] [OTA] Percentage: 5
[Fri Sep 13 19:20:32.564 2019] [OTA] Percentage: 6
[Fri Sep 13 19:20:32.643 2019] [OTA] Percentage: 7
[Fri Sep 13 19:20:32.718 2019] [OTA] Percentage: 8
[Fri Sep 13 19:20:32.799 2019] [OTA] Percentage: 9
[Fri Sep 13 19:20:32.863 2019] [OTA] Percentage: 10
[Fri Sep 13 19:20:32.944 2019] [OTA] Percentage: 11
[Fri Sep 13 19:20:33.023 2019] [OTA] Percentage: 12
[Fri Sep 13 19:20:33.108 2019] [OTA] Percentage: 13
[Fri Sep 13 19:20:33.187 2019] [OTA] Percentage: 14
[Fri Sep 13 19:20:33.252 2019] [OTA] Percentage: 15
[Fri Sep 13 19:20:33.332 2019] [OTA] Percentage: 16
[Fri Sep 13 19:20:33.414 2019] [OTA] Percentage: 17
[Fri Sep 13 19:20:33.492 2019] [OTA] Percentage: 18
[Fri Sep 13 19:20:33.567 2019] [OTA] Percentage: 19
[Fri Sep 13 19:20:33.616 2019] [OTA] Percentage: 20
[Fri Sep 13 19:20:36.254 2019] [OTA] Percentage: 21
[Fri Sep 13 19:20:36.573 2019] [OTA] Percentage: 22
[Fri Sep 13 19:20:36.852 2019] [OTA] Percentage: 23
[Fri Sep 13 19:20:37.116 2019] [OTA] Percentage: 24
[Fri Sep 13 19:20:37.551 2019] [OTA] Percentage: 25
[Fri Sep 13 19:20:37.678 2019] [OTA] Percentage: 26
[Fri Sep 13 19:20:37.932 2019] [OTA] Percentage: 27
[Fri Sep 13 19:20:38.130 2019] [OTA] Percentage: 28
[Fri Sep 13 19:20:39.137 2019] [OTA] Percentage: 29
[Fri Sep 13 19:20:39.357 2019] [OTA] Percentage: 30
[Fri Sep 13 19:20:39.678 2019] [OTA] Percentage: 31
[Fri Sep 13 19:20:39.819 2019] [OTA] Percentage: 32
[Fri Sep 13 19:20:40.283 2019] [OTA] Percentage: 33
[Fri Sep 13 19:20:40.555 2019] [OTA] Percentage: 34
[Fri Sep 13 19:20:40.682 2019] [OTA] Percentage: 35
[Fri Sep 13 19:20:40.961 2019] [OTA] Percentage: 36
[Fri Sep 13 19:20:41.373 2019] [OTA] Percentage: 37
[Fri Sep 13 19:20:41.519 2019] [OTA] Percentage: 38
[Fri Sep 13 19:20:41.803 2019] [OTA] Percentage: 39
[Fri Sep 13 19:20:42.207 2019] [OTA] Percentage: 40
[Fri Sep 13 19:20:42.592 2019] [OTA] Percentage: 41
[Fri Sep 13 19:20:42.719 2019] [OTA] Percentage: 42
```

```
[Fri Sep 13 19:20:42.987 2019]  [OTA]  Percentage:  43
[Fri Sep 13 19:20:43.105 2019]  [OTA]  Percentage:  44
[Fri Sep 13 19:20:43.489 2019]  [OTA]  Percentage:  45
[Fri Sep 13 19:20:43.759 2019]  [OTA]  Percentage:  46
[Fri Sep 13 19:20:43.886 2019]  [OTA]  Percentage:  47
[Fri Sep 13 19:20:44.331 2019]  [OTA]  Percentage:  48
[Fri Sep 13 19:20:44.831 2019]  [OTA]  Percentage:  49
[Fri Sep 13 19:20:45.066 2019]  [OTA]  Percentage:  50
[Fri Sep 13 19:20:45.145 2019]  [OTA]  Percentage:  51
[Fri Sep 13 19:20:45.361 2019]  [OTA]  Percentage:  52
[Fri Sep 13 19:20:45.871 2019]  [OTA]  Percentage:  53
[Fri Sep 13 19:20:45.966 2019]  [OTA]  Percentage:  54
[Fri Sep 13 19:20:46.264 2019]  [OTA]  Percentage:  55
[Fri Sep 13 19:20:46.786 2019]  [OTA]  Percentage:  56
[Fri Sep 13 19:20:48.057 2019]  [OTA]  Percentage:  57
[Fri Sep 13 19:20:48.729 2019]  [OTA]  Percentage:  58
[Fri Sep 13 19:20:48.942 2019]  [OTA]  Percentage:  59
[Fri Sep 13 19:20:49.977 2019]  [OTA]  Percentage:  60
[Fri Sep 13 19:20:50.943 2019]  [OTA]  Percentage:  61
[Fri Sep 13 19:20:51.804 2019]  [OTA]  Percentage:  62
[Fri Sep 13 19:20:52.680 2019]  [OTA]  Percentage:  63
[Fri Sep 13 19:20:53.254 2019]  [OTA]  Percentage:  64
[Fri Sep 13 19:20:54.319 2019]  [OTA]  Percentage:  65
[Fri Sep 13 19:20:54.508 2019]  [OTA]  Percentage:  66
[Fri Sep 13 19:20:55.147 2019]  [OTA]  Percentage:  67
[Fri Sep 13 19:20:55.253 2019]  [OTA]  Percentage:  68
[Fri Sep 13 19:20:55.644 2019]  [OTA]  Percentage:  69
[Fri Sep 13 19:20:55.852 2019]  [OTA]  Percentage:  70
[Fri Sep 13 19:20:56.247 2019]  [OTA]  Percentage:  71
[Fri Sep 13 19:20:56.856 2019]  [OTA]  Percentage:  72
[Fri Sep 13 19:20:57.206 2019]  [OTA]  Percentage:  73
[Fri Sep 13 19:20:57.556 2019]  [OTA]  Percentage:  74
[Fri Sep 13 19:20:57.652 2019]  [OTA]  Percentage:  75
[Fri Sep 13 19:20:57.924 2019]  [OTA]  Percentage:  76
[Fri Sep 13 19:20:58.201 2019]  [OTA]  Percentage:  77
[Fri Sep 13 19:20:58.348 2019]  [OTA]  Percentage:  78
[Fri Sep 13 19:20:58.550 2019]  [OTA]  Percentage:  79
[Fri Sep 13 19:20:58.790 2019]  [OTA]  Percentage:  80
[Fri Sep 13 19:20:59.286 2019]  [OTA]  Percentage:  81
[Fri Sep 13 19:20:59.779 2019]  [OTA]  Percentage:  82
[Fri Sep 13 19:21:00.051 2019]  [OTA]  Percentage:  83
[Fri Sep 13 19:21:00.389 2019]  [OTA]  Percentage:  84
[Fri Sep 13 19:21:01.129 2019]  [OTA]  Percentage:  85
[Fri Sep 13 19:21:01.607 2019]  [OTA]  Percentage:  86
[Fri Sep 13 19:21:01.753 2019]  [OTA]  Percentage:  87
[Fri Sep 13 19:21:01.960 2019]  [OTA]  Percentage:  88
[Fri Sep 13 19:21:02.247 2019]  [OTA]  Percentage:  89
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```
[Fri Sep 13 19:21:02.472 2019]  [OTA]  Percentage: 90
[Fri Sep 13 19:21:02.615 2019]  [OTA]  Percentage: 91
[Fri Sep 13 19:21:02.824 2019]  [OTA]  Percentage: 92
[Fri Sep 13 19:21:03.092 2019]  [OTA]  Percentage: 93
[Fri Sep 13 19:21:03.233 2019]  [OTA]  Percentage: 94
[Fri Sep 13 19:21:03.444 2019]  [OTA]  Percentage: 95
[Fri Sep 13 19:21:03.525 2019]  [OTA]  Percentage: 96
[Fri Sep 13 19:21:04.337 2019]  [OTA]  Percentage: 97
[Fri Sep 13 19:21:04.551 2019]  [OTA]  Percentage: 98
[Fri Sep 13 19:21:04.643 2019]  [OTA]  Percentage: 99
[Fri Sep 13 19:21:04.662 2019]  [OTA]  Percentage: 100
[Fri Sep 13 19:21:05.161 2019]  [OTA]  Percentage: 1
[Fri Sep 13 19:21:05.191 2019]  [OTA]  Percentage: 2
[Fri Sep 13 19:21:05.206 2019]  [OTA]  Percentage: 3
[Fri Sep 13 19:21:05.235 2019]  [OTA]  Percentage: 4
[Fri Sep 13 19:21:05.255 2019]  [OTA]  Percentage: 5
[Fri Sep 13 19:21:05.265 2019]  [OTA]  Percentage: 6
[Fri Sep 13 19:21:05.298 2019]  [OTA]  Percentage: 7
[Fri Sep 13 19:21:05.314 2019]  [OTA]  Percentage: 8
[Fri Sep 13 19:21:05.346 2019]  [OTA]  Percentage: 9
[Fri Sep 13 19:21:05.363 2019]  [OTA]  Percentage: 10
[Fri Sep 13 19:21:05.376 2019]  [OTA]  Percentage: 11
[Fri Sep 13 19:21:05.409 2019]  [OTA]  Percentage: 12
[Fri Sep 13 19:21:05.424 2019]  [OTA]  Percentage: 13
[Fri Sep 13 19:21:05.456 2019]  [OTA]  Percentage: 14
[Fri Sep 13 19:21:05.473 2019]  [OTA]  Percentage: 15
[Fri Sep 13 19:21:05.505 2019]  [OTA]  Percentage: 16
[Fri Sep 13 19:21:05.522 2019]  [OTA]  Percentage: 17
[Fri Sep 13 19:21:05.542 2019]  [OTA]  Percentage: 18
[Fri Sep 13 19:21:05.569 2019]  [OTA]  Percentage: 19
[Fri Sep 13 19:21:05.589 2019]  [OTA]  Percentage: 20
[Fri Sep 13 19:21:06.253 2019]  [OTA]  Percentage: 24
[Fri Sep 13 19:21:06.358 2019]  [OTA]  Percentage: 28
[Fri Sep 13 19:21:06.464 2019]  [OTA]  Percentage: 33
[Fri Sep 13 19:21:06.592 2019]  [OTA]  Percentage: 39
[Fri Sep 13 19:21:06.727 2019]  [OTA]  Percentage: 44
[Fri Sep 13 19:21:06.854 2019]  [OTA]  Percentage: 48
[Fri Sep 13 19:21:06.962 2019]  [OTA]  Percentage: 53
[Fri Sep 13 19:21:07.094 2019]  [OTA]  Percentage: 59
[Fri Sep 13 19:21:07.299 2019]  [OTA]  Percentage: 64
[Fri Sep 13 19:21:07.425 2019]  [OTA]  Percentage: 68
[Fri Sep 13 19:21:07.553 2019]  [OTA]  Percentage: 73
[Fri Sep 13 19:21:07.680 2019]  [OTA]  Percentage: 79
[Fri Sep 13 19:21:07.808 2019]  [OTA]  Percentage: 84
[Fri Sep 13 19:21:07.919 2019]  [OTA]  Percentage: 88
[Fri Sep 13 19:21:08.035 2019]  [OTA]  Percentage: 93
[Fri Sep 13 19:21:08.149 2019]  [OTA]  Percentage: 99
```

```
[Fri Sep 13 19:21:08.149 2019] [OTA] Percentage: 100
[Fri Sep 13 19:21:08.629 2019] [OTA] Percentage: 5
[Fri Sep 13 19:21:08.663 2019] [OTA] Percentage: 10
[Fri Sep 13 19:21:08.677 2019] [OTA] Percentage: 15
[Fri Sep 13 19:21:08.687 2019] [OTA] Percentage: 20
[Fri Sep 13 19:21:08.934 2019] [OTA] Percentage: 99
[Fri Sep 13 19:21:08.934 2019] [OTA] Percentage: 100
[Fri Sep 13 19:21:08.981 2019] [OTA] NVM backup (0)
[Fri Sep 13 19:21:08.996 2019] [OTA] NVM cleaned (0)
[Fri Sep 13 19:21:08.996 2019] [OTA] Done.
[Fri Sep 13 19:21:42.166 2019]
[Fri Sep 13 19:21:42.166 2019]
[Fri Sep 13 19:21:42.166 2019]#OTAEV: Module Upgraded To New
Fw
[Fri Sep 13 19:25:14.669 2019] AT+GMR
[Fri Sep 13 19:25:14.766 2019] 20.00.015
[Fri Sep 13 19:25:14.766 2019]
[Fri Sep 13 19:25:14.766 2019] OK
```