



NTN

Getting Started Guide

v1.1

Contents

- 1 Introduction..... 2**
 - 1.1 SIM cards 3
- 2 Installation and programming..... 5**
 - 2.1 Program MFW_nRF9151-NTN 5
 - 2.2 Programming application MCU 6
- 3 Modem trace and debug 8**
- 4 Liability disclaimer 10**

Revision history

Date	Version	Description
12.9.2025	1.0	Initial limited release
12.1.2026	1.1	Public release

1 Introduction

Operation in Non-Terrestrial Networks (NTN) in addition to Terrestrial Networks (TN) is now enabled in our cloT module nRF9151.

Before you start, especially if you have been working with nRF91 products before and already have nRF91 kits and/or modules, please note the following.

IMPORTANT:

1. NTN bands (B249, B255, B256 and B23) are only supported in nRF9151 version with product code: nRF9151 LACA **A1A**
 - Version is easily identified by the label on the module, it should read **nRF9151 LACA A1**
2. If you have older nRF9151 modules with label nRF9151 LACA **A0**, these modules will **not** support NTN, and they will not be updated to support it.
3. The new **nRF9151 SMA DK** launched in December 2025, are all fitted with nRF9151 LACA A1A, and with the external antennas in the kit, these are the kits you should use for all NTN evaluation and development
4. Also note:
 - All current (Jan 2026) nRF9151 DK (nRF9151 kit with on-board antennas) are fitted with nRF9151 LACA A0A, so cannot be used for NTN and the on-board antennas are not optimized for NTN either.
 - Thingy 91 X are available with both versions of nRF9151, check module label, but is not recommended for NTN evaluation as antenna performance is poor on B255 (L band), but may be acceptable (-3 dBi) for simple demonstrations on B256/B23 (S band).
5. To operate on NTN you need modem FW: MFW_nRF9151-NTN_1.0.x-x
 - This modem FW supports NTN as well terrestrial LTE-M and NB-IoT
 - MFW_nRF91x1_2.0.x supports only TN operation and will not be upgraded to include NTN
6. Older modules nRF9160, nRF9161 and nRF9131, as well as their MFW releases, will **not** be upgraded to support NTN.

If you have worked with nRF91 products before and are familiar with our nRFconnect toolchain, there are no changes to what you are familiar with. Program the NTN enabled MFW, install nRF connect SDK v3.2.0 or later and use our VS code extension. Our serial modem (SM) and Asset tracker (ATT) examples now also support NTN. Links can be (also) found in the Programming section in this document.

If you are new to nRF9151 and our nRF connect tool chain, we recommend you follow our standard getting started process by following the instructions on the card found in the DK, install nRFconnect for desktop and run the Quick start guide app to get your new kit up and running.

NOTE:

The general Quick start guide will program the nRF9151 with MFW_nRF91x1_v2.0.x, our terrestrial only modem FW. You can NOT connect to NTN networks after running this process, but successful

completion of the quick start guide ensures that your tool chain and kit is properly installed and working. Once you have a working terrestrial connection, please follow the instructions below to re-program the nRF9151 with the NTN enabled MFW and application to start your NTN testing.

If you are new to nRF91 and nRFconnect, we also strongly recommend you visit our developer academy (<https://academy.nordicsemi.com/>) and go through our nRF connect fundamentals course, this will lead you through install and setup of our nRF Connect SDK and other key topics to get started on full (application SW) development.

1.1 SIM cards

To connect to any network TN or NTN, you need a SIM that can authenticate users and enable access. If you have an existing MNO or MVNO that you work with, or prefer to use, please contact them and ask them if they have SIM cards that support roaming on NTN networks.

If they have, and most M(V)NO already have or are planning NTN support, you can get nano size plug in SIM and evaluate and develop NTN using the nRF9151 SMA DK.

The RF9151 SMA DK is, however, shipped with 3 SIM cards included to simplify your getting started process and give you some connectivity options to evaluate:

1. **Deutsche Telekom:** This SIM is shipped inactivated. To connect to Deutsche Telekom network and roaming partners you need to follow the instructions in the leaflet in the kit:
 - Set up an account with Deutsche Telekom and activate SIM. (It can take some days)
 - QR code url: <https://iot.telekom.com/nordic-sim>
 - Activate and configure needed SIM support in their portal:
 - Deutsche Telekom and roaming partners terrestrial networks
 - Skylo (GEO), Sateliot (LEO) and OQtech (LEO) NTN networks
2. **Monogoto:** This SIM comes with limited pre-paid TN and NTN data, so will:
 - Be able to connect to networks out of the (DK) box
 - Terrestrial networks Monogoto offers
 - Skylo and OQtech NTN (as of January 2026)
 - Follow Monogoto news releases for updates on additional roaming agreements
 - Use the QR code printed on the SIM to set up your own account and transfer the SIM there if you want more data than is pre-paid.
 - QR code url: <https://monogoto.io/nordic-ntn/>
3. **Onomondo:** This SIM comes with limited pre-paid terrestrial(!) data so will work out of the box in terrestrial networks.
 - This SIM gives you access to the terrestrial networks offered by Onomondo
 - Onomondo doesn't yet (January 2026) have commercial NTN roaming agreements.
 - When agreement(s) are in place the SIM shipped in the kit will be enabled with NTN roaming, no changes or updates are needed.
 - Use the QR code printed on the SIM to set up your own account and transfer the SIM there if you want more data than is pre-paid.

- QR code url: <https://onomondo.com/go/nordic-dev-kit>

Follow news updates from these and your preferred connectivity vendors for updates and launches of NTN network support, there are a lot of activity in this field.

2 Installation and programming

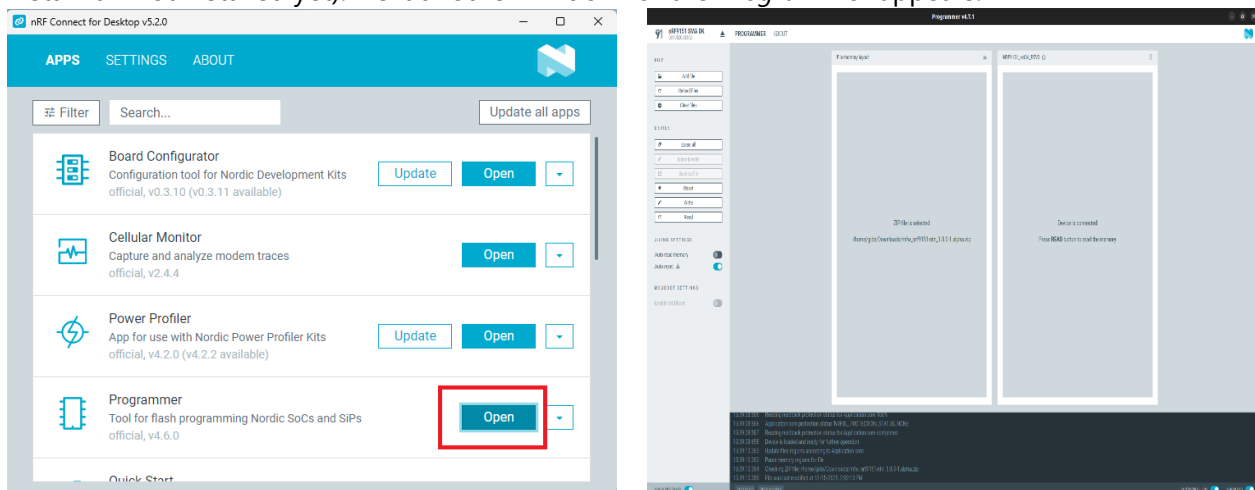
To program the nRF9151 for NTN operation, start the nRF connect for desktop SW framework (download latest version here: [nRF connect for desktop](#).) and install/open the Programmer app.

2.1 Program MFW_nRF9151-NTN

To program the LTE modem with the new MFW, download the latest version of the MFW_nRF9151-NTN_v1.x.x zip file found in the same download section as this doc package.

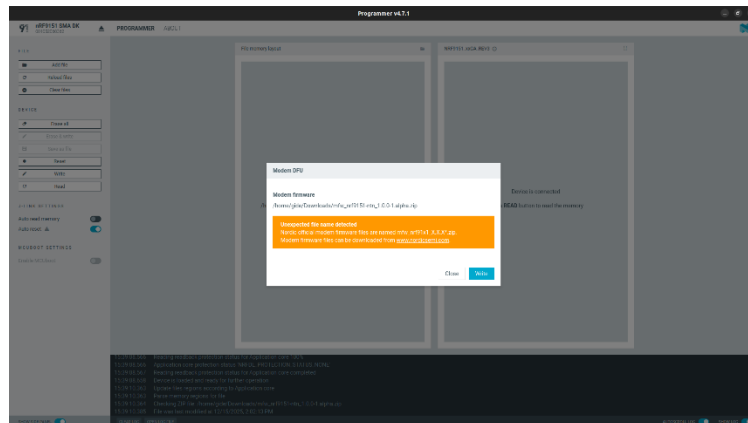
Follow the steps below to program/flash MFW_nRF9151-NTN zip on nRF9151.

Install and open the nRF Connect for Desktop. In the main APPS page open the *Programmer App* (or install it if not installed yet). Next another window for the *Programmer* appears.



Program the modem firmware.

1. Click *SELECT DEVICE* and a pull-down menu list of nRF kits connected to the PC will show up. For simplicity, you should only have a single Devkit attached to your PC.
2. Select the kit to be programmed: nRF9151 SMA DK
3. Click *Add file* and use *Browse..* to locate your downloaded modem firmware zip file, unless it is already listed in the pull-down menu list you will be presented.
4. Select the firmware package zip file provided by Nordic.
5. Click *Write* Note: you will get a pop-up window with a warning.
 - Since the MFW_nRF9151-NTN is still an alpha release, it is not yet a commercial modem firmware from Nordic, you will get the warning about this from the *Programmer APP* when you click *Write*. Ignore this warning and proceed to the next step.
6. Click *Write* in the pop-up window. Programming the modem will take about ~30 seconds.



2.2 Programming application MCU

Both source code and pre-compiled versions of SW to use for NTN evaluation as well as starting point for product development are available in git hub repositories.

For early evaluation using the serial modem application, which simply reflects the AT commands of modem FW on a UART serial interface is the simplest way to start.

The source code repo containing the serial modem application repo can be found here:
<https://github.com/nrfconnect/ncs-serial-modem>

If you just want a precompiled hex file to program into your device:

1. Click on the 'tags' link under **Releases** in the right hand menu
2. Brings you to <https://github.com/nrfconnect/ncs-serial-modem/tags>
3. Choose the latest version and scroll down to **Assets**
4. Click on file you want to download it
5. If you want to connect the kit to a PC and run a serial terminal to issue AT commands as described in the 'NTN operation document' in this package. Choose hex file with name ending with:
 - a. *_PPP_cmux or
 - b. *_PPP_cmux_mtrace if you want/need to debug issues, see section 3
6. If you want to connect nRF9151 to an MCU choose
 - a. *_Ext_mcu or
 - b. *_Ext_mcu_mtrace

When you are more familiar with nRF91 and NTN you can also check out our [Asset Tracker template - NTN](#) example to see NTN used in an user application embedded on the nRF9151.

Programming the selected Application core firmware follows almost the same procedure as the modem firmware.

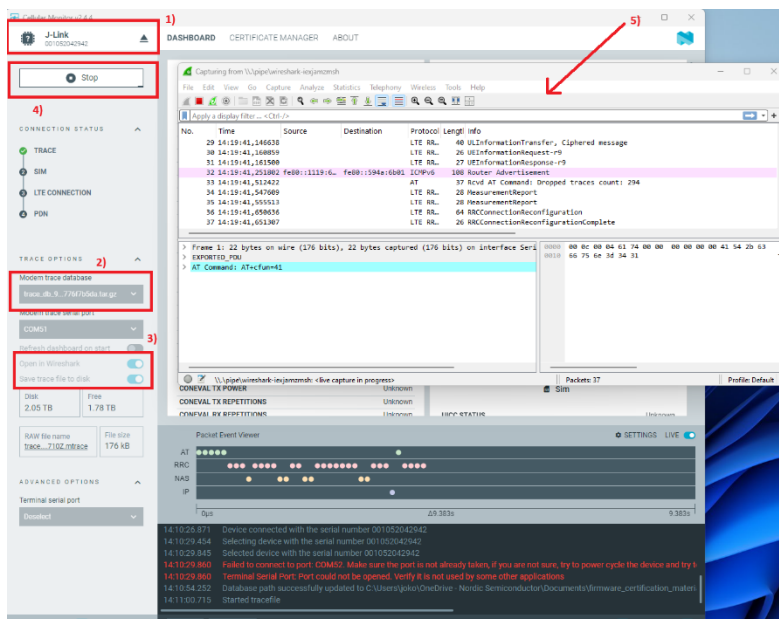
- 1) Click *Add file* and a file selector window will show up.
- 2) Locate the HEX file for SW you want to program.
- 3) Click *Erase & write*. The programming should take less than 10 seconds.

3 Modem trace and debug

If you run into any issues in your NTN testing and communication, all Nordic technical support requests (<https://devzone.nordicsemi.com/>) will need to include a modem trace for us to help you debug. While tracing you can also see all the communication between the modem and the network using Wireshark.

Modem tracing is logging of all commands, traffic and key events during modem operation, and is managed on the PC by the cellular monitor application found in nRF Connect for Desktop framework. Install and open Cellular monitor and follow the instructions to get tracing set up.

NOTE: For tracing of the MFW activity you need to select a Trace Data Base. You'll find the needed trace data base in the downloaded MFW_nRF9151-NTN_v1.0.x-x zip file (example: mfw_nrf9151-ntn_1.0.0-1.alpha_trace-db.json). Select and Input this in the cellular monitor app as described below. Once commercial version (v1.0.0) of the MFW is released, this trace database will be automatically downloaded and used by the cellular monitor



- 1) Click **SELECT DEVICE** and select nRF9151 (or J-Link if that is shown)
- 2) Click the Modem trace database pull-down menu and select 'select Trace DB' and locate the database file provided by Nordic.
- 3) Select **Open in Wireshark** and **Save trace file to disk**. Wireshark is for your benefit to see cellular signaling and user traffic packet traces. For Nordic you need to provide the trace files saved during tracing.
- 4) Click **Start** to start tracing.
- 5) Wireshark should pop up and show what is happening in the modem.

Modem trace and debug

Note: You may want to select *Deselect* in the *Terminal serial port* pull-down menu before step 4) if you are using external to Nordic serial terminal for your AT-commands. Otherwise, Cellular Monitor will reserve the COM-port.

4 Liability disclaimer

Nordic Semiconductor ASA reserves the right to make changes without further notice to the product to improve reliability, function or design. Nordic Semiconductor ASA does not assume any liability arising out of the application or use of any product or circuits described herein.