Exciting new features in nRF Connect SDK v1.8

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Today's hosts

Bjørn Kvaale

Product Marketing Engineer

Krzysztof Loska

Technical Product Manager
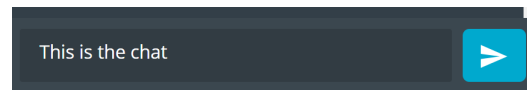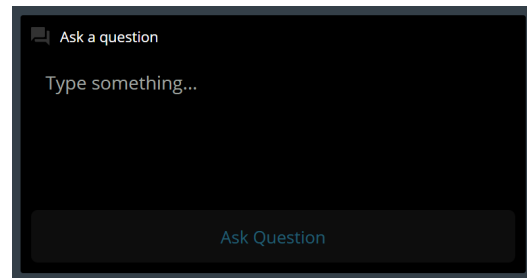Short-range wireless

Martin Lesund

Technical Marketing Manager
Cellular IoT

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

Agenda

- Intro to the nRF Connect SDK and basic terminology (15 min, Bjørn)

- Short-range updates in nRF Connect SDK v1.8 (15 min, Krzysztof)

- Cellular IoT updates in nRF Connect SDK v1.8 (15 min, Martin)

- Q&A (15 min)

Communities

Webinars

**Technology intros
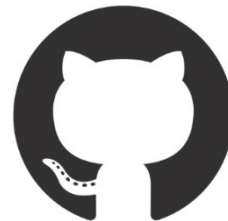and trainings**

nordicsemi.com/webinars

Nordic Developer Zone

**Nordic tech support center
& online community**
29k+ users, 60k+ 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

and basic terminology

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/GPS, Bluetooth Low Energy, Bluetooth mesh, Thread/Zigbee, Matter, ESB, Gazell, NFC
- Bluetooth v5.2 qualified Host and Controller stack since v1.4.1

nRF52 Series SDK Support

- nRF5 SDK
  - Good if you do not require an RTOS
  - If you are used to this SDK and do not require newer features after Bluetooth 5.0, Bluetooth mesh 1.0.1, Thread 1.1 or Zigbee 3.0 (R22)

- nRF Connect SDK support optional
  - Will support newer features after Bluetooth 5.0, Bluetooth mesh 1.0.1, Thread 1.1 or Zigbee 3.0 (R22)
  - Optional for the nRF52 Series

- See this statement for more info

| nRF52 Series Supported SDKs |
| --- |
| nRF5 SDK |
| nRF5 SDK for Bluetooth mesh |
| nRF5 SDK for Thread/Zigbee |
| nRF Connect SDK |

Code Base

- Contains app code, connectivity protocols, wireless stacks and peripheral drivers

- Code is organized in 4 main repositories (Nordic and Open Source (OS) code):

  - nRF – Application & Connectivity Protocols

  - nrfxlib – Peripheral Drivers and Stacks

  - Zephyr – RTOS & Board configuration (OS)

  - MCUBoot – Secure Bootloader (OS)

Nordic Applications
Connectivity Protocols, Security Libraries, DFU
Middleware
Zephyr RTOS / Wireless Stacks & Peripheral Drivers
Board Configuration
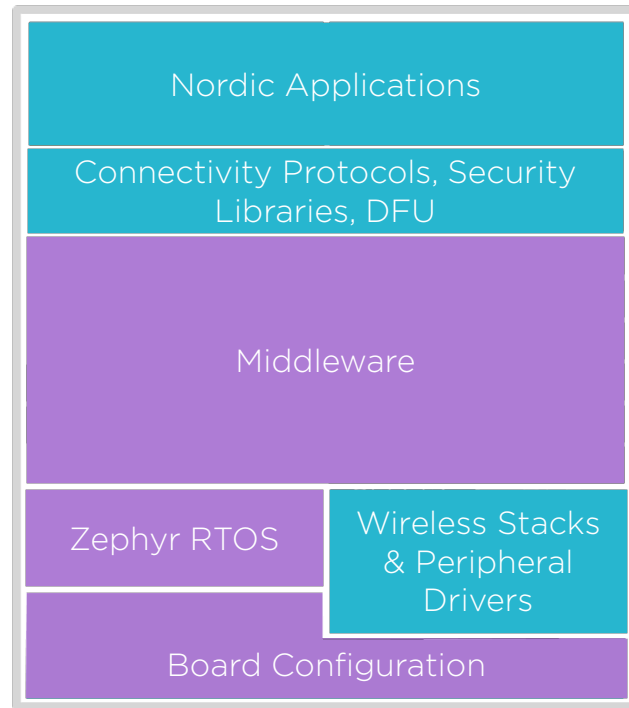
nRF Connect SDK Basic Terminology

- Git
  - An open source distributed version-control system for managing source code changes

- West
  - Command line tool for multi-repository management and building and flashing examples

- Repository
  - A version-controlled project folder e.g. nrf, zephyr
  - Every code commit creates a repository "version" with unique SHA identifier

nRF Connect SDK Basic Terminology

- Tag
  - Points to a specific commit SHA identifier, immutable
  - A human readable version reference
  - Nordic DevZone support is available

- Master/main branch
  - Points to the most recent commit SHA, mutable
  - Start testing newest features earlier
  - No DevZone support available

Manage Source Code and Configurations

West
Multi-repository management tool
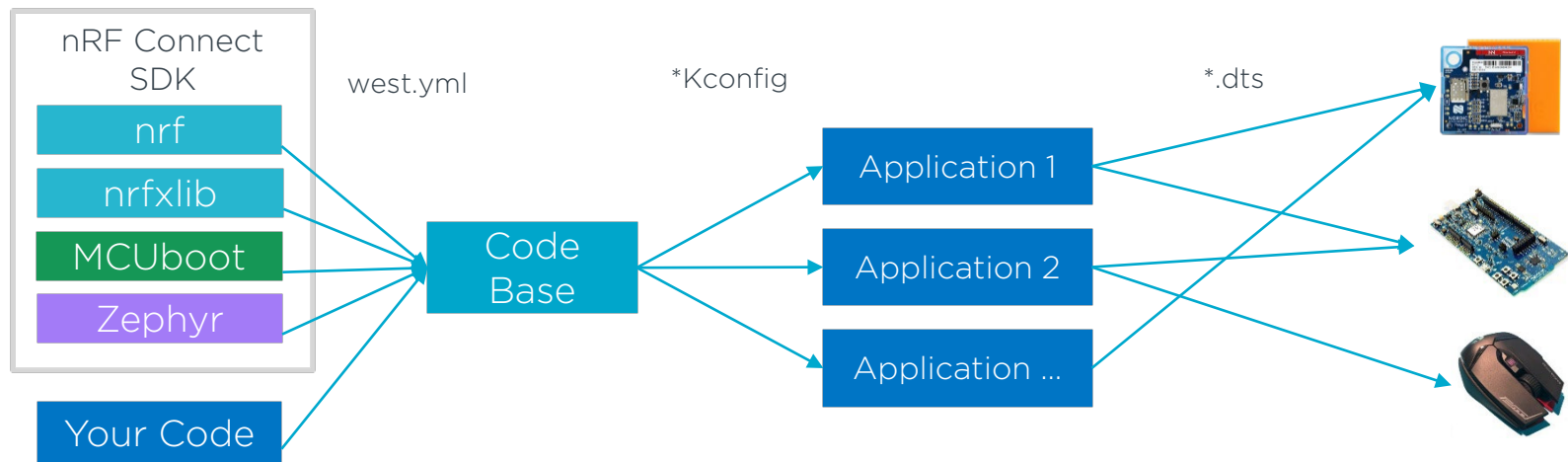
Kconfig
Source module / feature configuration for compile

Device Tree
Target Board / Device description

Clone / update

Configure features

Configure target

nRF Connect SDK

nrf

nrfxlib

MCUboot

Zephyr

Your Code

west.yml

*Kconfig

*.dts

Code Base

Application 1

Application 2

Application ...

Release Cycles

- Regular releases (e.g. quarterly)

- Publicly hosted on GitHub

- Fixes released as needed
  - Long term supported releases can have fixes applied and delivered after new releases

- Latest development version available

- Version control management with Git:
  - manage new version and fix adoption
  - tool supported merging
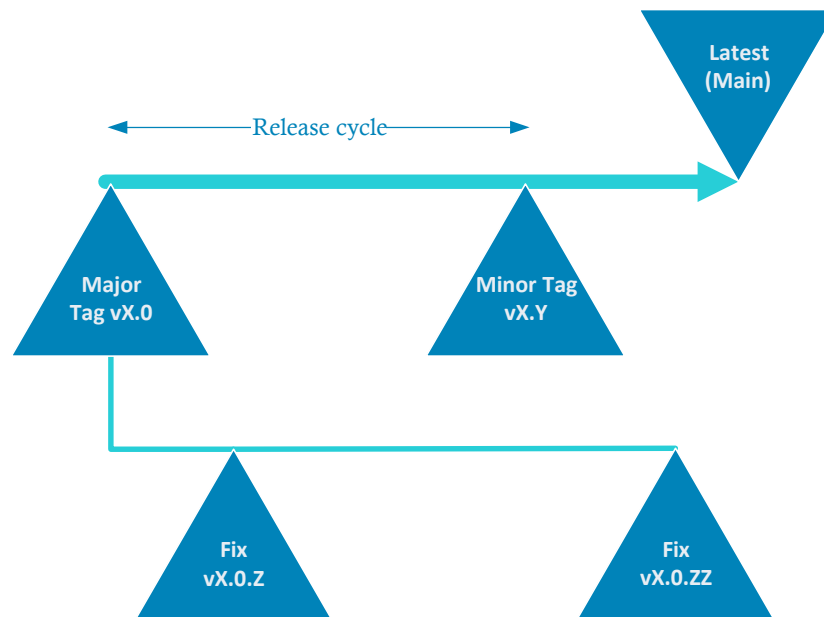
Supported for Development and Production

Features "supported for **Development**" may be used for development, but not recommended for volume production.

- Technical support is available
- Reported bugs may not be resolved until supported for Production
- Implementation may be partial
- APIs may change going to production
- Incomplete verification

- Suitable for prototype / evaluation

Features "supported for Production" will be maintained and are suitable for product development.

- Technical support is available
- Reported critical bugs will be resolved in both Main and latest Tag version of nRF Connect SDK.
- Complete implementations
- Verified for product development

- Suitable for integration in end-products

Experimental vs Supported

Experimental features/components may be used for development, but not recommended for volume production.

- Technical support available (tagged versions only)

- Reported bugs may not be resolved until feature/component is supported

- Implementation may be partial

- APIs may change going to supported

- Incomplete verification

- Suitable for prototype / evaluation

Supported features/components will be maintained and are suitable for product development.

- Technical support is available (tagged versions only)

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- Complete implementations

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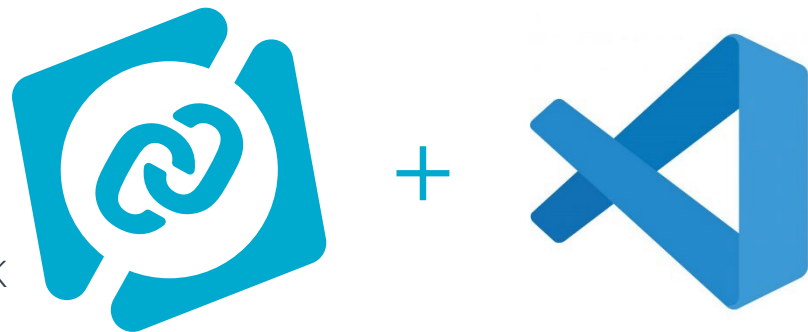
nRF Connect SDK documentation

- Documentation link

- Click on arrow in top left to choose documentation tag
  - 1.8.99 refers to main branch
  - Latest tag is 1.8.0

- Click on arrow in bottom left to switch to nrfxlib, Zephyr, MCUboot or other documentation
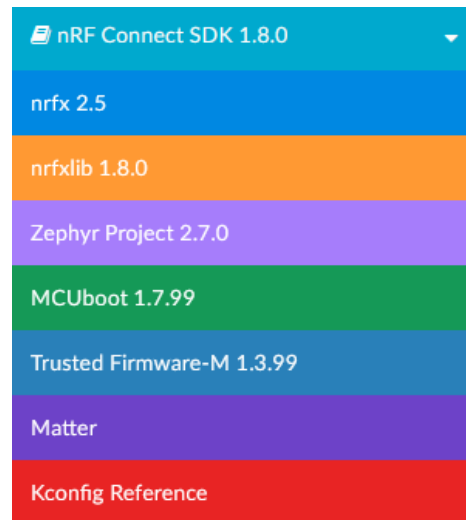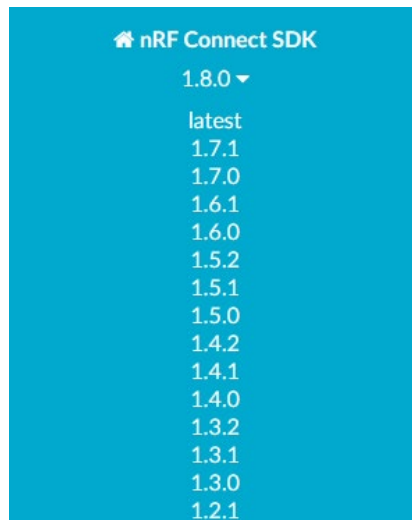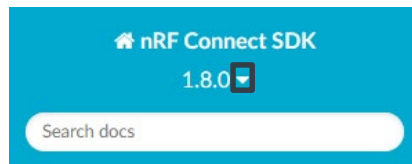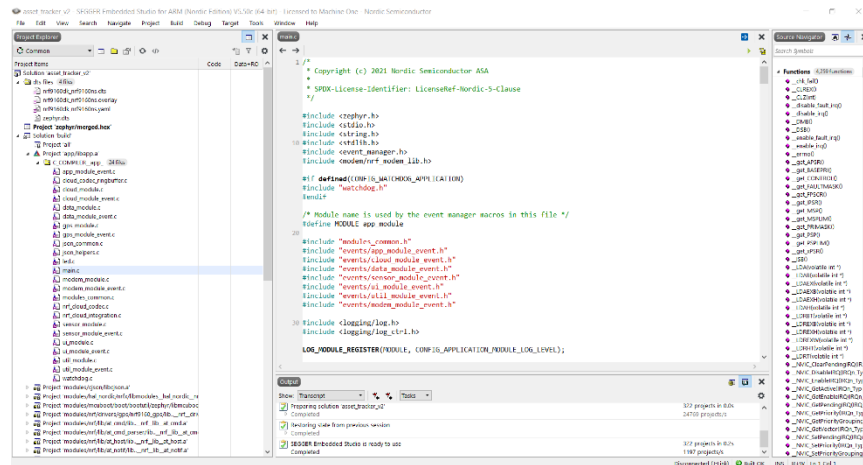
IDE support

- nRF Connect for Visual Studio Code

  - Built from the ground up for nRF Connect SDK

  - Highly extendable and configurable

  - CLI and GUI Interfaces

  - Cross-platform support

    > Windows, macOS, Linux

  - Create new board wizard

  - Rich set of tutorial videos
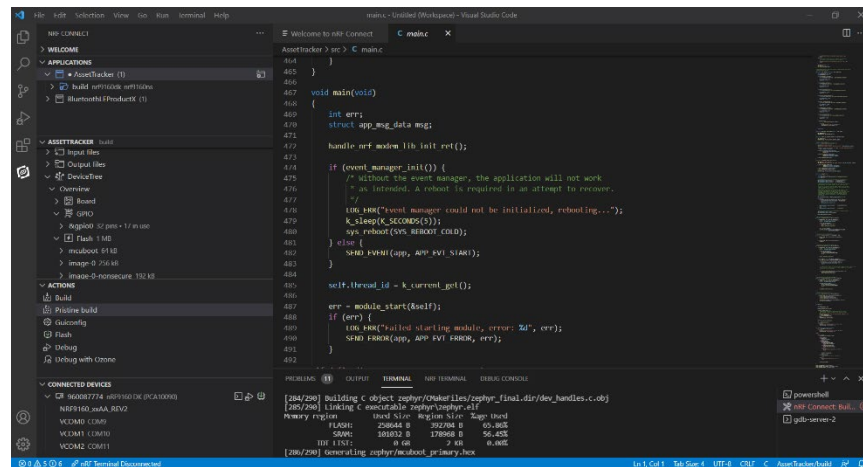
IDE support

Embedded Studio

- SEGGER Embedded Studio (Nordic Edition)
  - Cross-platform support (Windows, macOS, Linux)

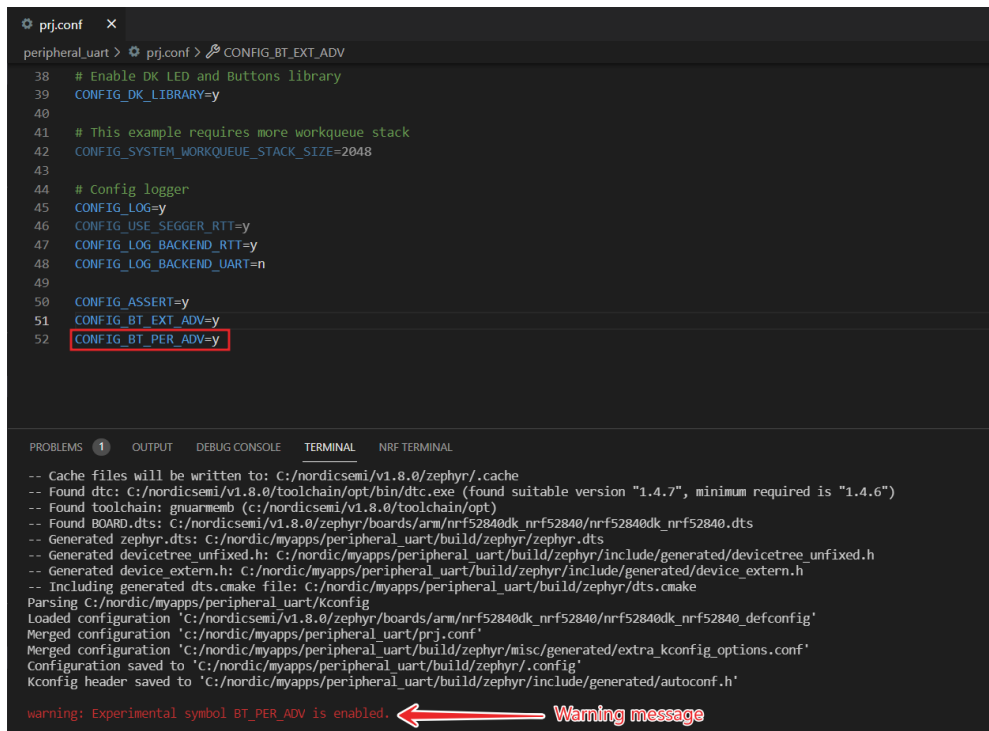- Any other IDE can be used with nRF Connect SDK
  - No nRF Connect SDK/toolchain integration.
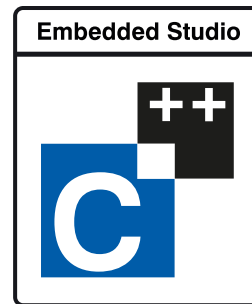
Generic Updates

nRF Connect SDK v1.8

Experimental features

- CONFIG_WARN_EXPERIMENTAL=y set in Kconfig (on by default)

- Can set features in Kconfig or prj.conf file
  - E.g. periodic advertising

- Building a sample that contains experimental features leads to a warning message

Experimental features

Short-range updates

nRF Connect SDK v1.8

SoftDevice Controller – new features
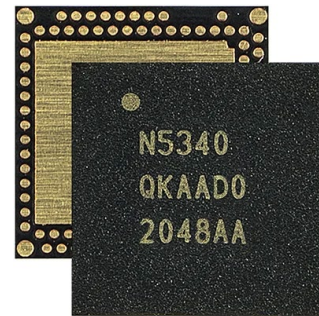
- Experimental support for Periodic Advertising

- Production support for a 3-wire Packet Traffic Arbitration (PTA) interface for external radio coexistence on the nRF52 Series. This interface is typically implemented in the Wi-Fi products

- Experimental support for a 1-wire PTA interface for external radio coexistence for the nRF52 Series. This interface is specific to Nordic Semiconductor's nRF91 Series

- Support for the Simple GPIO Front-End Module implementation on the nRF53 Series

nRF5340

nRF5340 SoC

Power and clock

Debug

Application

128MHz Arm® Cortex®-M33

1024kB Flash

512kB RAM

8kB ICache

IPC

Network

64MHz Arm® Cortex®-M33

256kB Flash

64kB RAM

2kB ICache

IPC

Multi-Protocol 2.4GHz Radio
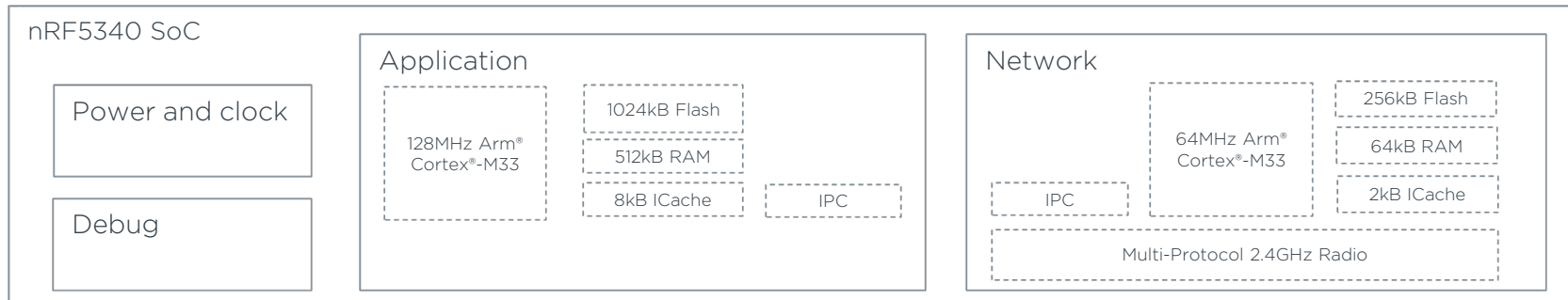
- Dual-core Bluetooth 5.3 SoC supporting Bluetooth LE, Bluetooth mesh, NFC, Thread and Zigbee

- The nRF5340 is the world's first wireless SoC with two Arm® Cortex®-M33 processors

- The ideal choice for LE Audio, professional lighting, advanced wearables, and other complex IoT applications

N5340
QKAAD0
2048AA

Remote procedure call library (nRF RPC)
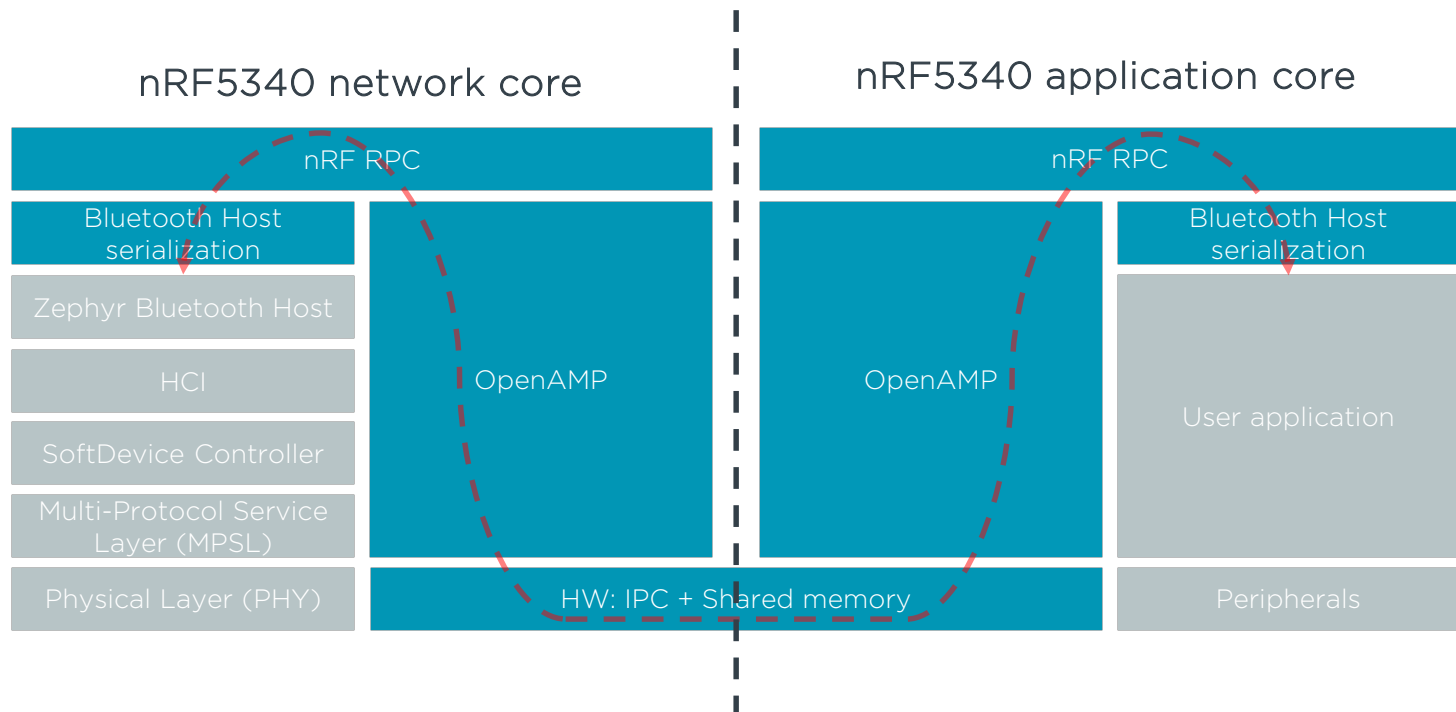
nRF RPC - samples

- ## Network core

  - The *Bluetooth: Host for nRF RPC Bluetooth Low Energy* sample is designed specifically to enable the Bluetooth LE stack functionality on a remote MCU (for example, the nRF5340 network core) using the Remote procedure call library (nRF RPC)

- ## Application core

  - To use the Bluetooth LE stack through nRF RPC, an additional configuration is needed. When building samples for the application core, enable the CONFIG_BT_RPC_STACK to run the Bluetooth LE stack on the network core

- More information can be found in the nRF Connect SDK documentation at *Libraries / Bluetooth libraries and services / Bluetooth Low Energy Remote Procedure Call*

Central and Peripheral HRS sample

- *Bluetooth: Central and Peripheral HRS* sample demonstrates how to use Bluetooth® with Central and Peripheral roles concurrently

- The sample demonstrates both Bluetooth® LE roles:
  - Central role - scans for a remote device providing Heart Rate Service
  - Peripheral role - advertises and exposes a Heart Rate Service

Bluetooth: Central /

Heart-rate Monitor sample

Bluetooth: Central and Peripheral HRS sample

Bluetooth: Peripheral HR sample
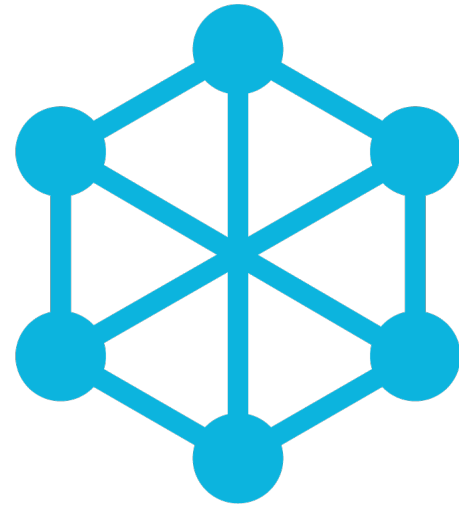
HEART RATE MONITOR

HEART RATE MONITOR

Bluetooth mesh updates

- Added *Bluetooth: Mesh and peripheral coexistence* sample, demonstrating how to combine Bluetooth mesh and Bluetooth Low Energy features in a single application

- Added support for nRF21540 DK

MESH

What is Matter?

- Matter (formerly *Project Connected Home over IP* or *Project CHIP*) is a standard unifying the smart home industry

- Matter is a promise of reliable, secure connectivity where devices work seamlessly together. Matter simplifies development for manufacturers and increases compatibility for consumers
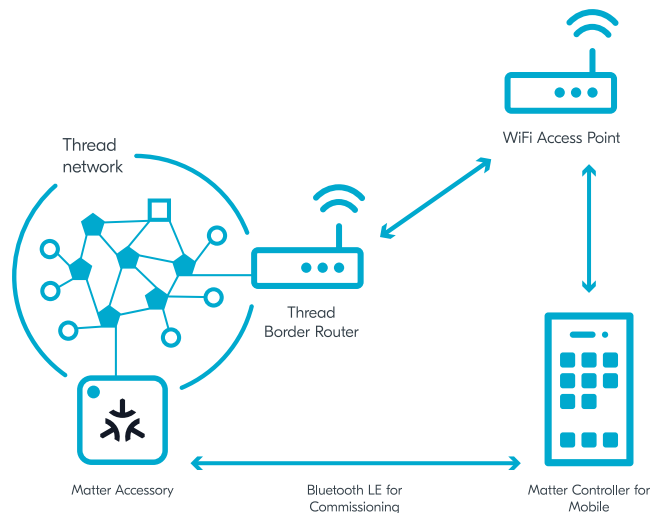
Some founding partners:

Matter updates

Thread network

Thread Border Router

WiFi Access Point

Matter Accessory

Bluetooth LE for Commissioning

Matter Controller for Mobile

- Energy consumption of Matter over Thread devices has been improved

- Added the *Configuring Matter in nRF Connect SDK* user guide

- Added a new documentation section *Configuring Matter* that contains several configuration guides for Matter

Apple HomeKit updates

- Integration of Apple's HomeKit Accessory Development Kit (ADK) v6.1

- Production support for nRF5340 for Thread and Bluetooth LE HomeKit accessories

- Production support for the nRF21540 front-end module combined with nRF53 Series SoCs

- MFi licensees can get access to the HomeKit repository by contacting us via Nordic DevZone private ticket


HomeKit

Zigbee updates

- Added *Zigbee shell* sample

- New version of the *Zigbee Network Co-Processor (NCP) Host* (v2.0.0)

- Added *Zigbee quick start guide*

Gazell

- Gazell is a proprietary 2.4 GHz wireless protocol for setting up a robust wireless link between a single Host and up to eight Devices in a star network topology

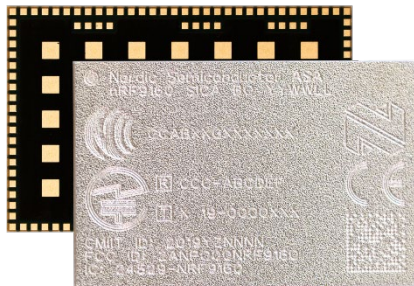- Gazell is supported on all nRF52 Series SoCs, with related libraries and samples
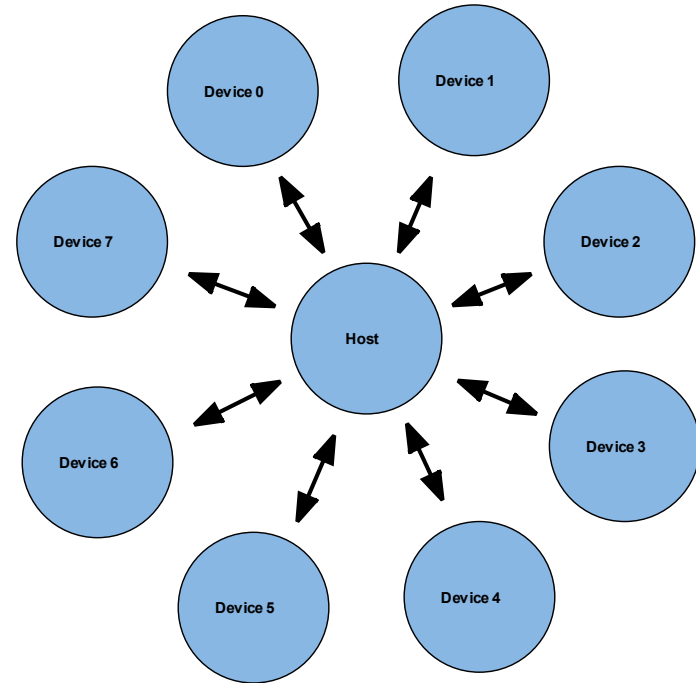
Cellular IoT updates

nRF Connect SDK v1.8

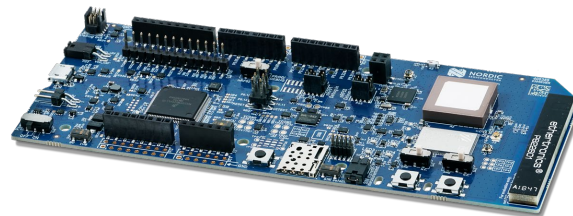# Complete low power cellular IoT solution

nRF9160

Dedicated application processor and memory

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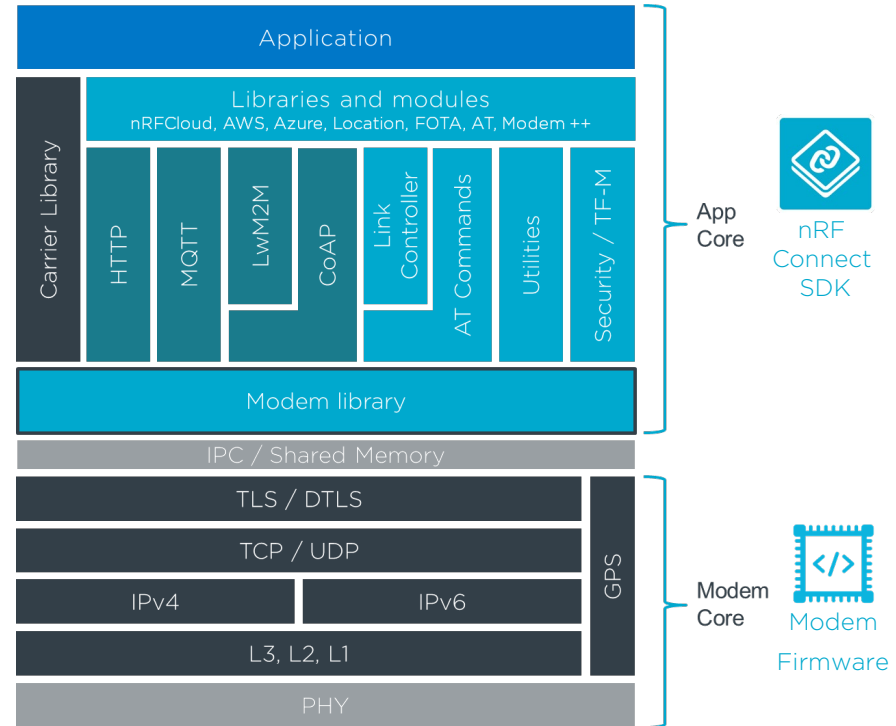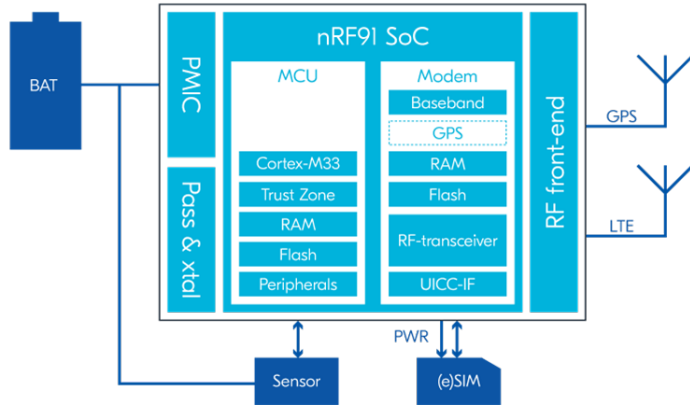
Ultra Low Power

nRF Connect

nRF Connect SDK

nRF Connect for Desktop

nRF Cloud

nRF9160 DK

Standalone development kit for the nRF9160 SiP

eSIM from iBasis

nRF52840 board controller with Bluetooth LE
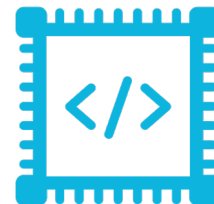
LTE, GPS, and 2.4 GHz antennas

nRF Connect SDK overview

Modem

Modem firmware 1.3.1

- Full changelog

- Compatibility matrix

Modem library 1.4.1

- Modem firmware 1.3.1 features

- General bug fixes and improvements

- Additional version of lib. Is released capable of outputting logs

- Added more GNSS flexibility parameters

- Removed:
  - The GNSS/PDN socket has been removed.
  - This was replaced in nRF Connect SDK v 1.5.0 by GNSS v2 API and PDN library
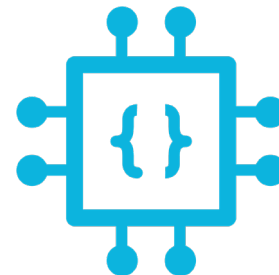
Libraries

- <u>Location</u> Library
  - GNSS (A/P-GPS), Cellular and Wi-Fi

- <u>AT shell</u> library
  - Add AT shell command to a shell

- <u>LTE Link Controller</u> Library
  - Neighbor cell measurement search type
  - Timing advance measurement time to current cell data event

- Full list of <u>all the libraries updates</u>
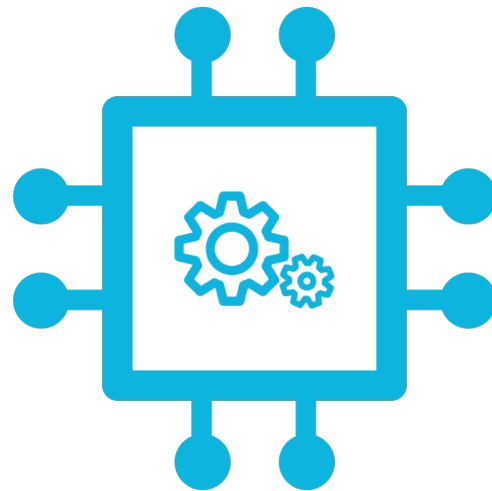
Device management

- **LwM2M carrier** library v0.21.0
  - Supports also non-bootstrap custom URI
  - Support reading info from Smartcard
  - Added cellular connectivity object and location object
  - Added new event to indicate modem domain events

- **LwM2M client utils** library
  - Based on Zephyrs LwM2M stack
  - Added support for Firmware Update object to use **FOTA download** library
  - Added support for full modem firmware update
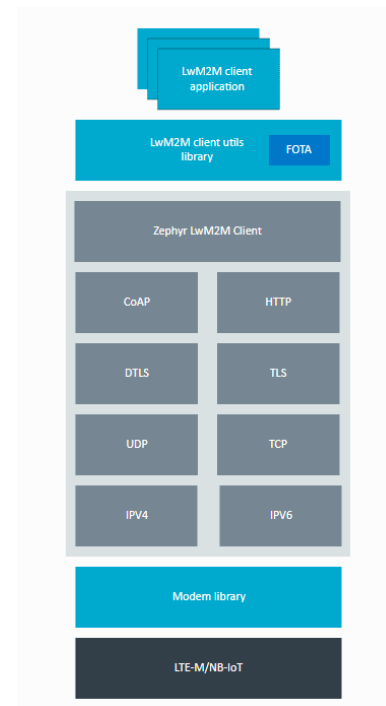
Samples

- [NEW] nRF Cloud REST FOTA sample
- HTTPS client sample
  - Added possibility to use TF-M and Zephyrs Mbed TLS
- LwM2M Client sample
  - Support for Thingy:91 (sensor objects using the sensors onboard)
  - More LwM2M objects (full modem support)
- Modem Shell sample
  - Added a lot of new commands and support
- GNSS sample (*A-GPS Sample removed*)
  - Added periodic fixes, power saving, low accuracy fixes, nrf cloud A-GPS/P-GPS

Asset Tracker v2

- Added support for A-GPS/P-GPS in Azure IoT hub integration

- Content type and encoding properties to outgoing azure messages

- Split the "prj.conf" files to quickly build application for different configurations
  - Depending on connecting to which cloud
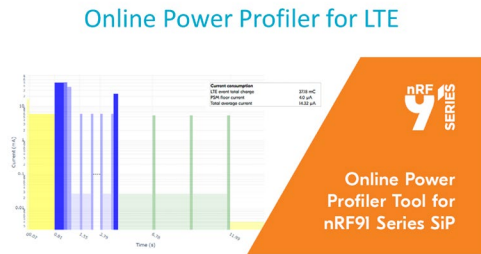 - Low power properties
  - Memfault
  - Etc.

Serial LTE Modem

- Added XNRFCLOUD command
  - Send/receive from nRF Cloud JSON messages in datamode
  - Ability to read out the sec_tag and the UUID
- Added #UUID command to read out from modem
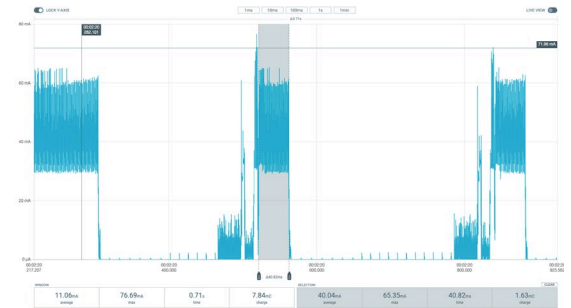- Added new AT commands related to GPIOs
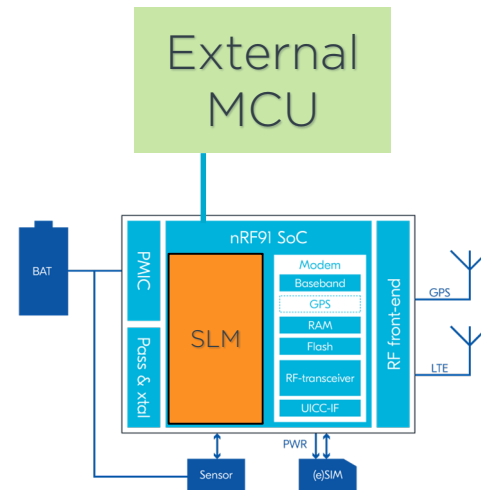
Tools for saving power

Online Power Profiler

Power Profiler Kit II

Power optimization guide

© Nordic Semiconductor

Supported Modem firmware

- [mfw_nrf9160 v1.3.1](#)

- [Compatibility matrix](#)

- [nRF9160 Certification web page](#)

nRF9160 modem firmware version	nRF Connect SDK
1.2.3	1.4.0 1.4.1 1.4.2 1.5.0 1.5.1
1.2.7	1.5.1
1.3.0	1.6.0 1.6.1 1.7.0
1.3.1	1.7.0 1.8.0

Table 1. nRF9160 modem firmware and nRF Connect SDK versions

Get on it

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

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

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Q&A