Iridium 9604
Firmware Update Guide

IRDM-5220-UDOC-005 | v1.0 | r02A8CFB593 | 2026-MAY-26

LEGAL DISCLAIMER AND CONDITIONS OF USE

Use of the product (the "Product") described in this document (the "Document"), the information provided in this Document, and this Document itself is governed by and subject to the terms, licenses and restrictions of your Agreement with Iridium. Please review that Agreement. This Document is Iridium proprietary business information. Consistent with your Agreement with Iridium, you may not disclose this Document to others without express prior written permission from Iridium. Any violation of your Agreement's Proprietary and Confidentiality obligations shall result in remedies to the fullest extent available to Iridium at law or in equity.

Reasonable effort has been made to make the information in this Document reliable and consistent with other specifications, test measurements and other information. However, Iridium Satellite LLC and its affiliated companies, directors, officers, employees, agents, trustees or consultants ("Iridium") assume no responsibility for any typographical, technical, content or other inaccuracies in this document. Iridium reserves the right in its sole discretion and without notice to you to change this Document and materials and/or revise this Document or withdraw it at any time. You assume any and all risks of using the Product and any information provided in this Document.

IRIDIUM MAKES NO REPRESENTATIONS, GUARANTEES, CONDITIONS OR WARRANTIES, WHETHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION, IMPLIED REPRESENTATIONS, GUARANTEES, CONDITIONS OR WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, NON-INFRINGEMENT, SATISFACTORY QUALITY, NON-INTERFERENCE, ACCURACY OF INFORMATIONAL CONTENT, OR THOSE ARISING FROM OR RELATED TO A COURSE OF DEALING, LAW, USAGE, OR TRADE PRACTICE OR ARISING FROM OR RELATED TO THE PERFORMANCE OR NONPERFORMANCE OF THE PRODUCT OR THIS DOCUMENT. ANY OTHER STANDARDS OF PERFORMANCE, GUARANTEES, CONDITIONS AND WARRANTIES ARE HEREBY EXPRESSLY EXCLUDED AND DISCLAIMED TO THE FULLEST EXTENT PERMITTED BY LAW. THIS DISCLAIMER AND EXCLUSION SHALL APPLY EVEN IF THE EXPRESS LIMITED WARRANTY AND DOCUMENTATION FOR THE PRODUCT FAILS OF ITS ESSENTIAL PURPOSE.

IN NO EVENT SHALL IRIDIUM BE LIABLE, REGARDLESS OF LEGAL THEORY, INCLUDING WITHOUT LIMITATION CONTRACT, EXPRESS OR IMPLIED WARRANTY, STRICT LIABILITY, GROSS NEGLIGENCE OR NEGLIGENCE, FOR ANY DAMAGES IN EXCESS OF THE PURCHASE PRICE OF THE PRODUCT, IF ANY. NOR SHALL IRIDIUM BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES OF ANY KIND, LOSS OF REVENUE OR PROFITS, LOSS OF BUSINESS, LOSS OF PRIVACY, LOSS OF USE, LOSS OF TIME OR INCONVENIENCE, LOSS OF INFORMATION OR DATA, SOFTWARE OR APPLICATIONS OR OTHER FINANCIAL LOSS CAUSED BY THE PRODUCT (INCLUDING HARDWARE, SOFTWARE AND/OR FIRMWARE) AND/OR THE IRIDIUM SATELLITE SERVICES, OR ARISING OUT OF OR IN CONNECTION WITH THE ABILITY OR INABILITY TO USE THE PRODUCT OR ANY OTHER IRIDIUM PRODUCTS (INCLUDING HARDWARE, SOFTWARE AND/OR FIRMWARE) AND/OR THE IRIDIUM SATELLITE SERVICES TO THE FULLEST EXTENT THESE DAMAGES MAY BE DISCLAIMED BY LAW AND WHETHER IRIDIUM WAS ADVISED OF THE POSSIBILITIES OF SUCH DAMAGES. IRIDIUM IS NOT LIABLE FOR ANY CLAIM MADE BY A THIRD PARTY OR MADE BY YOU FOR A THIRD PARTY.

LIMITED LICENSE TO SOFTWARE/FIRMWARE

The Product may contain software, including firmware and software made available by one or more third parties (the "Software.") To the extent it does, each such item of software is subject to the applicable terms and conditions (the "Software Terms") available at https://www.iridium.com/resources/?fwp_resource_categories=legal-notice. Do not use the Product until you have carefully read the Software Terms. Do not use the Product if you do not wish to agree to the Software Terms. Your use of the Product constitutes your acceptance of all of the Software Terms. Without limiting the foregoing, if you do not agree to the Software Terms, you are not granted any license or rights whatsoever to use the software contained on the Product.

EXPORT COMPLIANCE INFORMATION

This document or item contains information subject to the Export Administration Regulations (EAR) (15 CFR 730-774). It may not be exported, disclosed, or transferred to any foreign person without the applicable prior authorization of the U.S. Department of Commerce. Violations may result in civil or criminal penalties. ECCN: 5E991

© Iridium Satellite LLC 2026

Revision History

Version	Date	Description
1.0	May 2026	Initial release

Documentation Feedback

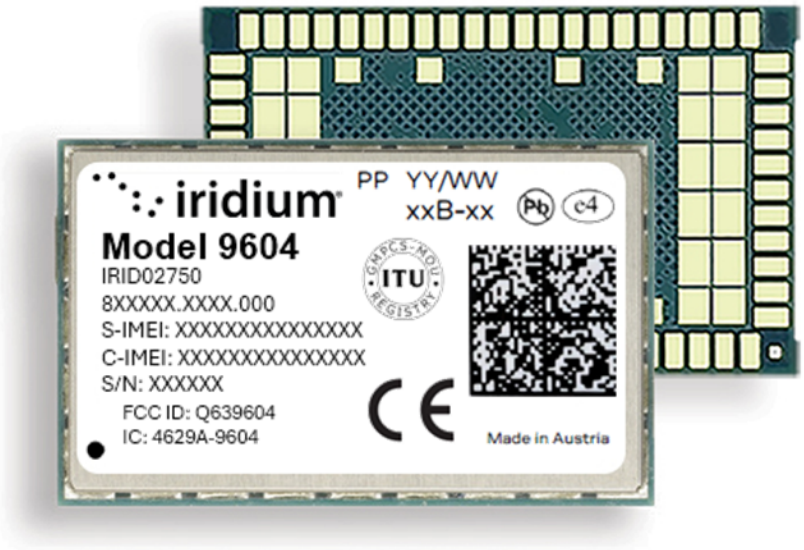
To provide feedback on this document, open a ticket in the Partner Support portal (Iridium Service Desk) and under Component select Document Feedback.

Table of Contents

Revision History . . . 2
Documentation Feedback . . . 2
1. Introduction . . . 4
1.1. Referenced Documents . . . 4
1.2. Abbreviations . . . 5
2. Firmware Update Options Overview . . . 6
2.1. Generic Firmware Update Process . . . 7
3. Firmware Update Using EasyFlash . . . 8
3.1. Flashing Steps . . . 8
3.2. EasyFlash Tips . . . 13
4. Firmware Update Over AT Command (FOAT) . . . 14
4.1. FOAT Process Description (+UFWUPD) . . . 14
4.1.1. FOAT Recovery Mechanism . . . 16
4.1.2. FOAT Installation Time . . . 16
4.2. Firmware Update Using FOAT Example . . . 17
Appendix A: Firmware Update — Device Files and Settings . . . 18

1. Introduction

Iridium® 9604 hybrid cellular and satellite IoT transceivers offer multiple flexible firmware update capabilities. These options include tethered updates using Firmware Over AT command (FOAT) and the EasyFlash firmware upgrade tool (requires a PC). This application note covers all available firmware update options for the Iridium 9604.



1.1. Referenced Documents

For the latest Iridium partner documentation, log in to the Iridium for Partners (IFP) website at https://ifp.iridium.com/login and then go to the Resources section.

No.	Document	Description
1	IRDM-5220-ICD-001	*Iridium 9604 AT Command Guide*
2	IRDM-5220-UDOC-002	*Iridium 9604 Software Development Guide*

1.2. Abbreviations

Term	Description
AT	AT Command Interpreter Software Subsystem, or attention
CRC	Cyclic Redundancy Check
FOAT	Firmware update AT command
FS	File System
FW	Firmware
IRC	Intermediate Result Code
LwM2M	Light weight Machine to Machine
MNO	Mobile Network Operator
NVM	Non-Volatile Memory
PSM	Power save mode
RF	Radio Frequency
URC	Unsolicited Result Code

2. Firmware Update Options Overview

There are three options for updating Iridium 9604 transceiver firmware:

- EasyFlash
- FOAT

The EasyFlash tool for Windows flashes the firmware image directly to the transceiver. With FOAT, the firmware image is transferred from host to transceiver and automatically installed using the +UFWUPD AT command.

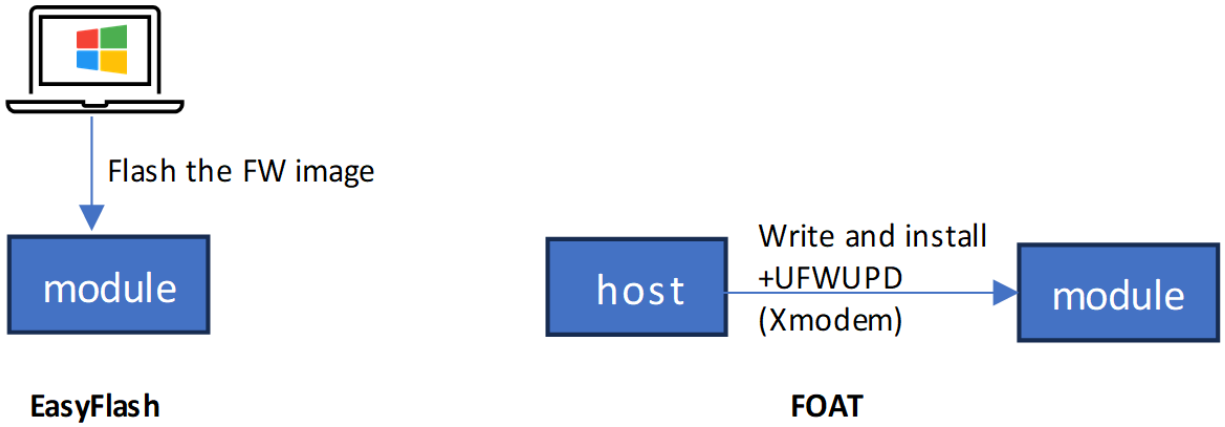


Figure 1. Firmware Update by EasyFlash and by FOAT

Table 1 summarizes the characteristics of the three available firmware update methods.

Table 1. Summary of Transceiver Firmware Update Methods

	EasyFlash	FOAT
File Format	Full firmware image file	Full firmware image file
Duration	Fast	Medium
Pro	Easy	No PC required.
Con	Requires a PC.	File must be stored on host. Must implement Xmodem protocol.
Typical Use Cases	Development / production	Production / Field devices
Complexity	Low	Medium

⚠ Contact Iridium Support to obtain new firmware versions.

2.1. Generic Firmware Update Process

The firmware update proceeds in three phases, as shown in Figure 2. During each phase, Unsolicited Result Codes (URC) are provided to report firmware update progress.

- **Download Phase:** Time to download the firmware update file to the transceiver from the host device or PC. The time needed to install the new firmware depends on new firmware file size.
- **Validation Phase:** Time to validate the file as binary content and check signature.
- **Installation Phase:** Time to install new firmware.

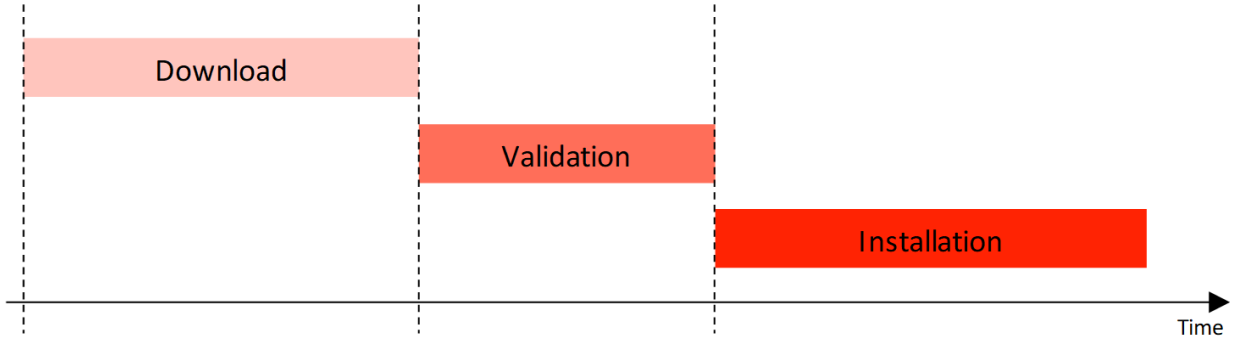


Figure 2. Firmware Update Process

3. Firmware Update Using EasyFlash

EasyFlash is a Windows based tool that flashes firmware onto the transceiver using its primary UART interface. Iridium support must be contacted for access to the tool.

- The auxiliary UART interface cannot be used to update the transceiver by EasyFlash.
- Each firmware release has an accompanying recommended version of EasyFlash. Check the firmware release notes for the recommended version or contact Iridium support for assistance.
- **OS Requirements:** Windows 7, 10, or 11.

3.1. Flashing Steps

1. If there are any tools related to the transceiver running on the computer, close them. To ensure they are closed, terminate them in **Windows Task Manager**.
2. Make sure the transceiver is turned off.
3. Open EasyFlash (run / open it as **Administrator** in Windows).
4. Select the path to the firmware flash file (".dof") in the main window, as shown in Figure 3.

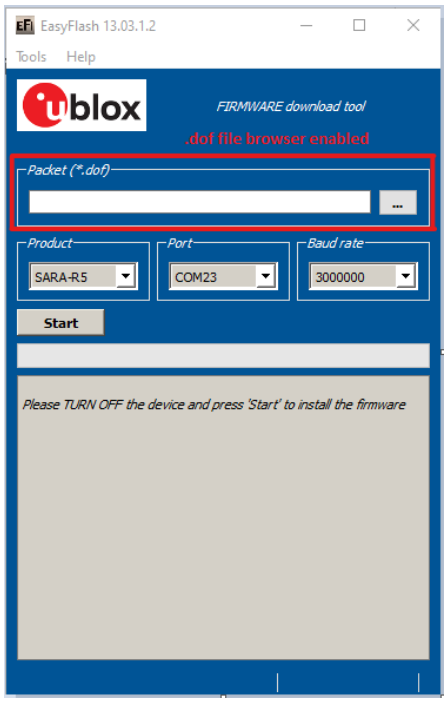


Figure 3. EasyFlash, select the ".dof" file path

- Alternatively, uncheck **Enable file browser** in **Tools** to use a .dof file stored in the application folder, as shown in Figure 4.

5. In the **Tools** menu, verify that **Enable trace** is selected. This creates a log per each flash attempt. These logs are useful for troubleshooting purposes if the EasyFlash encounters an error while installing firmware.

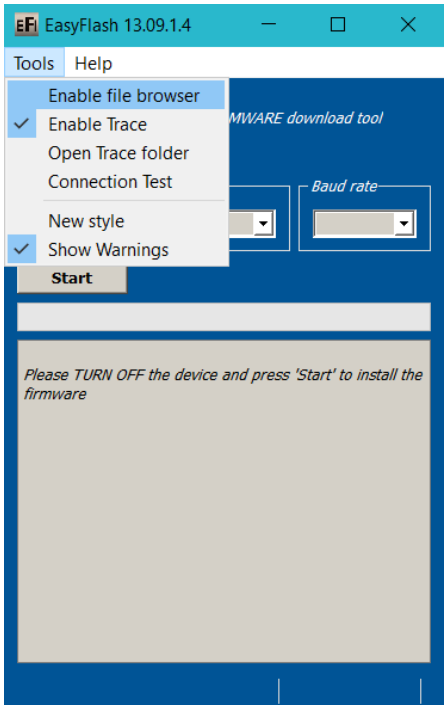


Figure 4. Enable Trace

The EasyFlash file directory contains the EasyFlash executable, necessary files to run the application, logs, and .dof files.

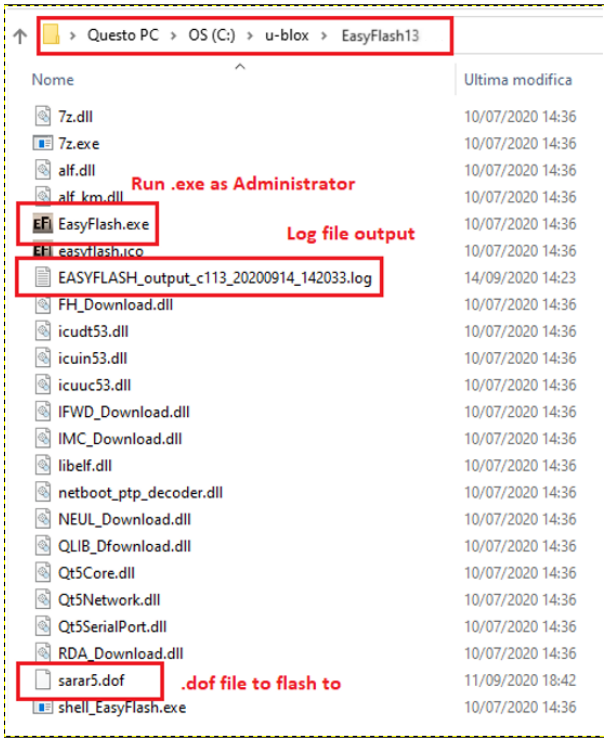


Figure 5. EasyFlash Directory and File Details

The folder where the dof file is placed **must be writable** since temporary and trace files are written there. If enabled in **Tools → Show Warnings**, the application displays a warning if the folder is not writable when selected through the file browser.

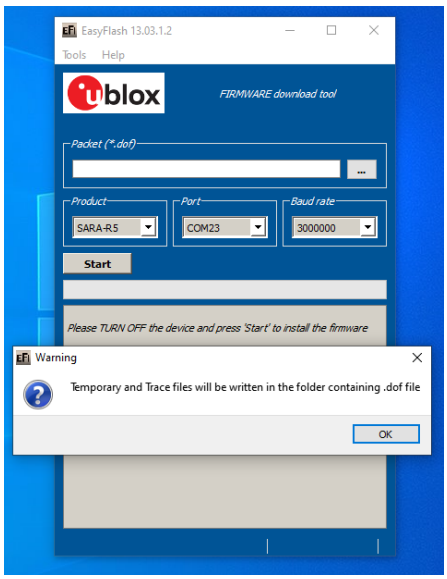


Figure 6. Write warning in folder

6. Select Product, Port and Baud Rate.
   - **Product:** SARA-R5
   - **Port:** Corresponding COM port
   - **Baud Rate:** 3000000

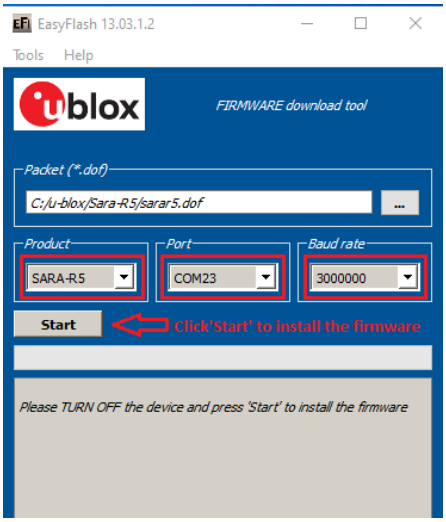


Figure 7. Set up EasyFlash and Start Firmware Installation

7. Click **Start** and power up the transceiver.

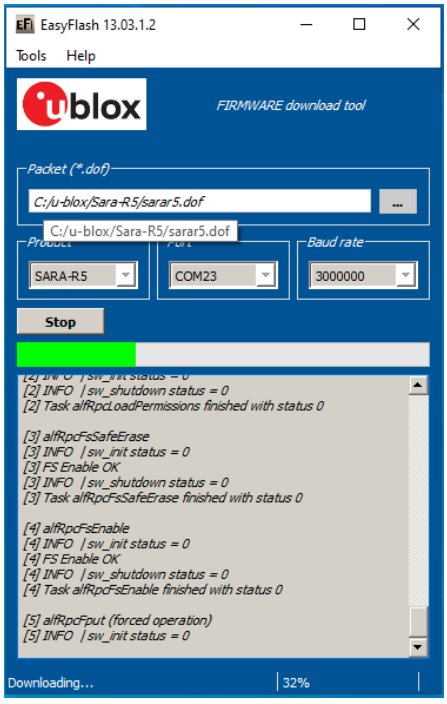


Figure 8. Firmware Update Process In Progress

8. Once the firmware update is complete, close EasyFlash and reboot the transceiver.

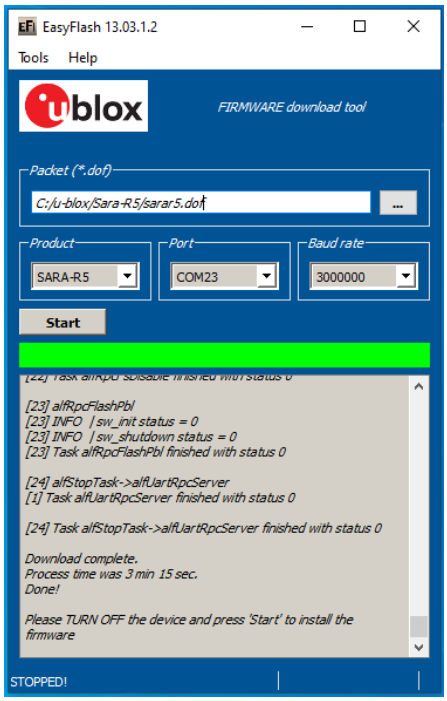


Figure 9. Firmware Update Process Complete

3.2. EasyFlash Tips

- Ensure that the transceiver is powered off before the firmware update begins.
- Remove any drivers for other chipset/products present on the computer.
- If the firmware update process fails, retry. RF calibration data for the transceiver is always backed up and restored, even on a failed firmware update attempt.
- Reboot the PC if the firmware process fails multiple times.
- Traces can be accessed directly through EasyFlash using **Tools** → **Open Trace Folder**, as shown in Figure 10.

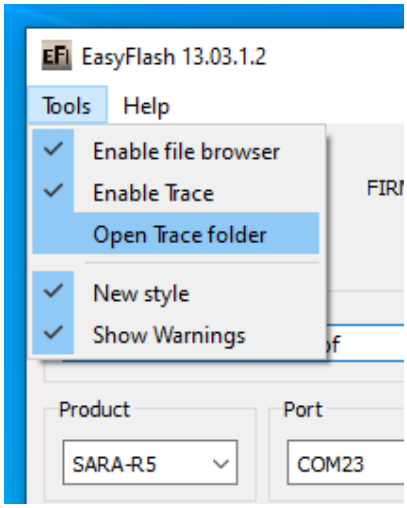


Figure 10. Open Trace Folder

4. Firmware Update Over AT Command (FOAT)

FOAT update provides a tethered data transfer method to perform firmware download over UART connectivity with a host processor. The FOAT feature uses a full update package.

FOAT download does not support the resume feature. Therefore, the download must be restarted after any failure, external interrupt, or timeout. The FOAT system is illustrated in Figure 11.

During a FOAT download, the PSM is held off from entering the low power state.

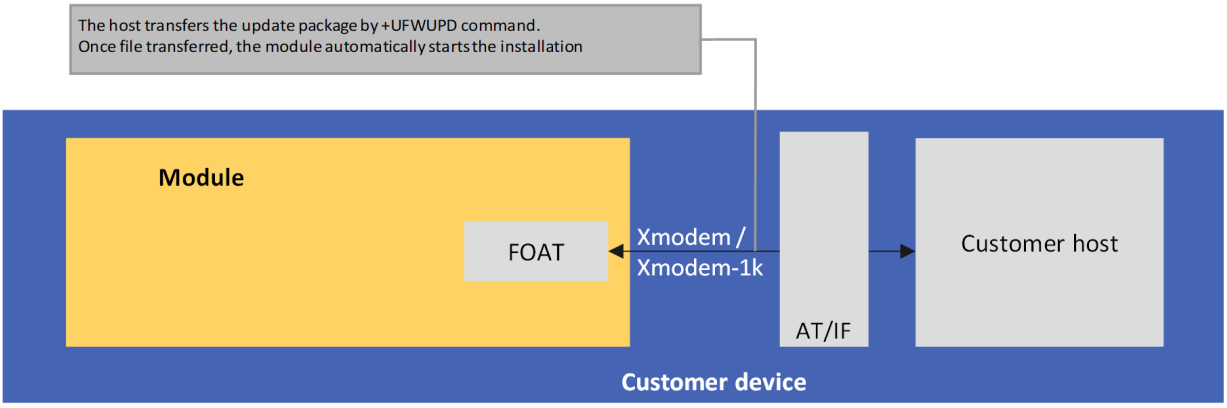


Figure 11. FOAT Architecture System

4.1. FOAT Process Description (+UFWUPD)

The +UFWUPD AT command triggers the firmware download using the Xmodem or Xmodem-1k protocol. Once downloaded the FOAT update file (.upd) using the Xmodem protocol, the installation procedure starts. The Xmodem protocol handles any errors (data corruption, data loss etc.) internally during the update phase.

When a firmware update is triggered, the host processor can choose either the Xmodem-1k protocol (1024-byte packets) or Xmodem protocol (128-byte packets).

The firmware download using AT commands is allowed on both primary and auxiliary UART interfaces.

On receiving the +UFWUPD AT command, the transceiver:

- Reboots and switches to firmware update mode
- Configures the serial port at the new baud rate if the baud rate specified in the +UFWUPD AT command is different from the previous baud rate
- Sends the **+UFWUPD: ONGOING** IRC to the host device using the AT interface, followed by up to three “C” (0x43) characters and up to ten <NACK> (0x15) characters. The first three “C” characters are sent with a 3 s timeout after the last one. The <NACK> characters are sent with a 10 s timeout after the last one. The total timeout is 109 s. The host device must send all firmware package data during this 109 s window.

If data is sent while the “C” character is coming, the protocol uses the CRC method to detect transmission errors, otherwise the standard CHECKSUM method is used.

Once the +UFWUPD starts returning "C" and <NACK> characters, file transfer from the host device to the transceiver can begin. Files can be transferred using a standard terminal program at the selected serial baud rate without flow control (e.g., HyperTerminal with these settings: frame format 8N1, no flow control, baud rate configurable, power saving disabled). The update file is downloaded into the transceiver file system. After the download ends, +UFWPREVAL URCs indicate progress for firmware file validation.

After the firmware file is validated:

- If the validation failed, the procedure is suspended and a FOAT error code is issued together with the +UFWUPD URC. The transceiver exits from firmware update mode and returns to normal mode on the previous firmware.
- If the validation succeeded, the firmware installation procedure starts, as indicated by +UFWUPD URCs. During firmware update operations, the +UFWUPD URCs display update progress and operation result on the AT interface.

The progression of the installation is incremental, and increments indicating progress vary in size.

Both URCs and any further final result codes are sent at the new baud rate on the serial interface selected. Only a syntax error in the +UFWUPD AT command triggers an error result code at the original baud rate.

During the update process, the transceiver cannot be used for normal data or messaging operations.

When the firmware update is completed, a URC is sent with the final result of the operation. See the *Iridium 9604 AT Command Guide* [1] for the full list of possible final result codes.

Once firmware is successfully installed:

- The transceiver reboots.
- NVM and data profiles are set to the factory-programmed values of the new firmware version.
- SIM is reset (PIN required if enabled).

See the *Iridium 9604 AT Command Guide* [1] for factory-programmed values. If a custom APN is required for LTE attach, +CGDCONT <cid>: 1 must be reconfigured with the custom APN. The same is true for other data APNs, if any, and for other transceiver configurations such as eDRX, PSM. See Table 3 for details on data persistence after a firmware update.

4.1.1. FOAT Recovery Mechanism

In case of a firmware update failure (for instance due to power loss or cable detach), the firmware update procedure starts again from scratch, and the host must resend the update file to the transceiver.

If the firmware update ends with an ERROR condition or if power is lost during the update, the transceiver remains in firmware update mode until the update is restarted from the Xmodem handshake. The firmware is corrupted and the update process cannot start.

Even though the procedure is fault tolerant, it is strongly recommended to not remove the power supply or reset the transceiver during the installation process. The transceiver reboots automatically at the end of the update procedure.

4.1.2. FOAT Installation Time

Installation time varies depending on the update file size. Firmware update files can exceed 5 MB. Installation may take several minutes (not counting Xmodem download). File transfer time varies depending on the selected baud rate — for example, at 921600 bit/s the estimated time is 140 s.

4.2. Firmware Update Using FOAT Example

Table 2 provides a complete FOAT example.

Table 2. Firmware Over AT Commands Procedure

Command	Response	Description
AT+UFWUPD=1,460800	+UFWUPD: ONGOING	Host starts the FOAT process on primary UART interface at speed 460800 bit/s. From now on, cellular transceiver responses are sent at 460800 bit/s.
	CCC<NACK><NACK><NACK><NACK><NACK><NACK><NACK><NACK><NACK><NACK>	Up to 3 “C”s and up to 10 <NACK>s.
<Send firmware image using Xmodem or Xmodem-1k protocol at speed 460'800 over primary UART interface>		
	+UFWPREVAL: 0 +UFWPREVAL: 3 +UFWPREVAL: 7 … +UFWPREVAL: 90 +UFWPREVAL: 100	The download is completed, and a reboot follows. Firmware update file validation started.
	+UFWUPD: 1 +UFWUPD: 3 … +UFWUPD: 92 +UFWUPD: 100	Firmware validation completed. Firmware installation started.
	+UFWUPD: 128	Firmware installation completed. The transceiver is updated to the new firmware version and is ready to receive further commands.

Appendix A: Firmware Update — Device Files and Settings

Table 3 summarizes each of the update methods and their impact on user files and settings.

Table 3. Impact to device files and settings of different firmware update methods

Item	Firmware package using FOAT (applied with +UFWUPD)	EasyFlash
"USER" tagged files stored in user file system	Erased.	Erased.
LwM2M files stored in user file system	Erased, then set to what is configured with firmware image (if any).	Erased, then set to what is configured with firmware image (if any).
MNO profiles	The MNO profile(s) configurations are erased and replaced with the ones included in the firmware image. After firmware update, the default MNO profile (global) is set.	The MNO profile(s) configurations are erased and replaced with the ones included in the firmware image. After firmware update, the default MNO profile (global) default is set.
MNO list	Erased, then set to default values as configured in firmware build image.	
User NVM settings	Erased, then set to default values as configured in firmware build image. All the configurations including APNs, eDRX, PSM, URCs, USECMNG profiles, must be restored by Host processor.	
User certificate and private keys	User certificate and private keys are preserved	
RF Calibration Data	All data are preserved	
SMS	Erased	

To restore the transceiver to factory settings, use the +UFACTORY AT command. For more details, see the *Iridium 9604 AT Command Guide* [1] and the *Iridium 9604 Software Development Guide* [2].