Exciting new features in nRF Connect SDK v2.0.0

NORDIC®
SEMICONDUCTOR

Today's hosts

Bjørn Kvaale

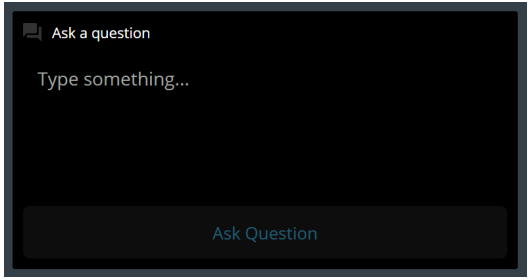
Product Marketing Engineer

Ali Aljaani

Developer Marketing Manager

Practicalities

- Duration: 45 min presentation, 15 min Q&A
- Questions are encouraged!
  - Please type questions in the top of the right sidebar
  - All questions are anonymous
  - Try to keep them relevant to the topic
  - We will answer them towards the end
- The chat is not anonymous, and should not be used for questions
- Go to DevZone if you have more questions
- A recording of the webinar will be available together with the presentation at webinars.nordicsemi.com/on-demand



{ DevZone

Agenda

- Intro to the nRF Connect SDK
- Generic updates
- Short-range updates in nRF Connect SDK v2.0
- Cellular IoT updates in nRF Connect SDK v2.0
- Q&A

Communities

Webinars

Technology intros and trainings

nordicsemi.com/webinars

Nordic Developer Zone

{DevZone

Nordic tech support center & online community
29k+ users, 80k+ Posts Q&A
3 million page visits last 6 months

devzone.nordicsemi.com

Nordic GitHub

121 Repos, C/C++
Python, Javascript

github.com/NordicSemiconductor

nRF Connect SDK intro

nRF Connect SDK

- One code base and toolchain for nRF91, nRF53, nRF52 and nRF21 Series
  - Optional for nRF52 Series (>= v1.3.0)
- Includes LTE-M, NB-IoT, GNSS, Bluetooth Low Energy, Bluetooth mesh, Thread, Zigbee, Matter, ESB, Gazell, NFC
- Bluetooth v5.3 qualified Host and Controller stack since v2.0.0

Generic Updates

nRF Connect SDK v2.0.0

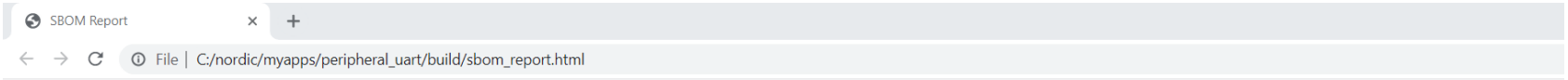
Generic Updates

- Simplified software license report generation
- IDE updates
- nRF Connect for VS code improvements
- Unified installation experience across all three major operating systems: Windows, macOS, and Linux.
- Toolchain updates
- Other changes

Software License Report Generation

- Simplified software license report generation
- Scans any nRF Connect SDK project and reports discovered licenses
- Implemented as a west extension (`ncs-sbom`)
- Supports multiple output formats (Ex: `*.html` , `*.spdx`)
- Generating a license report from a build directory (`-d`) is **experimental**
- Demo!

License Report (HTML)



Software Bill of Material Report

Note

Some of the files in the report do no contain license information or it cannot be detected. See license details for list of such files. You need to evaluate them manually to get the license information.

This report was generated from the following inputs:

- The "zephyr/zephyr.elf" file from the build directory "C:\nordic\myapps\peripheral_uart\build"

The files are covered by the following licenses:

- LicenseRef-Nordic-5-Clause
- GPL-3.0-or-later WITH GCC-EXCEPTION-3.1
- Apache-2.0
- BSD-3-Clause
- Unknown licenses that cannot be detected automatically

The texts of the following licenses are added to this report:

- LicenseRef-Nordic-5-Clause

License details

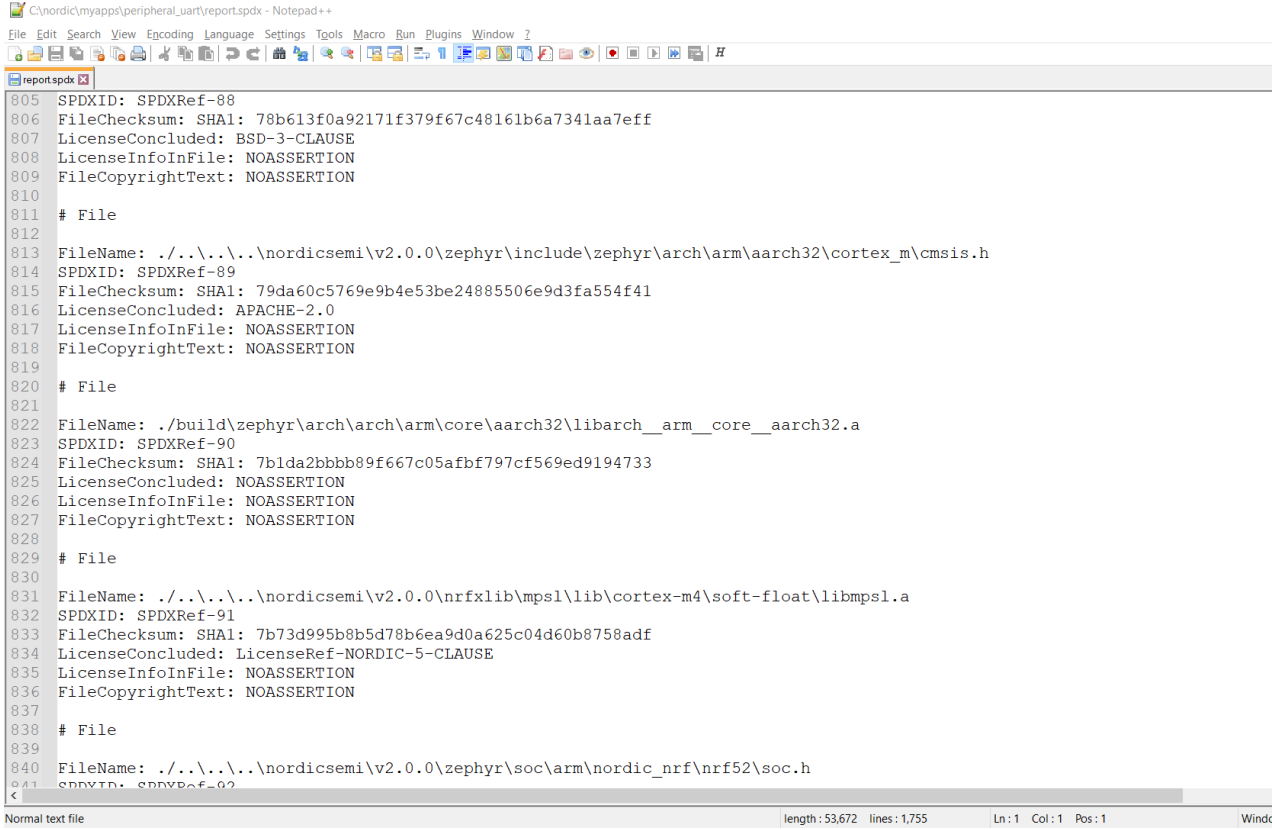
License Details (HTML)

BSD-3-Clause

BSD 3-Clause "New" or "Revised" License
https://spdx.org/licenses/BSD-3-Clause.html

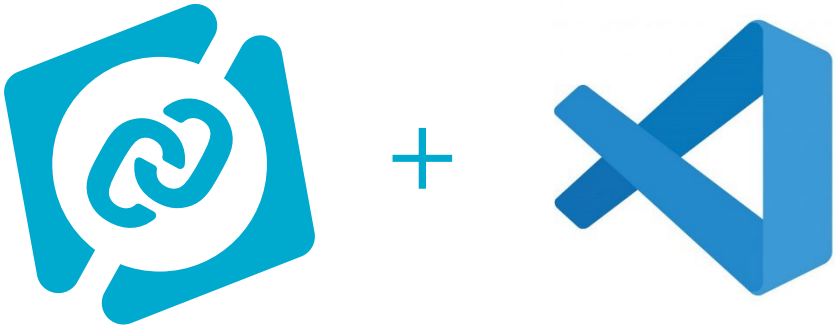
```
C:\nordicsemi\v2.0.0\modules\hal\nordic\nrfx\drivers\nrfx_common.h
C:\nordicsemi\v2.0.0\modules\hal\nordic\nrfx\drivers\nrfx_errors.h
C:\nordicsemi\v2.0.0\modules\hal\nordic\nrfx\hal\nrf_common.h
C:\nordicsemi\v2.0.0\modules\hal\nordic\nrfx\mdk\compiler_abstraction.h
C:\nordicsemi\v2.0.0\modules\hal\nordic\nrfx\mdk\nrf.h
C:\nordicsemi\v2.0.0\modules\hal\nordic\nrfx\mdk\nrf51_to_nrf52840.h
C:\nordicsemi\v2.0.0\modules\hal\nordic\nrfx\mdk\nrf52840.h
C:\nordicsemi\v2.0.0\modules\hal\nordic\nrfx\mdk\nrf52840_bitfields.h
C:\nordicsemi\v2.0.0\modules\hal\nordic\nrfx\mdk\nrf52840_peripherals.h
C:\nordicsemi\v2.0.0\modules\hal\nordic\nrfx\mdk\nrf52_to_nrf52840.h
C:\nordicsemi\v2.0.0\modules\hal\nordic\nrfx\mdk\nrf_peripherals.h
C:\nordicsemi\v2.0.0\modules\hal\nordic\nrfx\nrfx.h
```

License Report (SPDX)



IDE Updates

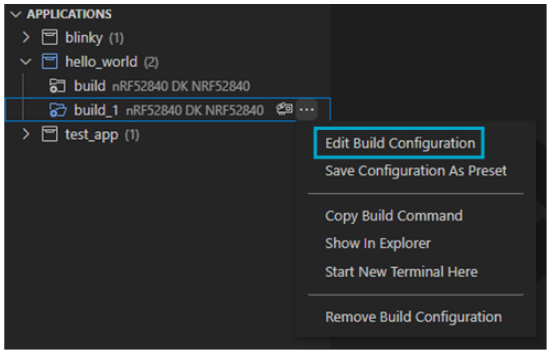
- nRF Connect SDK is Integrated Development Environment (IDE) agnostic
- nRF Connect for VS Code is the officially supported IDE for nRF Connect SDK v2.0.0
- SEGGER Embedded Studio Nordic Edition is **no longer tested and recommended** for new nRF Connect SDK projects
- SEGGER Embedded Studio is still the recommended IDE for **nRF5 SDK**



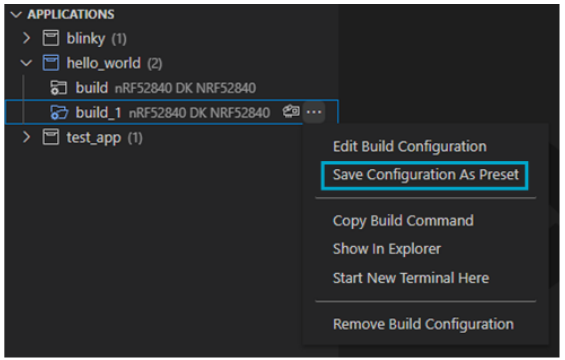
nRF Connect for VS Code Improvements

- Save, and share build configurations (CMake Presets)
- Edit build configurations
- Searching:
  - Search in source files in the application
  - Search for text in the editor on DevZone and in our documentation
  - Massively improved symbol search in Kconfig
- Many more improvements!

nRF Connect for VS code Improvements



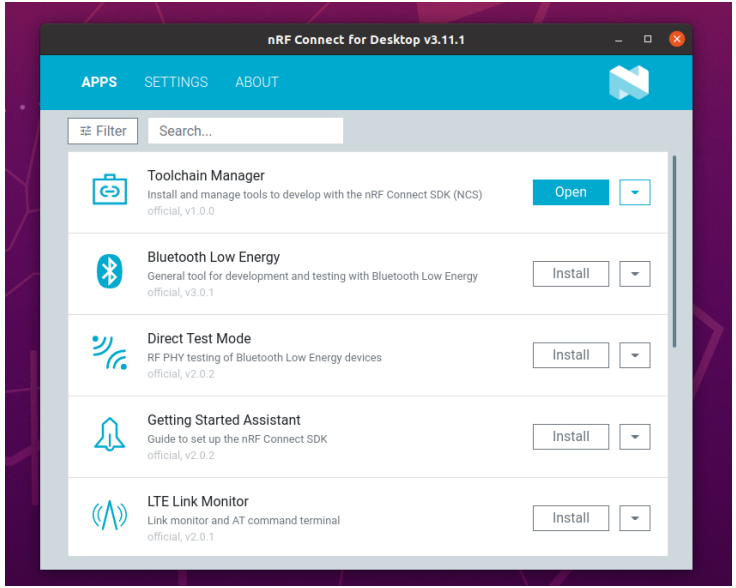
Editing build configurations



Saving and sharing build configurations

Unified Installation Experience

- Toolchain Manager is now available for Linux (Ubuntu 20.04)
- Unified installation experience across all three major operating systems: Windows, macOS, and Linux(Ubuntu 20.04).



Toolchain Update

- Toolchain used in nRF Connect SDK v2.0.0 is now based on the Zephyr SDK (`sdk-ng`) instead of the GNU ARM Embedded toolchain
- Customized toolchain built and tuned explicitly for Zephyr that works on all three major operating systems: Windows, macOS and Linux

Other Changes

- Pin multiplexing and pin configuration are now managed by pinctrl
  - All drivers use the same standardized method (pinctrl) to configure pins.
- Trusted Firmware M (TF-M) replaces the Secure Partition Manager (SPM) for secure image firmware.
  - TF-M is now enabled by default for most nRF9160 and nRF5340 applications and samples
  - First step in making TF-M our default secure firmware implementation
- A migration guide is available for users interested in moving from nRF Connect SDK v1.x.x to v2.x.x

Short-range Updates

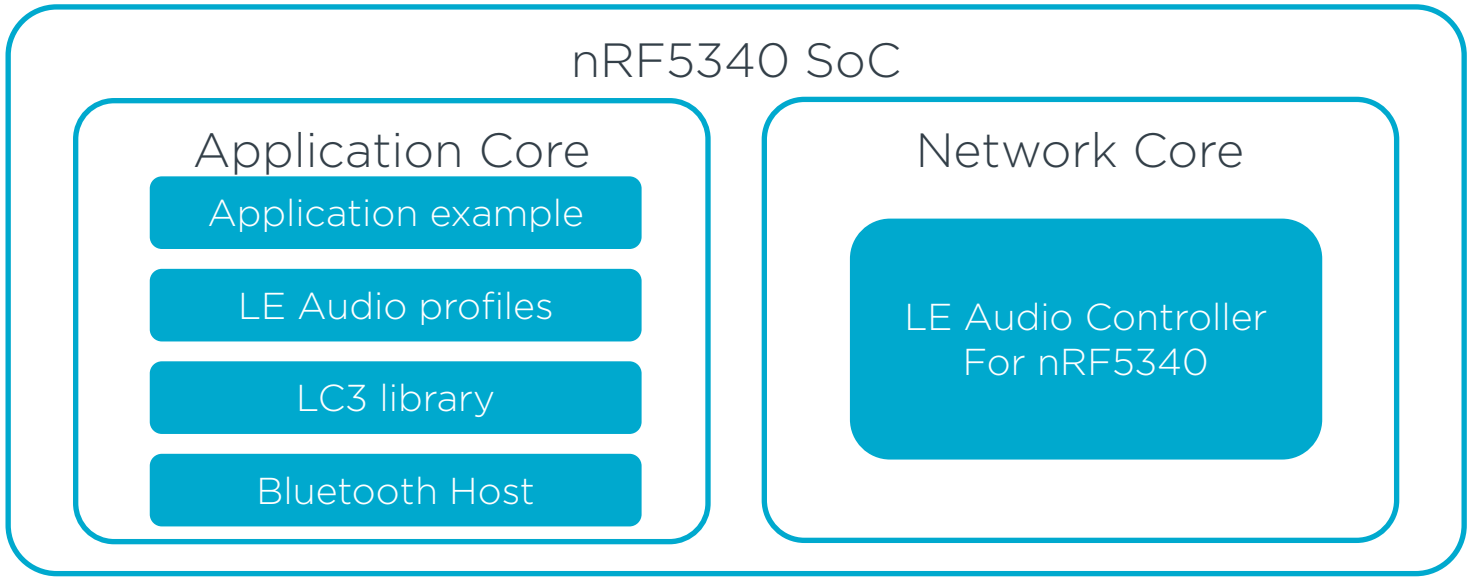
nRF Connect SDK v2.0.0

Short-range Updates

- Added experimental Bluetooth LE Audio support, including an application for the nRF5340 Audio DK
- Bluetooth Low Energy stack is v5.3 qualified
- Improved DFU over Bluetooth Low Energy
- Support for Thread v1.2 is no longer experimental. HomeKit over Thread and Matter over Thread use Thread v1.2 libraries by default now
- Support for the Zigbee Cluster Library specification v8 (ZCL 8) and Base Device Behavior specification v3.0.1 (BDB 3.0.1) is no longer experimental. ZCL 8 and BDB 3.0.1 libraries are now used by default in Zigbee samples

Experimental Bluetooth LE Audio Support

- Added experimental Bluetooth LE Audio support, including an application for the nRF5340 Audio DK



Experimental Bluetooth LE Audio Support

- New application (nRF5340 Audio)
- Can be found under `applications/nrf5340_audio`
- Connected isochronous stream (CIS) and broadcast isochronous stream (BIS) modes supported
- Headset or gateway

Dongle

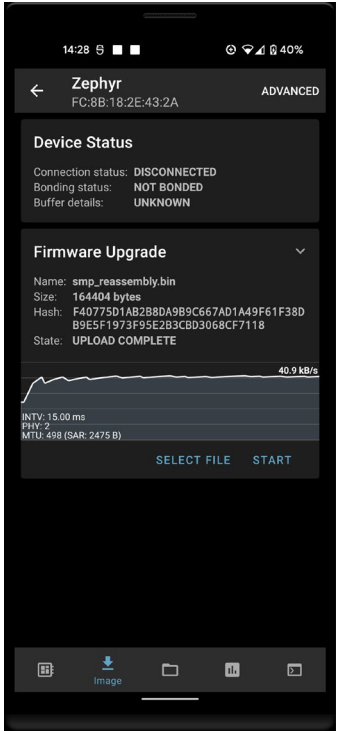
TWS Earbud

Bluetooth LE Stack 5.3 Qualified

- The full stack (Host + Controller) is now 5.3 qualified.
- Bluetooth 5.3 is the latest revision of the Bluetooth specification
- Includes Periodic Advertising Enhancement
- Learn more on What's new in Bluetooth 5.3?

Improved DFU over Bluetooth Low Energy

- 30 – 40 kB/s is possible (more than 3x speedup)
- Use RF Connect Device Manager mobile app => v1.3.0
- Use SMP Server sample (`smp_svr`)
- Use (`overlay-bt.conf`) fragment
- App now shows:
  - Throughput graph
  - Connection Interval, Phy used, and the MTU used.
- Client device (smartphone, tablet, etc..) must support optimal Bluetooth parameters affecting DFU throughput.



Support for Thread 1.2

Thread 1.1

Low power
Resilient (mesh)
IP-based
Open protocol
Secure and user friendly
IEEE 802.15.4 Radio

Thread 1.2

Thread 1.1 +

Low Power enhancements:

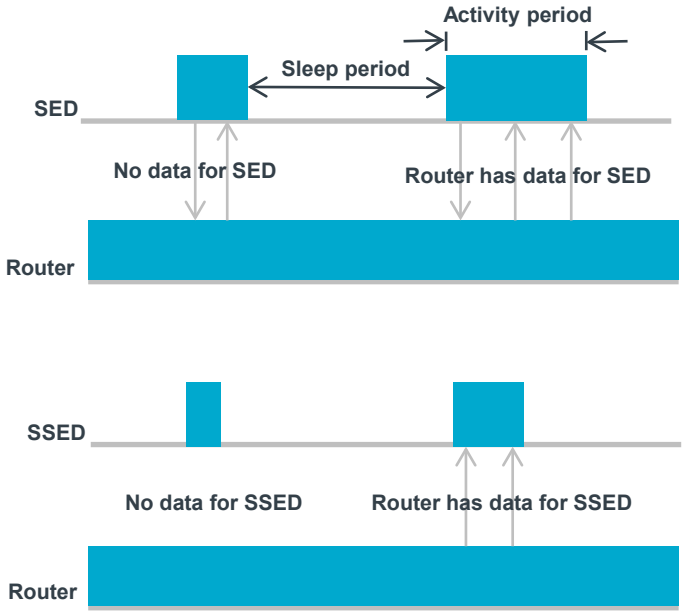
- Enhanced Frame Pending
- Enhanced Keep-Alive
- Coordinated Sampled Listening
- Link Metrics

Improvements for commercial:

- Backbone Router
- Domain Unicast Addressing
- Multicast across Thread Networks

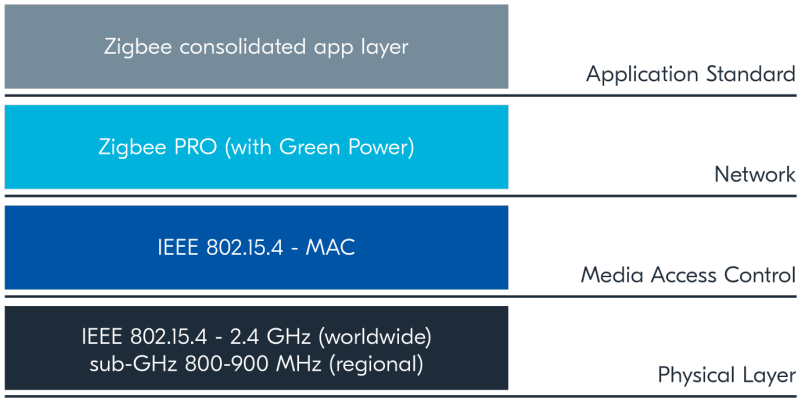
Synchronized Sleepy End Device (SSED)

- Low-power roles in Thread
  - Sleepy end device (SED) - has its radio turned off during idle periods and wakes periodically to communicate with its parent router
  - Synchronized sleepy end device (SSED) - introduced in Thread 1.2. Utilizes Coordinated Sampled Listening mechanism. It has its radio turned off during idle periods and wakes periodically to listen for messages from its parent at scheduled intervals



Zigbee Update

- Support for the Zigbee Cluster Library specification v8 (ZCL 8) and Base Device Behavior specification v3.0.1 (BDB 3.0.1) is no longer experimental.
- ZCL 8 and BDB 3.0.1 libraries are now used by default in Zigbee samples

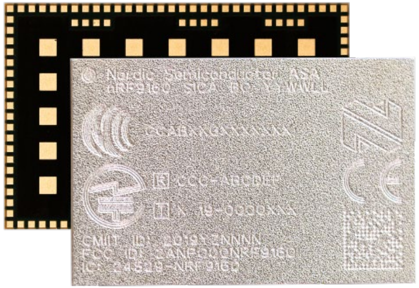


Cellular IoT updates

nRF Connect SDK v2.0.0

Complete low power cellular IoT solution

nRF9160



Dedicated application processor and memory

Multimode LTE-M / NB-IoT modem with integrated RFFE and GNSS support

Ultra Low Power

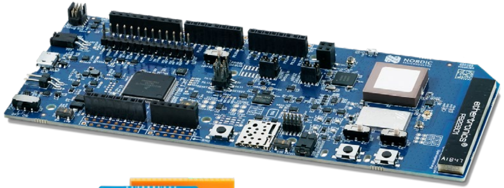
nRF Connect

nRF Connect SDK

nRF Connect for Desktop

nRF Cloud

nRF9160 DK & Thingy:91



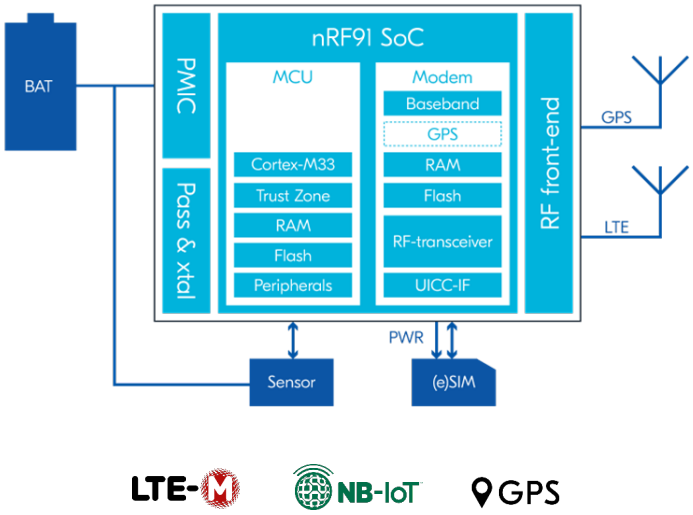
Standalone development kit & prototyping platform

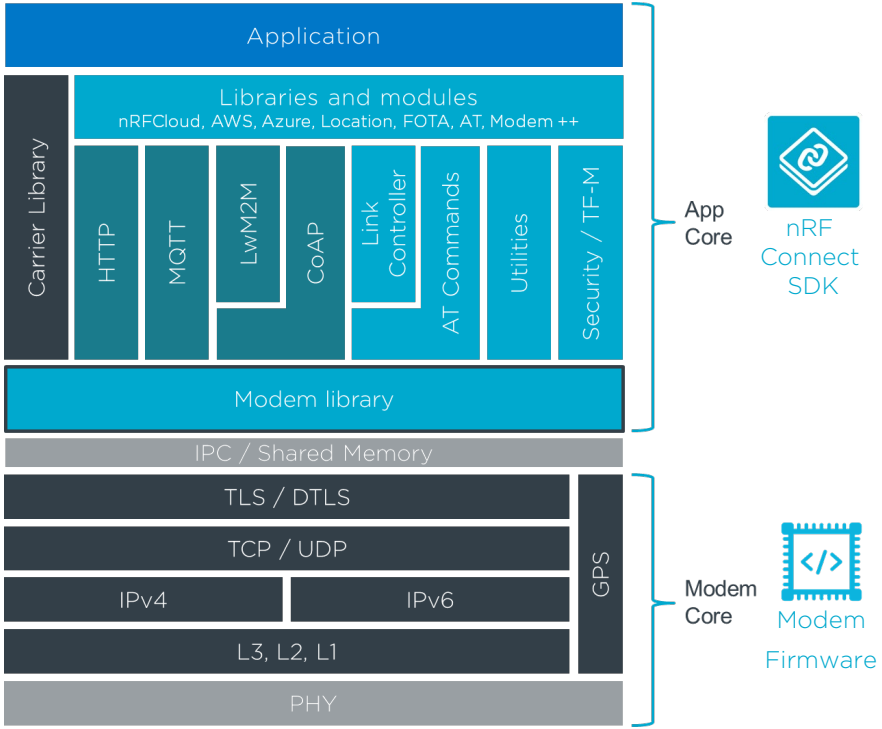
eSIM from iBasis

nRF52840 board controller with Bluetooth LE

LTE, GNSS, and 2.4 GHz antennas

nRF Connect SDK overview





Supported Modem firmware

- mfw_nrf9160 v1.3.2
- Compatibility matrix
- nRF9160 Certification web page

nRF9160 modem firmware version	nRF Connect SDK
1.3.0	1.6.0 1.6.1 1.7.0
1.3.1	1.7.0 1.8.0 1.9.0
1.3.2	1.8.0 1.9.0 1.9.1 2.0.0

Table 1. nRF9160 modem firmware and nRF Connect SDK versions

Modem Firmware v1.3.2

- Full release notes in modem zip folder or on our webpage
- Focus on carrier and customer fixes, power consumption and location
- Reduced mobility for stationary devices.
- Fixed flow control between modem and application.
- Obstructed satellite visibility detection feature for GNSS (Early Indoor / No GNSS signal detection)

nRF Connect SDK v2.0.0

- Focus on nRF Cloud, location, device management and security.
- Ease of use, documentation and optimizations.
- Updated Zephyr LwM2M stack to v1.1
- AVSystem Coiote LwM2M support
- Trusted Firmware-M (TF-M) as replacement for Secure Partition Manager
- nRF Connect for VS Code as default IDE

DevAcademy

nRF Connect SDK Fundamentals Course

nRF Connect SDK v2.0.0

- Enable power optimized and full featured device management and location services through LwM2M/CoAP
  - Support for nRF Cloud Location Services through LwM2M objects. Supported by our partner AVSystem
  - Supported in LwM2M client sample and Asset Tracker v2

nRF Connect SDK Fundamentals Course

nRF Connect SDK v2.0.0

- Easy to use location library APIs
  - Can combine different location technologies through same application API
- Updated MBedTLS 3.x.
- Unify development around nRF Connect for VS Code as default IDE

DevAcademy

nRF Connect SDK Fundamentals Course

Zephyr LwM2M v1.1

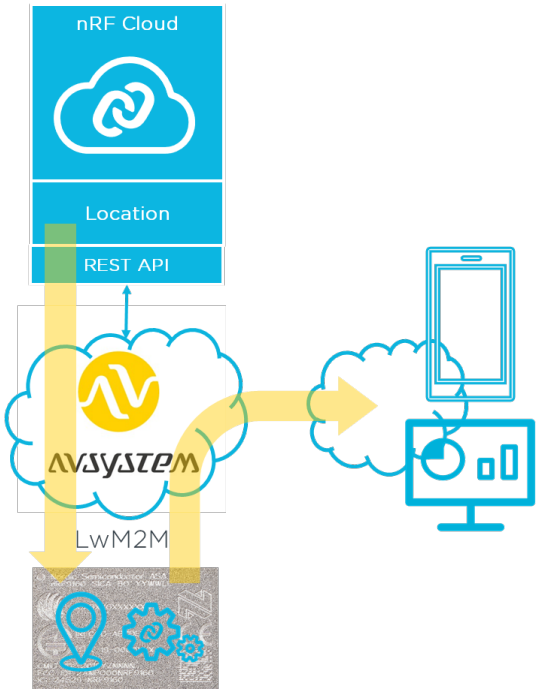
- App layer protocol with device management
- Based on CoAP/UDP, defined by Open Mobile Alliance
- LwM2M carrier library required in AT&T, T-Mobile or Verizon certified product
- LwM2M carrier sample

Zephyr LwM2M v1.1

- Composite Read, Write and Notification
- Send operation
- CBOR (and JSON) data format

AVSystem + nRF Cloud Location Services

- Full featured LwM2M device management.
  - With support for nRF Cloud Location Services.
- Using our Zephyr LwM2M stack. (Or AVsystem Anjay LwM2M stack).
- Nordic delivers location services and AVSystem device management.
- nRF Cloud Location Services through Coiote LwM2M Server
  - Used in both lwm2m client sample and Asset Tracker v2 application
- Free trial & getting started documentation. See partner page.



Efficiency comparison

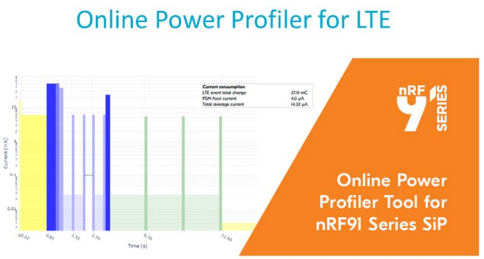
Device management for low power constrained devices

- Source MachNation, 2020
- Metrics of a typical IoT device
- AWS IoT MQTT broker
- AVSystem Coiote LwM2M
- Data reporting scenario
  - Update of one string, one floating-point number, one integer, and one Boolean every 30 seconds
  - 10 reports over 5 min
- FOTA scenario
  - Download 1,048,576 byte test file

	LwM2M	MQTT	Efficiency
Initial connection	4213 bytes	14907 bytes	LwM2M 72% more efficient
	14 packets	53 packets	
Steady-state	179 bytes	260 bytes	LwM2M 31% more efficient
	2 packets	3 packets	
Data reporting	1820 bytes	15394 bytes	LwM2M 88% more efficient
	10 packets	30 packets	
Single platform to device	181 bytes	217 bytes	LwM2M 17% more efficient
	2 packets	2 packets	
FOTA update	1.15 MB	1.11 MB	MQTT 4% more efficient

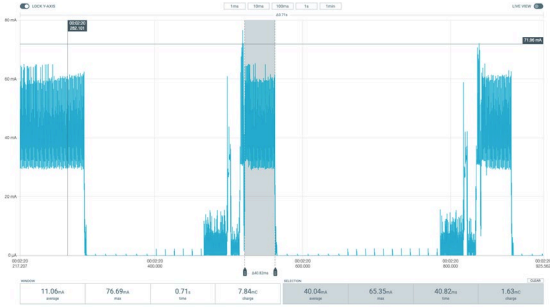
Tools for saving power

Online Power Profiler



Power Profiler Kit II

Power optimization guide



Get on it

#1 Sign up for more webinars at **webinars.nordicsemi.com**

#2 Get tech support and join our community at **devzone.nordicsemi.com**

#3 Find out more about our products and services at **nordicsemi.com**

NORDIC SEMICONDUCTOR

Q&A