nRF Connect Programmer

v1.4.1

User Guide

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NORDIC® SEMICONDUCTOR

Contents

Revision history

Date	Description
2021-10-26	Added SW10 information to the following: • Programming the nRF9160 DK on page 12 • Programming applications on nRF9160 DK on page 12 • Programming the nRF9160 DK cellular modem on page 13
2021-08-12	• Updated Programming applications on nRF9160 DK on page 12 • Removed Nordic Thingy:91™ related content. Removed content is found in Nordic Thingy:91 Getting Started. • Editorial changes
August 2020	Updated: • Introduction on page 4 • nRF Connect Programmer overview on page 6 • Programming a Development Kit or the nRF51 Dongle on page 10 • Programming the nRF52840 Dongle on page 11 • Programming the nRF9160 DK on page 12 • Programming Nordic Thingy:91 • Troubleshooting on page 15
May 2020	Added Figure 5: Nordic Thingy:91 buttons on page 16
April 2020	• Updated Supported devices in Introduction on page 4 • Updated nRF Connect Programmer overview on page 6 • Added Programming the nRF9160 DK on page 12 • Added Programming Nordic Thingy:91 on page 15
September 2019	Updated to match nRF Connect Programmer v1.2.3: • Added Programming the nRF9160 DK cellular modem on page 13 • Updated nRF Connect Programmer overview on page 6 • Updated Installing the Programmer app on page 5
May 2019	Updated Installing the Programmer app on page 5
February 2019	First release

Previous versions

PDF files for relevant previous versions are available here:

- nRF Connect Programmer User Guide v1.3 (corresponds to nRF Connect Programmer v1.4.1)

1 Introduction

nRF Connect Programmer is an app available from nRF Connect for Desktop that you can use to program firmware to Nordic devices. The application allows you to see the memory layout for both J-Link and Nordic USB devices. It also allows you to display content for the HEX files and write it to the devices.

Supported devices

- Nordic Thingy:91 (see Nordic Thingy:91 Getting Started)
- Nordic Thingy:52
- nRF91 Series DKs
- nRF53 Series DKs
- nRF52 Series DKs and Dongle
- nRF51 Series DKs and Dongle

2 Installing the Programmer app

The Programmer app is installed as an app for nRF Connect for Desktop.

Before you can install the Programmer app, you must download and install nRF Connect for Desktop (version 3.2.0 or later).

To install the Programmer app:

1. Open nRF Connect for Desktop.
2. Find the Programmer app in the list of apps and click **Install**.

Once the app is installed, you can launch it by clicking **Open**.

For easy access, you can create a desktop shortcut by clicking the **arrow down** button and selecting **Create shortcut**.

If a new version of the app becomes available, an **Update** button is displayed next to the **Open** button. Click this button to install the latest version. To uninstall the app, click the **arrow down** button and select **Uninstall**.

3 nRF Connect Programmer overview

The nRF Connect Programmer main window shows the memory layout of device and file you want to work with. It also provides you with options to program the device and inspect the whole process through the log.

When you start the Programmer app, the following main window appears:

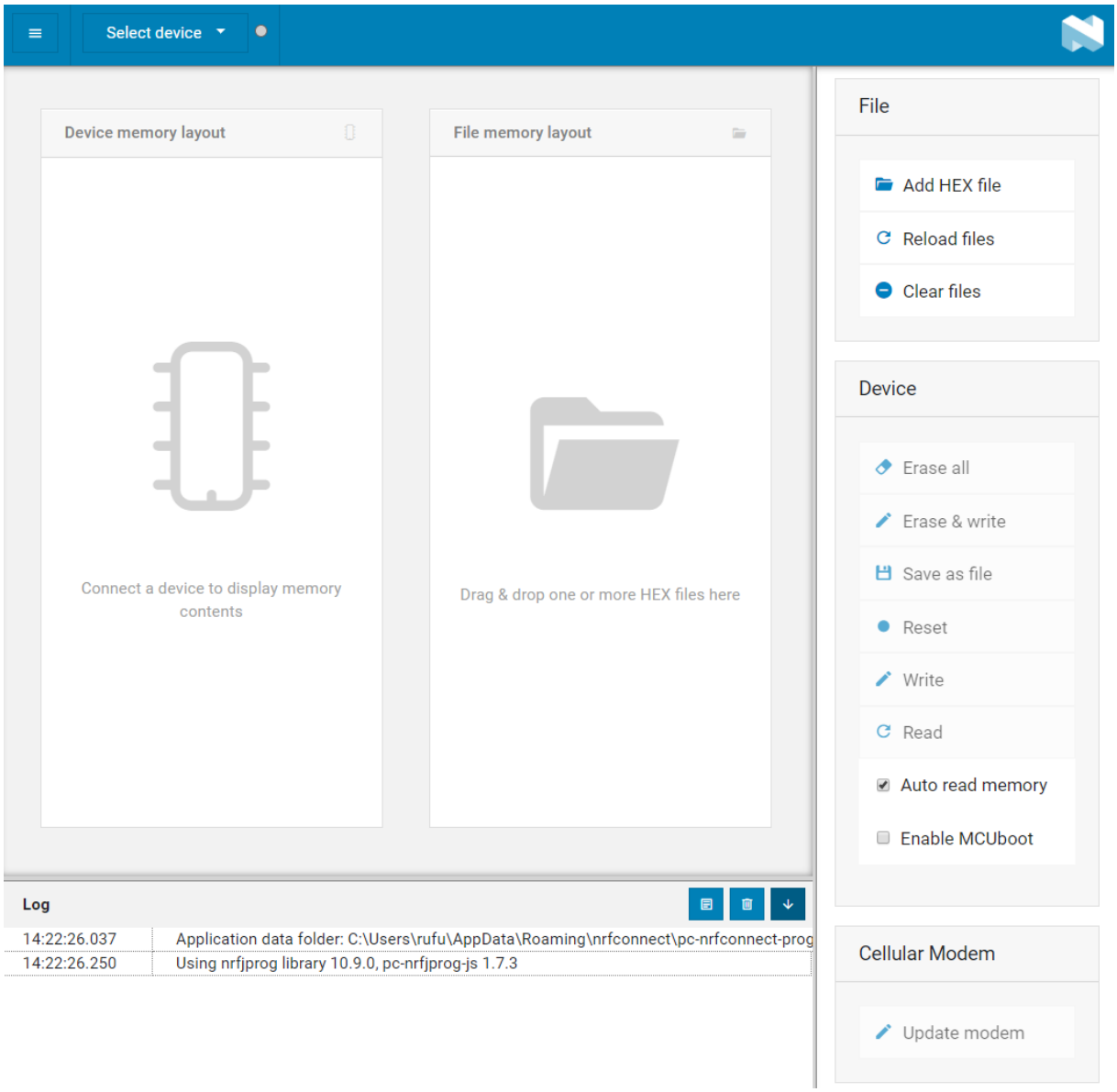


Figure 1: nRF Connect Programmer default view at startup

This main window is composed of the navigation bar and the smaller windows, which are described in the following sections.

Navigation bar

In the navigation bar at the top, you can access the menu, select a device, and see the connection status of the selected device.

Click the three-dash button in the top-left corner to open the menu through which you can launch another app, create a system report, or view information about the Programmer app.

Once you connect a device to the system, it becomes visible and available when you click on the **Select device** drop-down list. You can choose a device from the list of connected devices to perform further actions on the device such as programming.

The status indicator to the right of the **Select device** drop-down list shows the connection status of the selected device. The indicator is green when the Programmer app has established a connection to the device.

Device Memory Layout and File Memory Layout

In the **Device Memory Layout** window, you can see the memory sections for the device selected by using the **Select device** option in the navigation bar.

The **File Memory Layout** window displays the memory layout for files added into the Programmer app with the **Add HEX file** option. Once added, these files can be programmed onto the device.

Both windows use graphs that display the different sections in the memory with different colors.

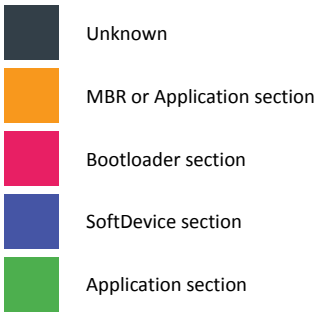


Figure 2: Memory layout section colors

Device

When you select a device, you have the following actions available in the Device section:

- **Erase all** clears the written memory on the device.
- **Read** reads and displays the written memory in the **Device Memory Layout**.
  - You can select the **Auto read memory** field to automatically read the memory layout of the device and display it in the **Device Memory Layout**.
  - In the **Device Memory Layout**, you can read the name, address range, and size of a memory section by hovering the mouse cursor over one of the memory sections. This option is possible only after loading a memory layout.

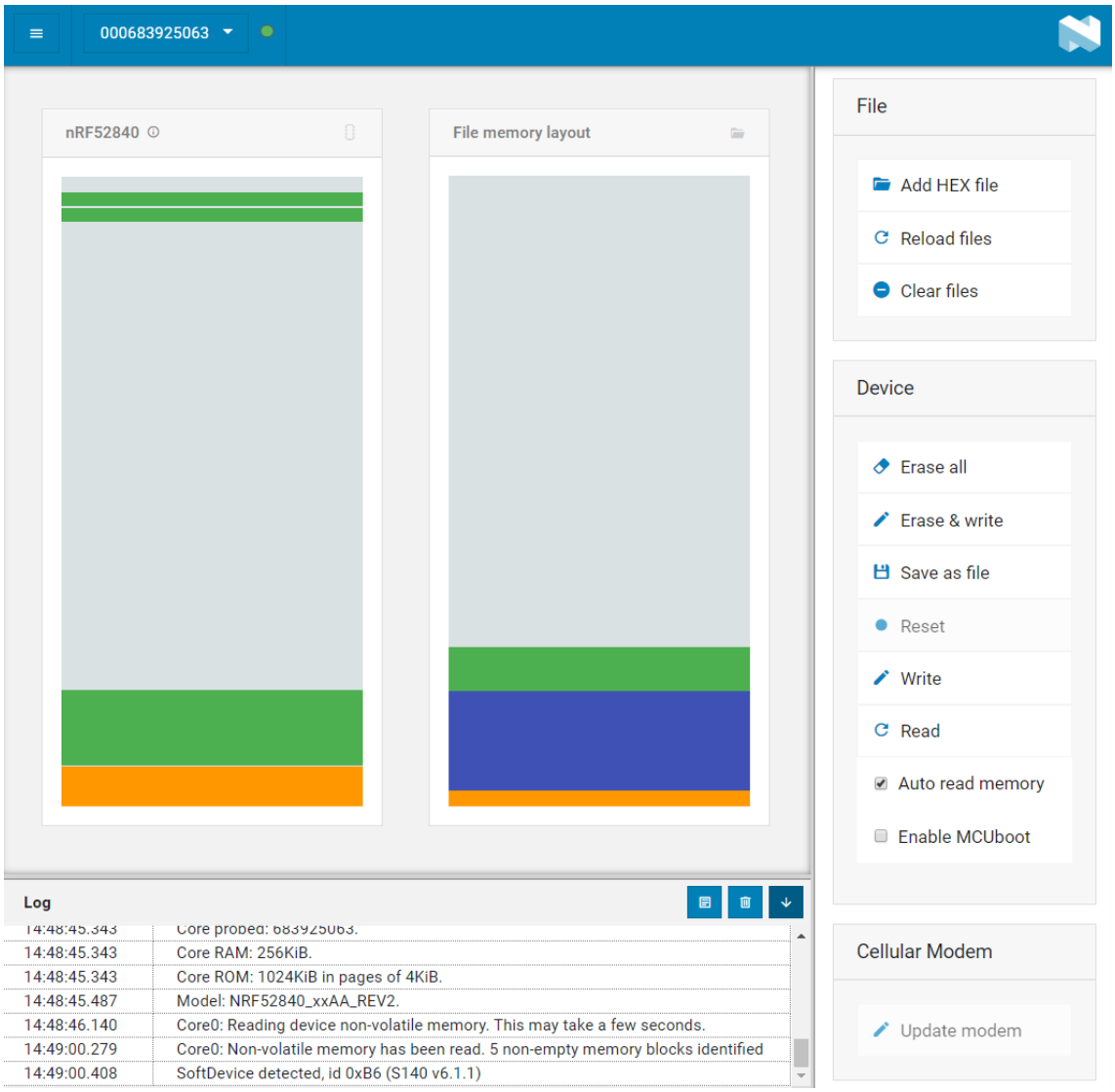


Figure 3: Memory section details

  - Additionally, after you read the memory, **Save as file** allows you to save the memory as a HEX file.
- **Erase & write** clears the written memory and programs the files added to the **File Memory Layout**.
- **Reset** resets the device.
- **Write** programs the files added to the **File Memory Layout**.

File

In the File section, you can add files to the **File Memory Layout** graphic, reload, and remove them.

When adding files with the **Add HEX file** button, you can select the files either from the drop-down list of previous files or by browsing to the file destination.

Cellular Modem

You can use the Programmer app to update the nRF9160 modem firmware on all kits with the nRF9160 SiP. To do so, click **Update modem** and select the zip file that contains the new modem firmware.

Log

Each time you open the Programmer app, a new session log file is created in the Log folder at `<user folder>/AppData/Roaming/nrfconnect/pc-nrfconnect-programmer/logs`. The **Log**

window allows you to view the most important log events that are saved to these log files. The events are tagged with a timestamp.

This window contains the following buttons in its top right corner:

- **Open log file** opens the detailed log file, which is useful for troubleshooting.
- **Clear log** erases all the information in the **Log** window. The contents of the log file are not affected.
- **Scroll automatically** toggles automatic scrolling of the **Log** window as new lines appear.

4 Programming a Development Kit or the nRF51 Dongle

In nRF Connect Programmer, you can program nRF91, nRF52, and nRF51 development kits, nRF51 Dongle, or a custom board with a supported chip that allows for communication with J-Link.

> **Note:** When programming a custom board with a supported chip, make sure that the J-Link supports the relevant Arm® CPU. For example, an nRF52 Series DK cannot be used to program a Nordic Thingy:91 since the J-Link on an nRF52 Series DK does not support the programming of the Arm Cortex®-M33 CPU of Nordic Thingy:91. Also, a Nordic Thingy:52™ can be programmed only via J-Link and a 10-pin programming cable.

To program the nRF52840 Dongle, see Programming the nRF52840 Dongle on page 11. To program the nRF9160 DK, see Programming the nRF9160 DK on page 12. To program any other development kit, the nRF51 dongle, or a custom board, see the following procedure.

1. Open nRF Connect for Desktop and launch nRF Connect Programmer.
2. Connect a development kit to the computer with a micro-USB cable, and turn it on.
   In the navigation bar, **No devices available** changes to **Select device**.
3. Click **Select device** and select the device from the drop-down list.
   The button text changes to the SEGGER ID of the selected device, and the **Device Memory Layout** section indicates that the device is connected.
4. If you have not selected the **Auto read memory** option under the **Device** menu and wish to visually see the memory layout before you program, click **Read** in the menu. If you have selected it, the memory layout will update automatically.
5. Drag and drop the HEX file into the **File Memory Layout** section. Alternatively, click **Add HEX file** on the right pane (named as **File**) to add the files you want to program, by using one of the following options:
   - Select the files you used recently.
   - If there are no recently used files, click **Browse** from the drop-down list.
6. Select the firmware image file (with the extension `.hex`) from the file browser that opens up.
7. Click **Erase & write** in the **Device** pane to program the device.

5 Programming the nRF52840 Dongle

Programming the nRF52840 Dongle in nRF Connect Programmer requires a different approach than programming the nRF51 Dongle.

To program the nRF52840 Dongle:

1. Open nRF Connect for Desktop and launch nRF Connect Programmer.
2. Insert the nRF52840 Dongle into a USB port on the computer.
3. Put the dongle into bootloader mode by pressing the **RESET** button.

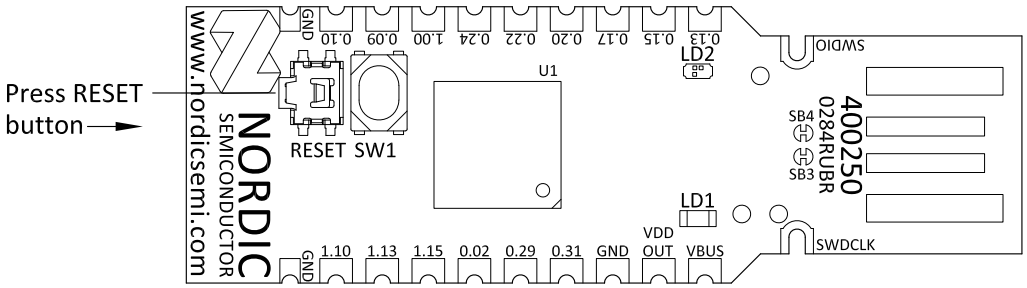


Figure 4: nRF52840 Dongle overview

Note:

- This step is not needed if the currently running application uses the DFU trigger library.
- If this is the first time the dongle is connected, a driver needed for the nRF52840 USB DFU feature is also installed as part of this step.

The status light (**LD2**) will start pulsing red, which indicates that the dongle is powered up and in bootloader mode. After a few seconds, the computer recognizes the dongle as a USB composite device.

4. In the navigation bar in the Programmer app, click **Select device** and select the serial number of the dongle from the drop-down list.
5. Drag and drop the HEX file into the **File Memory Layout** section. Alternatively, click **Add HEX file** on the right pane (named as **File**) to add the files you want to program, by using one of the following options:
   - Select the files you used recently.
   - If there are no recently used files, click **Browse** from the drop-down list.
6. Select the firmware image file (with the extension `.hex`) from the file browser that opens up.
7. Click **Write** to program the firmware onto the dongle.

When the writing process completes, the device resets and – unless the application uses the DFU Trigger Library – the dongle will no longer show up in the Programmer app, as it is no longer in the bootloader mode.

6 Programming the nRF9160 DK

You can use nRF Connect Programmer to program the modem and to program applications onto nRF9160 DK.

You can program applications either on the nRF9160 System in Package (SiP) or on the nRF52840 System on Chip (SoC) of nRF9160 DK. You can select the target to be programmed by using the **PROG/DEBUG SW10** switch (**SW5** for v0.9.0 and earlier) on the nRF9160 DK.

6.1 Programming applications on nRF9160 DK

You can program applications on the nRF9160 DK after obtaining the corresponding firmware images.

Before you start, download the latest application and modem firmware from the nRF9160 DK Downloads page. If you update the application firmware on an nRF9160 DK, you must also update the modem firmware using the steps described in Programming the nRF9160 DK cellular modem on page 13.

To program applications on the nRF9160 DK, complete the steps in this section.

1. Open nRF Connect for Desktop and launch nRF Connect Programmer.
2. Set the **PROG/DEBUG SW10** switch (**SW5** for v0.9.0 and earlier) on the nRF9160 DK to **nRF91** or **nRF52** depending on whether you want to program the nRF9160 SiP or the nRF52840 SoC.
3. Connect the nRF9160 DK to the computer with a micro-USB cable, and turn it on.
   In the navigation bar, **No devices available** changes to **Select device**.
4. Click **Select device** and select the device from the drop-down list.

   You can identify the nRF9160 DK by the fact that it has three COM ports. If the three COM ports are not visible, it could be because of the following reasons:

   - When the nRF9160 DK is reset while it is still connected to the Programmer app. Press **Ctrl+R** in Windows and **command+R** in macOS to restart Programmer and to correctly view the COM ports.
   - Other errors.

   The button text changes to the SEGGER ID of the selected device, and the **Device Memory Layout** section indicates that the device is connected.
5. If you have not selected the **Auto read memory** option under the **Device** menu and wish to visually see the memory layout before you program, click **Read** in the menu. If you have selected it, the memory layout will update automatically.
6. Select the firmware image file (with the extension `.hex`) from the zip file that you have downloaded from the nRF9160 DK Downloads page, using the file browser that opens up.

   Check the `CONTENTS.txt` file in the extracted folder for the details of the compatible firmware image file.
7. Drag and drop the HEX file into the **File Memory Layout** section. Alternatively, click **Add HEX file** on the right pane (named as **File**) to add the files you want to program, by using one of the following options:

   - Select the files you used recently.
   - If there are no recently used files, click **Browse** from the drop-down list.
8. Click **Erase & write** in the **Device** pane to program the device.

6.2 Programming the nRF9160 DK cellular modem

The nRF9160 DK contains a multimode modem that supports LTE-M and NB-IoT. You can use nRF Connect Programmer to program the multimode modem of the nRF9160 DK.

Before you start, download the latest modem and application firmware from the nRF9160 DK Downloads page. If you update the modem firmware on an nRF9160 DK, you must also update the application firmware using the steps described in Programming applications on nRF9160 DK on page 12.

To program the nRF9160 modem, complete the steps in this section.

1. Open nRF Connect for Desktop and launch nRF Connect Programmer.
2. Make sure that the **PROG/DEBUG SW10** switch (**SW5** for v0.9.0 and earlier) on the nRF9160 DK is set to **nRF91**.
3. Connect the nRF9160 DK to the computer with a micro-USB cable, and turn it on.
   In the navigation bar, **No devices available** changes to **Select device**.
4. Click **Select device** and select the device from the drop-down list.

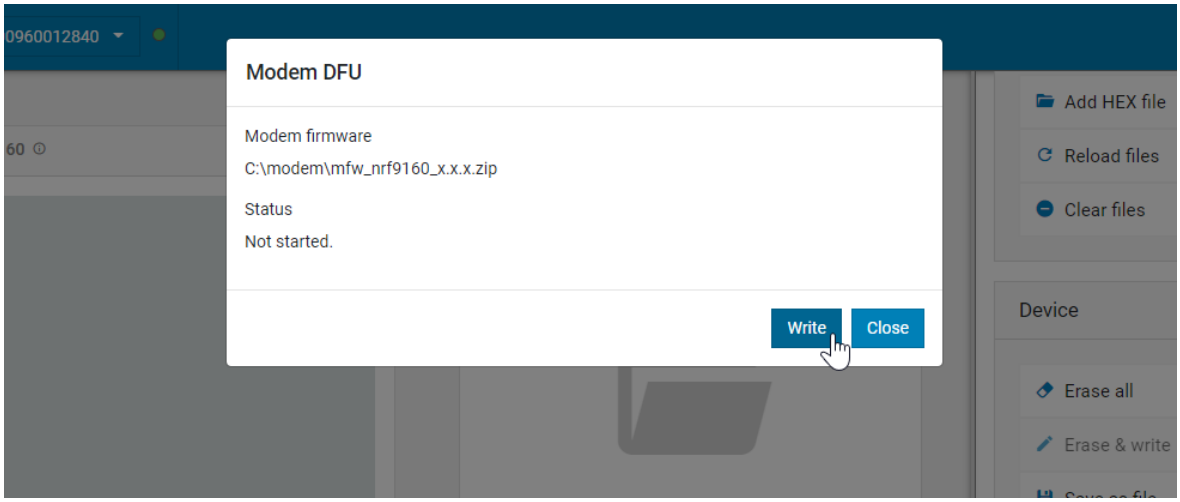
   You can identify the nRF9160 DK by the fact that it has three COM ports. If the three COM ports are not visible, it could be because of the following reasons:

   - When the nRF9160 DK is reset while it is still connected to the Programmer app. Press **Ctrl+R** in Windows and **command+R** in macOS to restart Programmer and to correctly view the COM ports.
   - Other errors.

   The button text changes to the SEGGER ID of the selected device, and the **Device Memory Layout** section indicates that the device is connected.
5. Click **Update modem** under the **Cellular Modem** pane on the right and choose the zip file that you have downloaded from the nRF9160 DK Downloads page, which contains the latest modem release.

   > **Note:** Make sure to select the zip file. Do not unzip it.

   The **Modem DFU** dialog box appears as shown in the following figure.



6. Click **Write** in the **Modem DFU** dialog box to update the firmware.

   Do not unplug or turn off the device during this process.

   > **Note:** If you have issues updating modem firmware, click **Erase all** before trying to update the modem again. In this case, the contents of the flash memory are deleted and the applications must be reprogrammed.

   When the update is complete, you see a success message.

If you want to verify that the update was successful, program the AT Client sample provided in the downloaded zip file to the device using the steps described in Programming applications on nRF9160 DK on page 12. To check the modem firmware version, run the AT+CGMR AT command via the nRF Connect LTE Link Monitor (part of nRF Connect for Desktop).

7 Troubleshooting

For troubleshooting, nRF Connect Programmer allows you to access a more detailed log file.

To open this file, click the **Open log file** button in the log window.

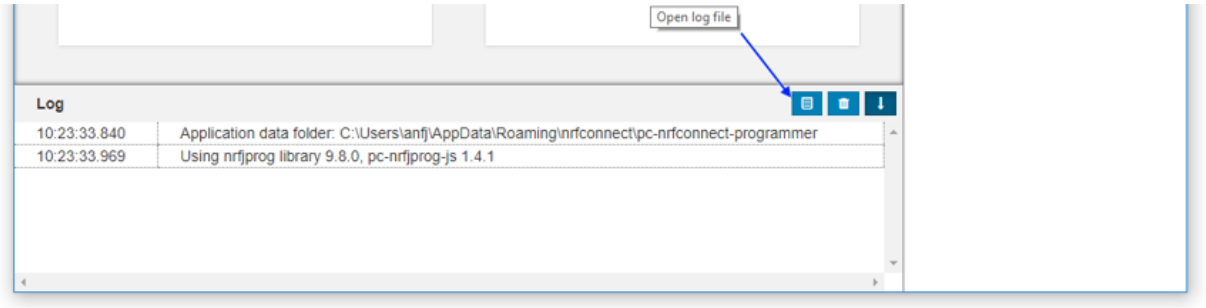


Figure 5: Where to open the detailed log file

The Programmer app shares several of the troubleshooting issues and suggested solutions with the nRF Connect *Bluetooth*® Low Energy app. Refer to the troubleshooting section in the nRF Connect Bluetooth Low Energy user guide for the list of issues.

Programming a device

If you are unable to program a device with the **Write** button, verify that:

- You are trying to program a supported device.
- There are no issues with the HEX file, and the addresses mentioned within the file are correct.

Restarting the Programmer app

You can restart the Programmer app by pressing **Ctrl+R** in Windows and **command+R** in macOS. A restart might be required in the following scenarios:

- A device is reset while it is connected to the Programmer app. In this case, you may not see all COM ports in the drop-down list while selecting the device (e.g. nRF9160 DK) in the Programmer app.
- Other errors.

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