OpenThread 1.2 Reference Release Quick Start Guide

Scope

This document introduces how to get started to run the certification tests supported in Thread 1.2 Test Harness with OpenThread 1.2 Reference Release based on openThread public repo.

Currently OpenThread1.2 reference release covers Low Power, Multicast across Thread Networks and Domain Unicast Address features defined in Thread 1.2 Specification.

Directory introductions

- otbr.20210615.img.zip
  The OTBR1.2 Raspibian image

- fw_dongle
  The RCP and CLI firmwares for nRF52840 USB dongle.

- thci
  OpenThread.py and OpenThread_BR.py are included to make OT1.2, OT1.1 or OTBR1.2 devices controlled by Test harness.

Prerequisites

Hardware

The reference hardwares for OpenThread 1.2 are

- Raspberry Pi 3 Model B or B+ or Raspberry Pi 4 with SD card >= 4G
- Nordic nRF52840 USB Dongle

Software

For OpenThread Border Router 1.2 (OTBR1.2 in short) host setup

- Raspbian image with OTBR1.2 setup
  (Based on 2019-04-08-raspbian-stretch-lite.zip)

For the nRF52840 USB Dongle, here are three binaries for RCP device and 1.2 CLI device and 1.1 CLI device respectively.

- ot-rcp-1.2.zip
  nRF52840 USB dongle, installed with RCP firmware, works with the Raspberry Pi with OTBR1.2 host setup as one OTBR1.2. (could act as PBBR and SBBR role during cert).

- ot-cli-ftd-1.2.zip
  nRF52840 USB dongle, installed with CLI firmware, works as a general Thread 1.2 device.

- ot-cli-ftd-1.1.zip
  nRF52840 USB dongle, installed with CLI firmware, works as a general Thread 1.1 device.

Setup

OTBR1.2 Host Setup - OTBR 1.2 Host Raspbian

It is the easiest way to set up OTBR1.2 host - just install the Raspibian image `otbr.20210615.img.zip` by flashing the image to SD card via Etcher tool according to raspbian installation.

By default, this Raspbian has console serial and ssh enabled, and the OS would expand to the whole SD card at first bringup after flashed.

Flash nRF52840 USB dongle

1. Install nrfutil

```
$python3 -m pip install --ignore-installed six nrfutil==6.0.1
```

2. Flash one nRF52840 USB dongle

```
# trigger DFU Bootloader Mode and download firmware
# nrfutil dfu serial -pkg <*.zip> -p <serial port>

# general thread 1.2 device
$nrfutil dfu serial -pkg ot-cli-ftd-1.2.zip -p /dev/tty.usbmodem14112

# radio adapter (RCP device) for OTBR1.2
$nrfutil dfu serial -pkg ot-rcp-1.2.zip -p /dev/tty.usbmodem14132
```

Test Harness Environment setup

1) Update THCI

```
a) copy OpenThread.py to C:\GRL\Thread1.2\Thread_Harness\THCI\
b) copy OpenThread_BR.py to C:\GRL\Thread1.2\Thread_Harness\THCI\
c) copy ot-comm directory to C:\GRL\Thread1.2\ThirdParty\
d) modify C:\GRL\Thread1.2\Thread Harness.bat: append
%systemdrive%/GRL/Thread1.2/ThirdParty/ot-comm; at the end of
PYTHONPATH
```

Note: OTBR1.2 has implemented TestHarness Discovery Protocol so TestHarness 1.2 can discover OTBR1.2 devices and connect them via SSH connections, without using UART serial connections.

References

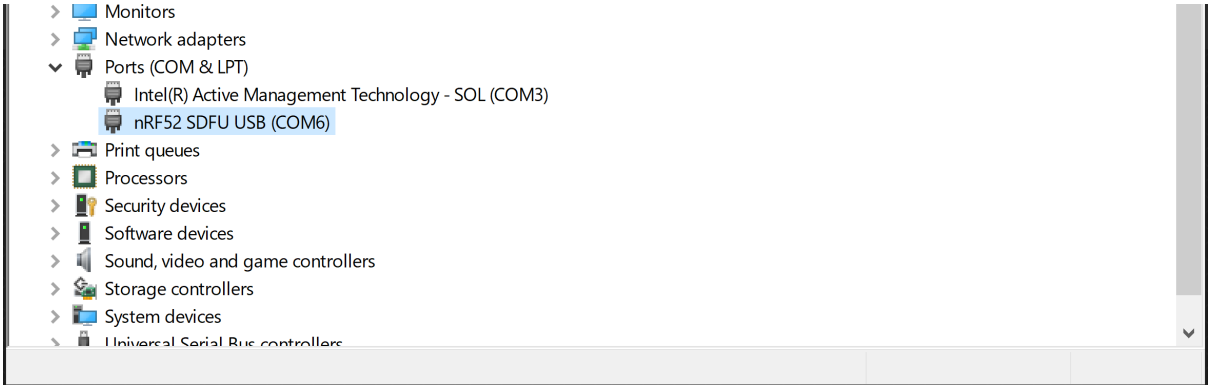
Use fresh nRF52840 USB dongle on windows

The instructions mentioned here are verified on win10 laptop. For every fresh nRF52840 USB dongle, it is required to do the driver update process per dongle after firstly flash OpenThread reference firmware.

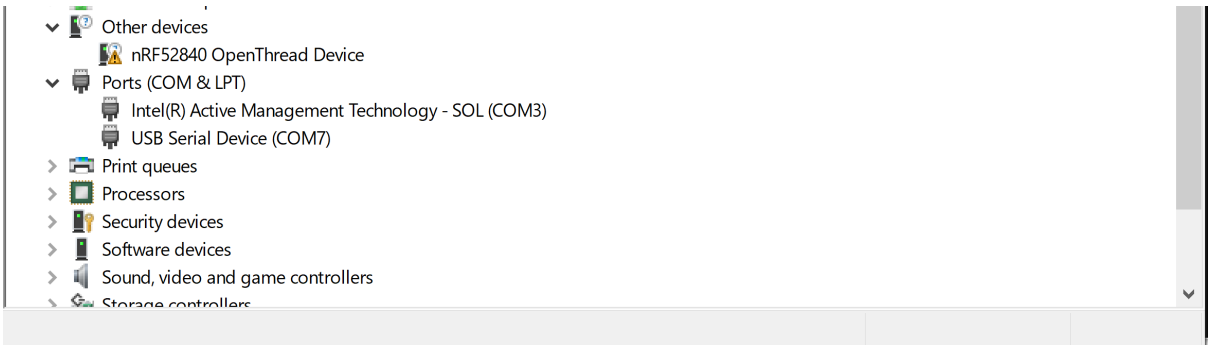
For win7 user, I don't have the chance to validate above process as I don't have one. Please download nRF52840 Win7 usb_drivers.zip Tom uploaded. Please report back to us if you have any issues when using the dongle on win7, and it is highly appreciated if you could contribute the driver update process on win7 if there are any differences.

Background

When a fresh nRF52840 USB dongle is plugged to Windows laptop, it would be recognized as `nRF52 SDFU USB` in Device Manager as below picture and LD2 on the dongle would be red, indicating the device is in DFU bootloader mode, ready to be flashed by nrfutil tool.

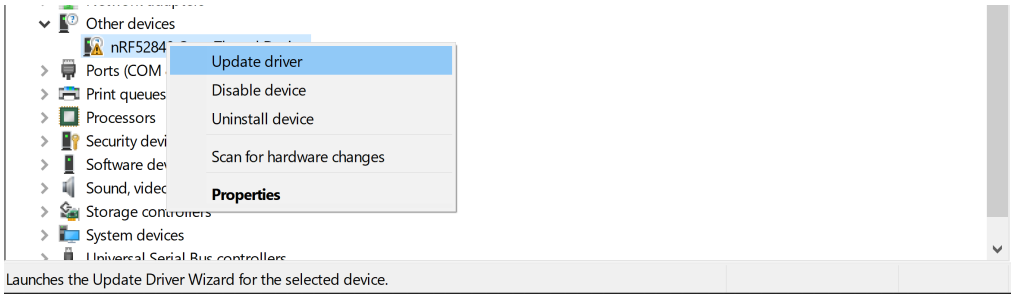


After flashed with the reference firmware provided in the release package first time, you will notice the change in the port number in `Ports (COM & LPT) section` in Device Manager and a new `nRF52840 OpenThread Device` with yellow triangle mark appeared in the 'Other devices' section, representing you need to update the Nordic DFU driver manually so that the device could be triggered by nrfutil to enter DFU bootloader mode next time, otherwise the device could not be flashed next time.

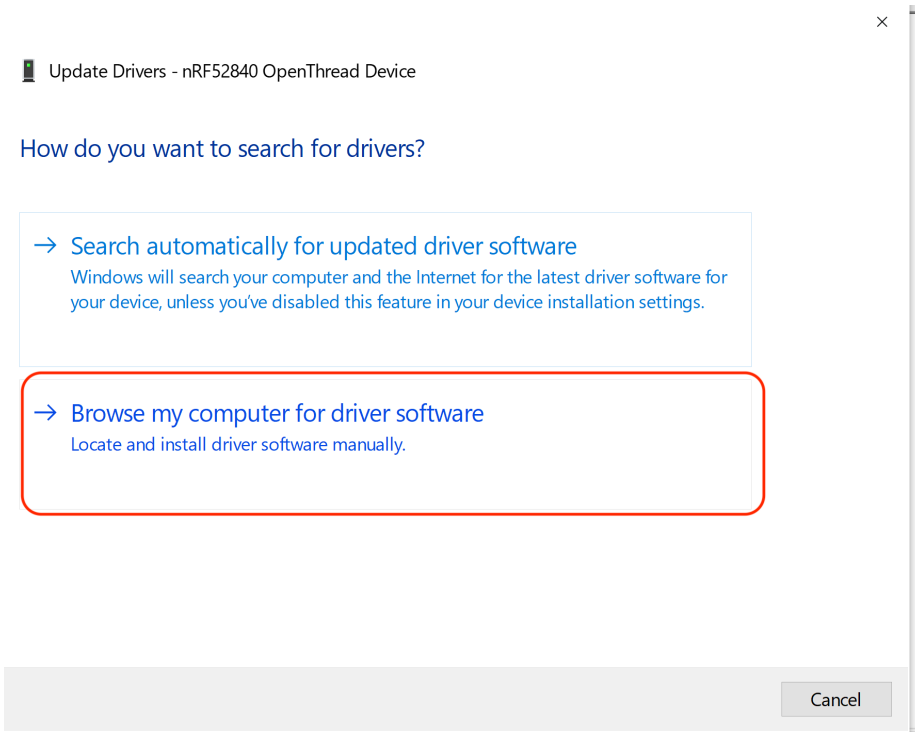

Other devices
nRF52840 OpenThread Device
Ports (COM & LPT)
Intel(R) Active Management Technology - SOL (COM3)
USB Serial Device (COM7)
Print queues
Processors
Security devices
Software devices
Sound, video and game controllers

Update Nordic DFU driver on windows

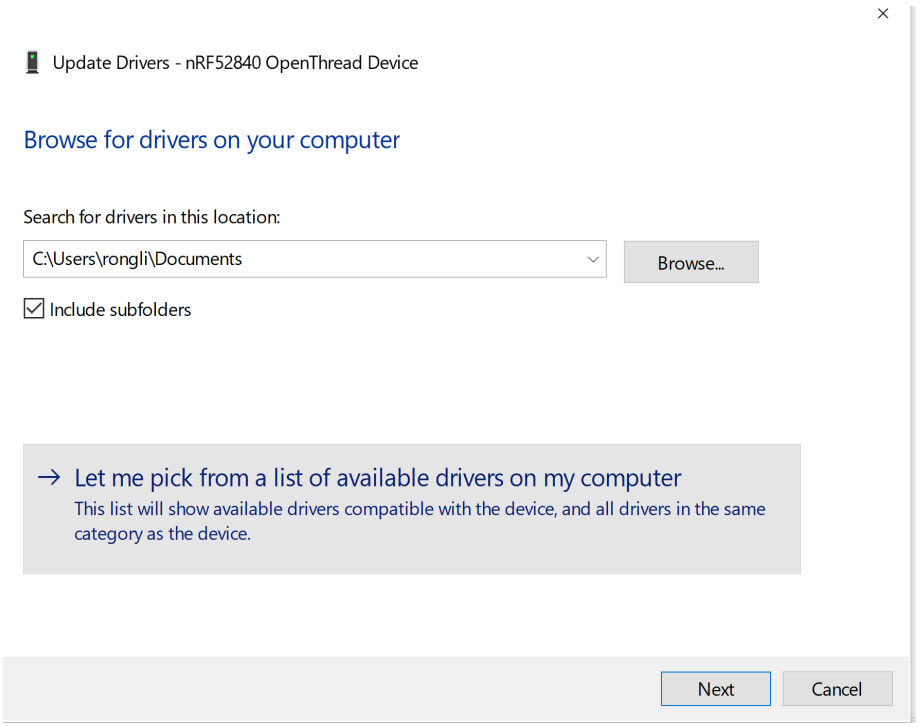
1) Download [nRFConnect for Desktop] and install it following the wizard instructions.
2) Update driver manually according to below instructions
    a) Right-click the `nRF52840 OpenThread Device` and choose `Update Driver`



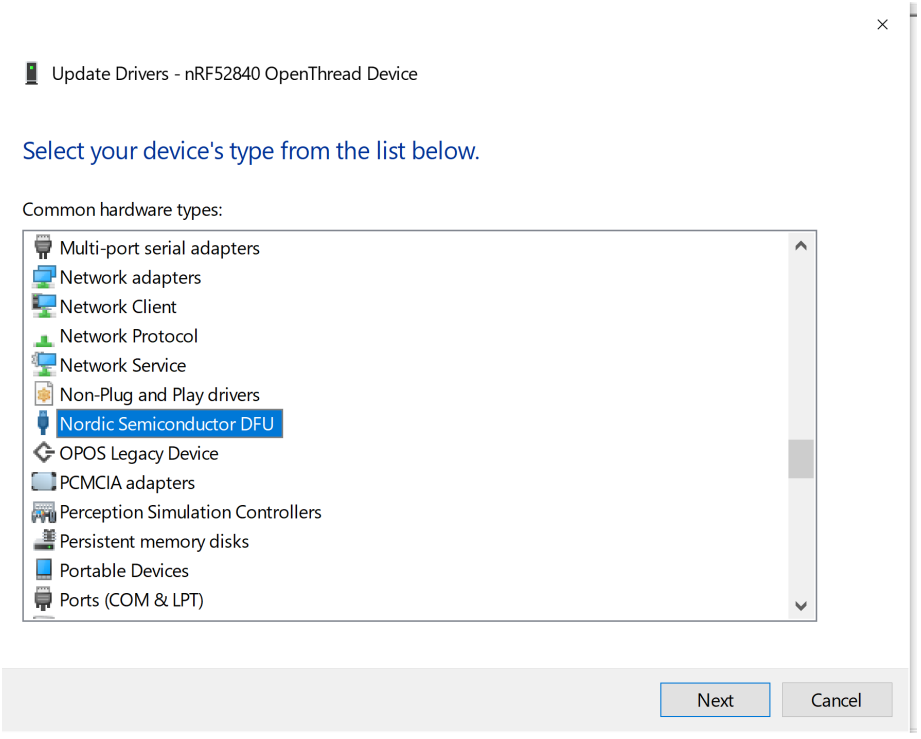
    b) Choose `Browse my computer for driver software`



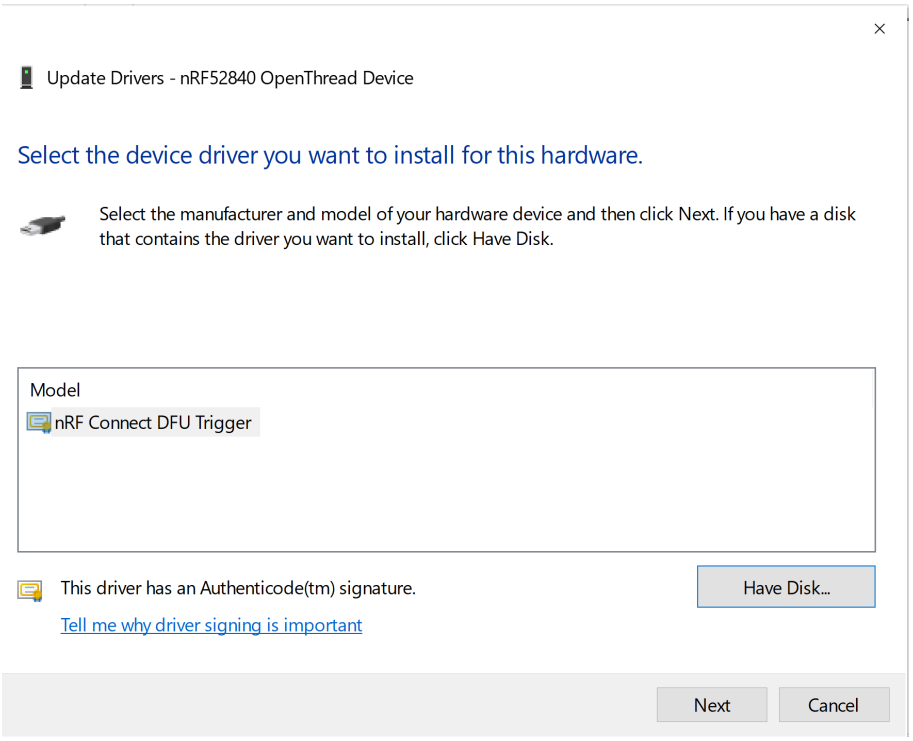
    c) Choose `Let me pick from a list of available drivers on my computer`



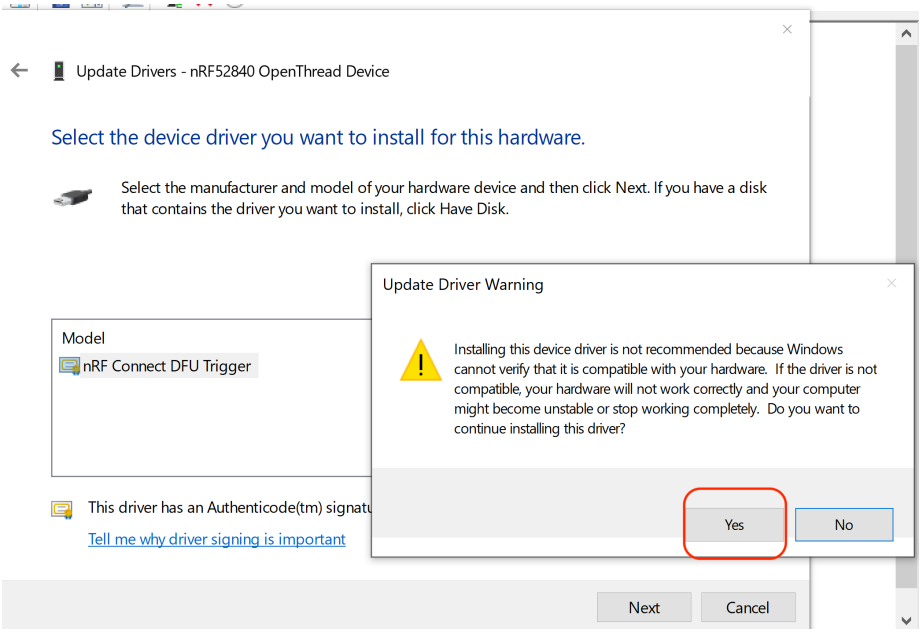
d) Scroll the bar and choose `Nordic Semiconductor DFU` and click `Next`



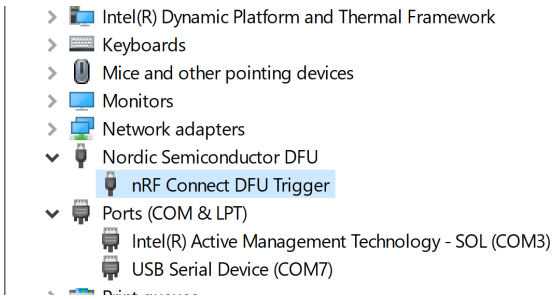
e) Choose `nRF Connect DFU Trigger` and click `Next`



f) Click `Yes` on the popup windows



g) When it finishes, the yellow triangle will disappear, and you will see `nRF Connect DFU Trigger` as picture below, then you could continue to reflash the dongle or the update its firmware.


Intel(R) Dynamic Platform and Thermal Framework
Keyboards
Mice and other pointing devices
Monitors
Network adapters
Nordic Semiconductor DFU
nRF Connect DFU Trigger
Ports (COM & LPT)
Intel(R) Active Management Technology - SOL (COM3)
USB Serial Device (COM7)

Code base per package

	Repo	Branch
OT1.2	https://github.com/openthread/openthread	main
OTBR1.2	https://github.com/openthread/ot-br-posix	main

Revision History

Date	Author	Descriptions
May 20, 2021	Simon Lin	Update documentation for the first alpha release based on public repositories.
Jan 23	Simon Lin	Update for RC5 - Add OT-Commissioner into otbr_host_pkg/ - Update THCI to support OT-Commissioner - Use Python3 to install nrfutil 6.0.1
Aug 25	Rongli Sun	Add new THCI APIs
May 31	Rongli Sun	Add Instructions to update Nordic DFU Trigger Driver for windows laptop users when using fresh nRF52840 USB dongle for the first time. Correct one typo (from `-t` to `-p`) when flash nRF52840 USB dongle via nrfutil tool.
May 20, 2019	Rongli Sun	Refine and Restructure the Quick Start Guide
April 11, 2019	Rongli Sun	Add introduction about how to disable MSD
April 2, 2019	Rongli Sun	Add introduction for otbr update Add nRF52840 USB dongle support
Oct 25, 2018	Rongli Sun	Add code repo introduction for each package delivered Add 'Build from source' section
Oct 20, 2018	Rongli Sun	Update for IOP7 - Support DomainPrefix in Thread Network Data(BHC-212)

		- Still keep reregistrationDelay 4 bytes
		- Support new BBR properties
		- Update THCI to support stable connection
		- Update burn_tool.py
		  - Fix error when no USB CDC is specified
		  - Add '-i' option to list JLink Serial Number of connected SEGGER
		- Add notes & tips section

Aug 13, 2018	Rongli Sun	Initial release