Exciting new features in nRF Connect SDK v1.6

A part of Mobile World Congress experience

NORDIC® SEMICONDUCTOR

Today's hosts

Bjørn Kvaale

Product Marketing Engineer

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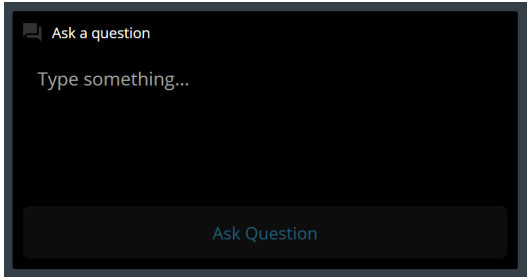
Technical Product Manager
Short-range wireless

Joakim Tønnesen

Technical Product 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



{ DevZone

Agenda

- Intro to the nRF Connect SDK and basic terminology (15 min, Bjørn)
- Short-range updates in nRF Connect SDK v1.6 (15 min, Krzysztof)
- Cellular IoT updates in nRF Connect SDK v1.6 (15 min, Joakim)
- Q&A (15 min)

Communities

Webinars

Technology intros and trainings

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Nordic Developer Zone

{DevZone

Nordic tech support center & online community

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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

- All in one place
- One code base and toolchain for nRF91, nRF53 and nRF52 Series
- Optional for nRF52 Series (>= v1.3.0 tag)
- Includes Bluetooth Low Energy, Bluetooth mesh, Thread/Zigbee and LTE-M/NB-IoT/GPS
- nRF Connect SDK v1.4.1 introduces Bluetooth v5.2 qualified Host and Controller

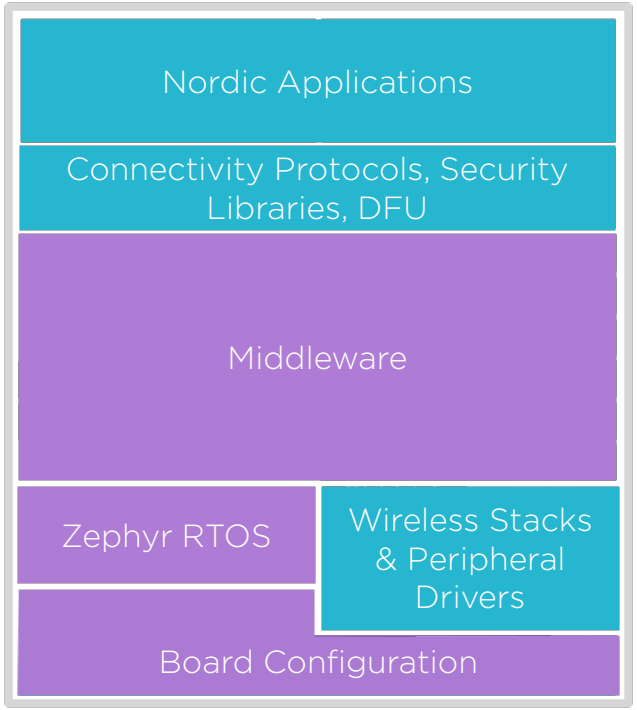
nRF52 Series SDK Support

- 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 documentation or webinar 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)



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 product development support is available
- Master branch
  - Points to the most recent commit SHA, mutable
  - Start testing newest features earlier

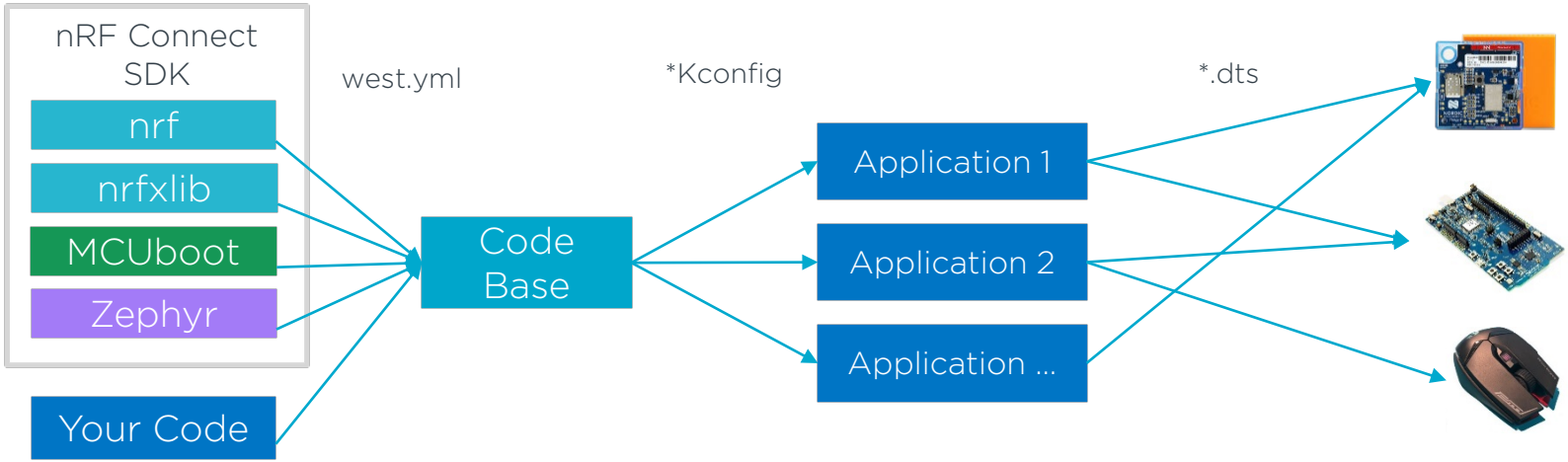
Manage Source Code and Configurations

West
Multi-repository management tool

Kconfig
Source module / feature configuration for compile

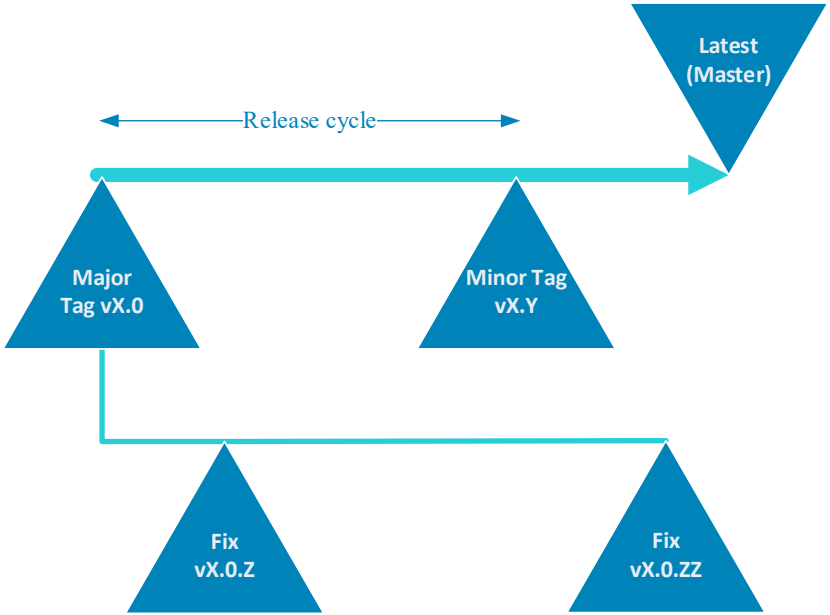
Device Tree
Target Board / Device description

Clone / update → Configure features → Configure target



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

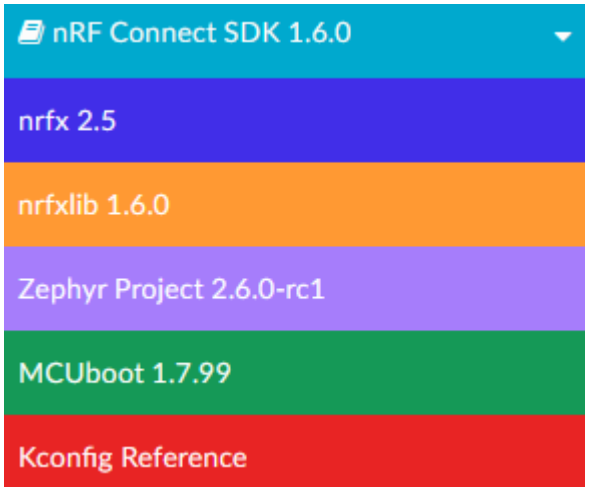
Features “supported for **Production**” will be maintained and are suitable for product development.

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

- Suitable for integration in end-products

nRF Connect SDK documentation

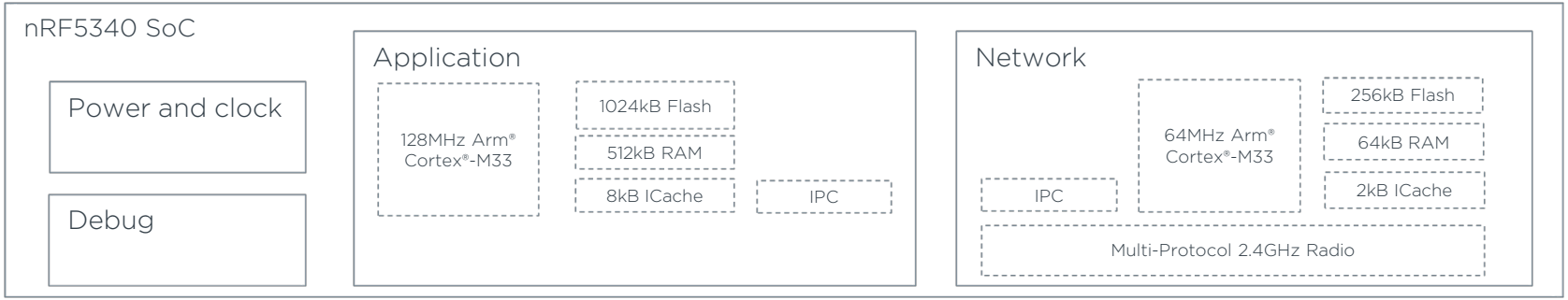
- Documentation link
- Click on arrow in top left to choose documentation tag
  - 1.6.99 refers to master branch
  - Latest tag is 1.6.0
- Click on arrow in bottom left to switch to nrfxlib, Zephyr or MCUboot doc



Short-range updates

nRF Connect SDK v1.6

nRF5340 – our flagship SoC

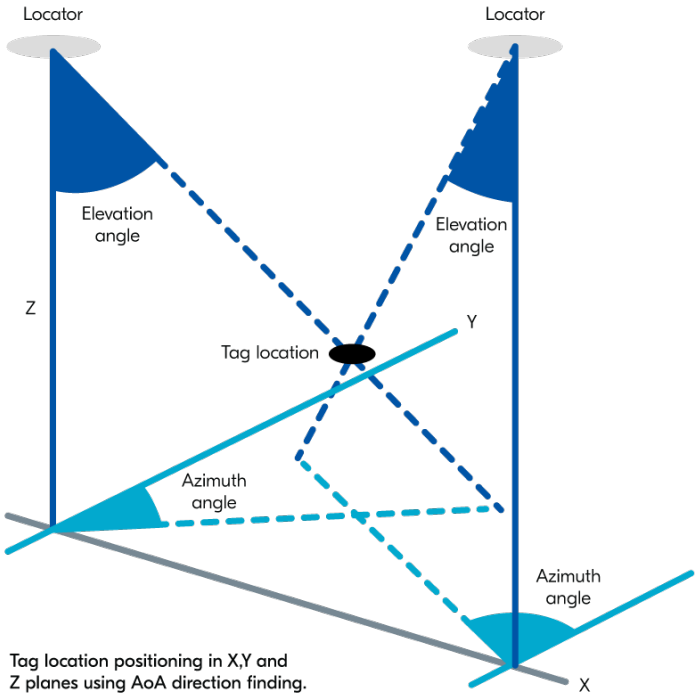


- The nRF5340 is the world's first wireless SoC with two Arm® Cortex®-M33 processors
- The ideal choice for LE Audio, professional lighting, advanced wearables, and other complex IoT applications

nRF5340 – status of connectivity protocols

Protocol	Status in NCS 1.6.0
Bluetooth LE	For production
Bluetooth mesh	For development
Thread	For production
Thread + Bluetooth LE Peripheral	For production
Zigbee	For development
Zigbee + Bluetooth LE	For development

Bluetooth Direction Finding



Tag location positioning in X,Y and Z planes using AoA direction finding.

- Bluetooth Direction Finding is the major feature of the Bluetooth 5.1 Core specification
- Samples demonstrating the direction finding feature based on periodic advertising (connectionless), available for the nRF52833 DK:
  - Bluetooth: Direction finding connectionless locator
  - Bluetooth: Direction finding connectionless beacon

Apple Find My network

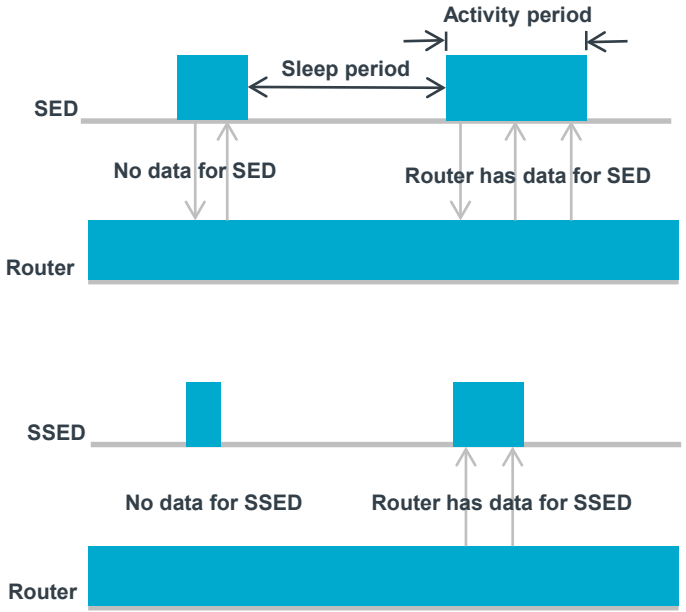
- Apple Find My network accessory program opens up the private and secure Find My network to third-party device manufacturers
- nRF Connect SDK 1.6.0 intergates Apple Find My supported for production
- Apple MFi Program members can get access to the Find My repository by contacting us via a Nordic DevZone private ticket

Apple HomeKit updates

- nRF Connect SDK supports both - HomeKit over Thread and HomeKit over Bluetooth Low Energy
- Apple's HomeKit Accessory Development Kit v5.3 have been integrated into the nRF Connect SDK 1.6.0 and is distributed as a private GitHub repository
- Added development support for nRF52832 and nRF52833 for Bluetooth LE HomeKit accessories
- MFi licensees can get access to the HomeKit repository by contacting us via Nordic DevZone private ticket

Thread 1.2 - SED vs. SSED

- 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, It has its radio turned off during idle periods and wakes periodically to listen for messages from its parent at scheduled intervals

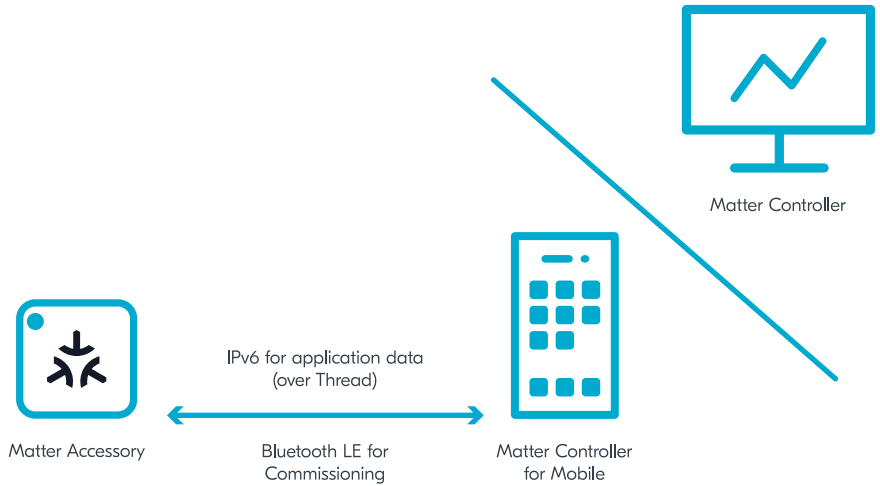


What is Matter?

- 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:

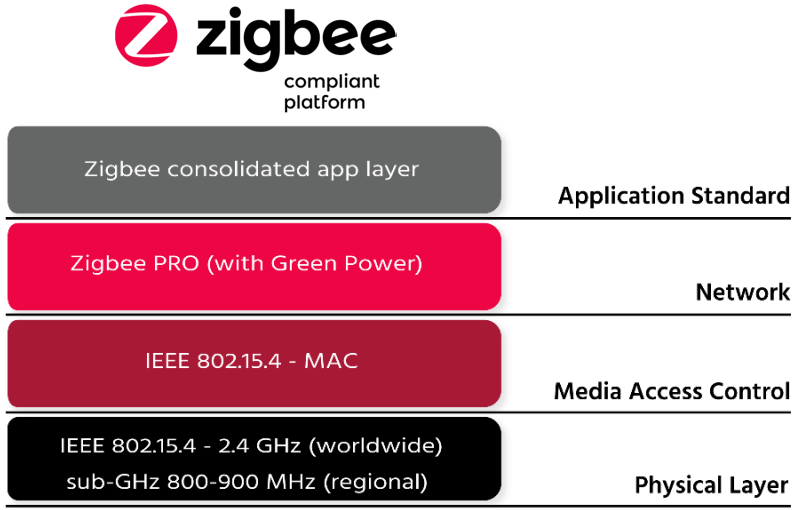
Matter updates



- Updated the Matter fork in the nRF Connect SDK to a recent revision which brings several new, important functionalities
- Added a new user guide about configuring Matter development environment

Zigbee updates

- nRF Connect SDK 1.5.1 features production support for Zigbee for nRF52833 and nRF52840
- In nRF Connect SDK 1.6.0 Zigbee is supported for development
- The application layer part of ZBOSS Zigbee stack is available in source code now



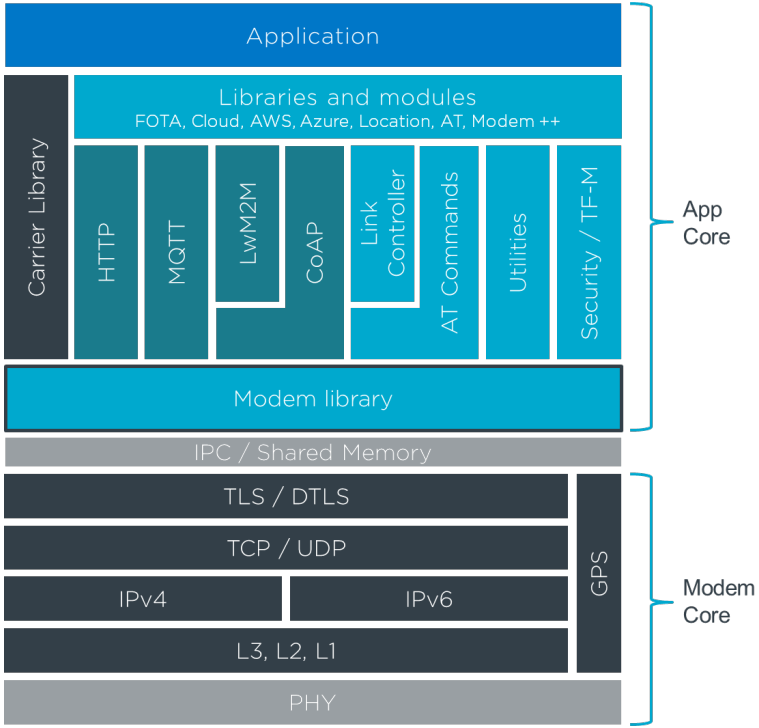
nRF Machine Learning application

- Edge Impulse is a development platform that can be used to enable embedded machine learning on nRF Connect SDK devices
- The nRF Machine Learning application is an out of the box reference design of an embedded machine learning using Edge Impulse
- The application gathers data from sensors, forwards data to the Edge Impulse platform, and runs the machine learning model

Cellular IoT updates

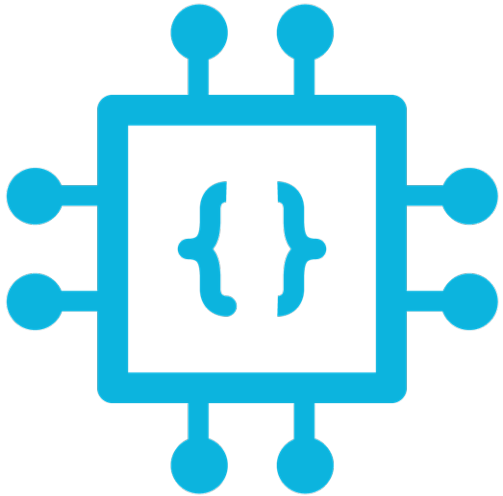
nRF Connect SDK v1.6

Overview



Modem

- Modem firmware v1.3.0
  - Webinar
- Modem library v1.2.1
  - Modem firmware v1.3.0 features.
  - GNSS Socket replaced by a new GNSS v2 API.
  - PDN socket replaced by new PDN library in NCS.
  - Release assistance indication (RAI) socket feature.
  - Smaller updates and bug fixes like new socket options, cleanup of error codes, and more



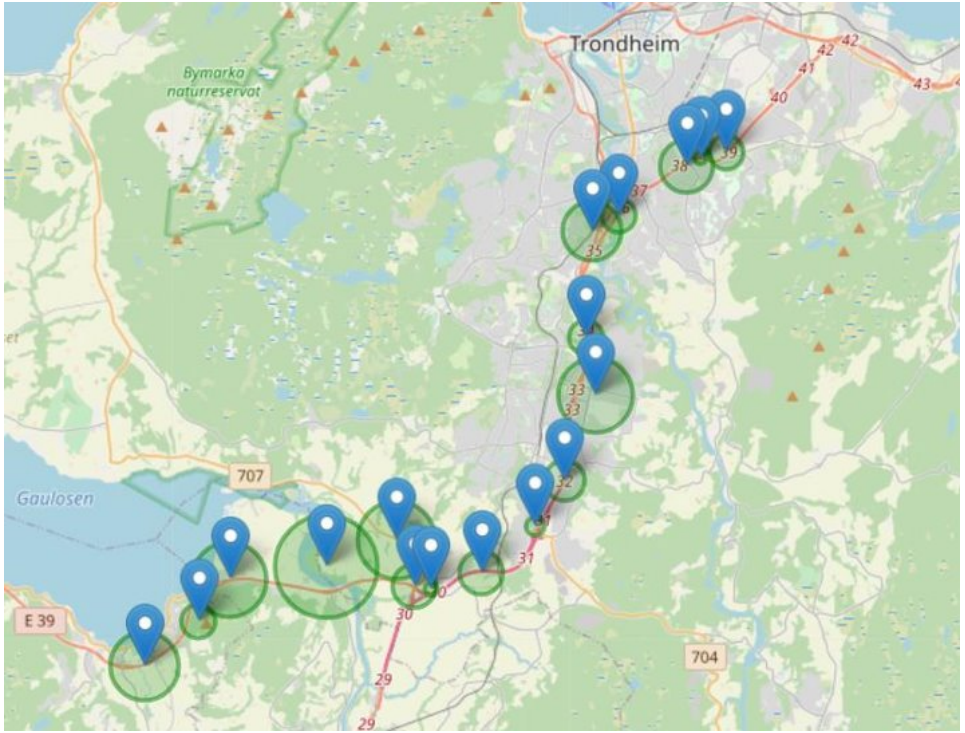
Device management

- LwM2M carrier library v0.20.1
  - Add more configuration options.
  - Now possible to use with custom LwM2M server.
- LwM2M client utils library
  - Simple inclusion of device management in custom applications.
  - Based on the Zephyr LwM2M stack
- FOTA download library
  - Added APIs to retrieve the **image type** that is being downloaded, **cancel** current downloading and **validate** image type before starting installation.

Location

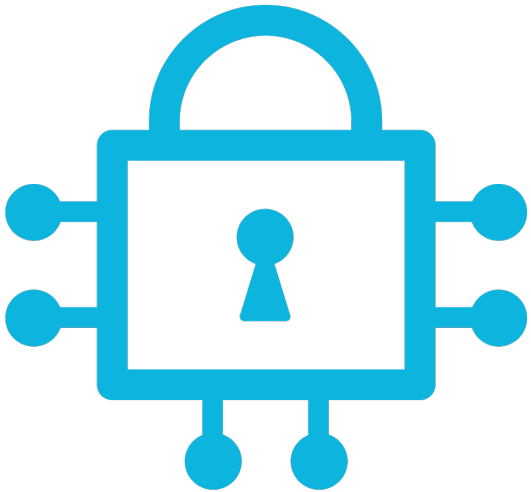
- nRF Cloud P-GPS library
  - Easy integration into custom applications.
  - Sample and application support.
    - nRF9160: Asset Tracker v2 application
    - nRF9160: A-GPS sample
- Multicell location library
  - Support nRFCloud, Skyhook and HERE.
  - nRF9160: Multicell location sample.

Multicell location



Security

- Trusted Firmware-M. Supported for development.
  - Using CryptoCell runtime libraries.
  - Support for PSA protected storage
    - Secure storage of certificates.
  - Encryption of stored data.
    - Using device specific keys
  - Various samples demonstrating usage
    - The TF-M Hello World sample
    - All cryptography samples in this SDK
    - A series of TF-M integration samples available in Zephyr

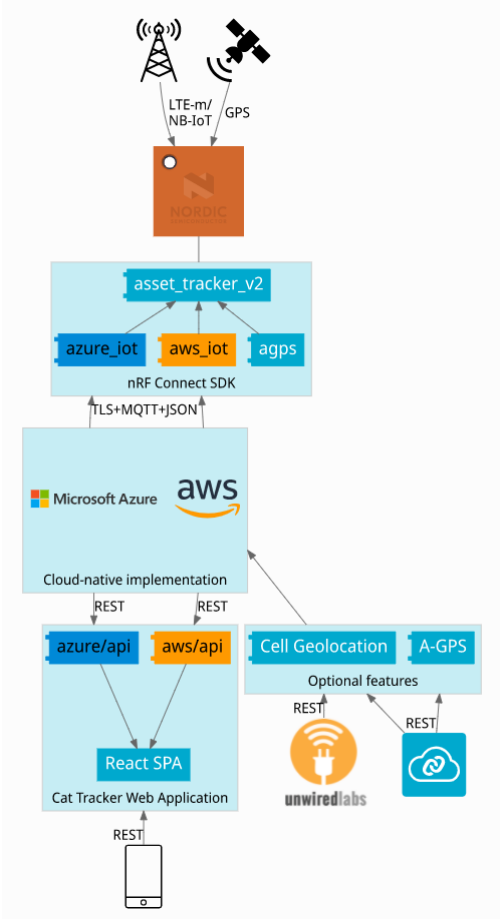


What is Trusted Firmware-M (TF-M)?

- Trusted Firmware-M (TF-M) is the reference implementation of Platform Security Architecture (PSA). PSA is a recipe for building secure connected devices from analysis to implementation
- TF-M is being built for ARM Cortex-M processors prioritizing v8-M Cortex cores leveraging ARM TrustZone technology
- TF-M provides a highly configurable set of software components to create a Trusted Execution Environment. This is achieved by a set of secure run time services such as Secure Storage, Cryptography, Audit Logs and Attestation
- Additionally, secure boot in TF-M ensures integrity of Run time Software and supports firmware upgrade

nRF Asset Tracker

- End-to-end Asset tracker implementation.
- Firmware - Asset tracker v2
  - AWS IoT support. (Already supported in NCS v1.5.0)
  - Microsoft Azure IoT support.
  - **nRF Cloud support**. Default configuration.
    - Out of box support for A-GPS and P-GPS.
- Cloud - nRF Asset Tracker
  - Support both AWS and Azure
- Hardware
  - Nordic Thingy:91
  - nRF9160-DK

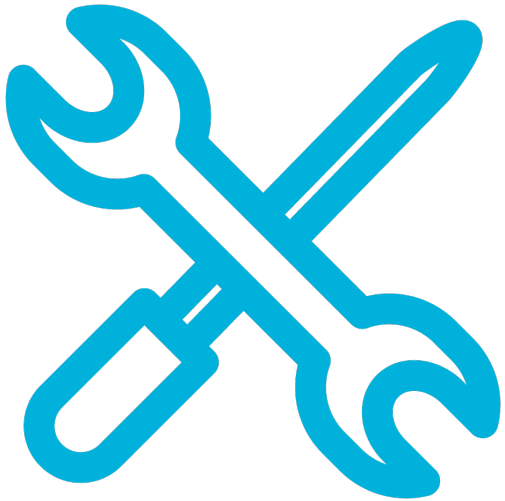


ARM Pelion – supported for development

- Collaboration with ARM.
- Integration of ARM pelion client sample in NCS.
- Works with both Cellular and Thread.
- Uses Pelion's *mbed-cloud-client* library.
  - Module in *ncs/modules/lib/pelion-dm.*
- User guide

Modem shell (MoSh)

- The Nordic modem team test application.
- Utilizes Zephyr shell to provide command-line interface for users.
- Easily scriptable for automated test environments..
- Testing of connectivity features such as:
  - LTE link handling, TCP/IP connections, data throughput (iperf3 and curl), SMS, GNSS, FOTA updates and PPP.

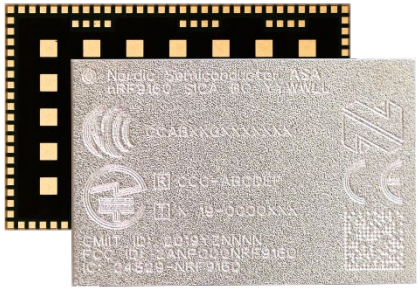


Serial LTE modem

- Add TWI service to communicate with peripheral device.
- Added AT#XSLEEP=2 to power off UART interface.
- Updated the HTTP client service code to handle chunked HTTP responses.
- Added support for the verbose, uput, mput commands and data mode to the FTP service.
- Added data mode to the MQTT Publish service to support JSON-type payload.
- Fixed TCP/UDP port range issue (0~65535).
- Added URC (unsolicited response code) to the FOTA service.
- Enabled all SLM services by default.

Complete low power cellular IoT solution

nRF9160



Dedicated application processor and memory

Multimode LTE-M / NB-IoT modem with integrated RFFE

GPS

Ultra Low Power

nRF Connect

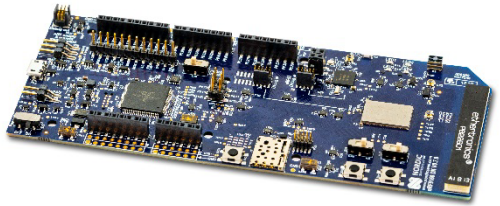
Nordic Semiconductor nRF Connect SDK

nRF Connect for Desktop

nRF Connect for Cloud

nRF Connect for Mobile

nRF9160 DK



Standalone development kit for the nRF9160 SiP

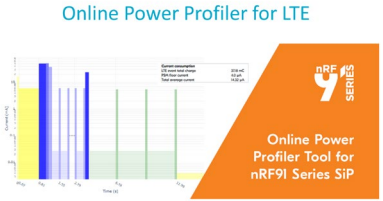
eSIM from iBasis

nRF52840 board controller with Bluetooth LE

LTE, GPS, and 2.4 GHz antennas

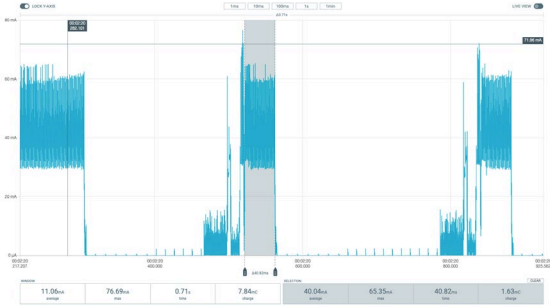
Tools for saving power

Online Power Profiler



Power Profiler Kit II

Power optimization guide



Program for Mobile World Congress 2021

Date	Topic
June 28, 10:00 CEST	How to power optimize with the latest features in the nRF9160 SiP
June 29, 09:00 CEST June 29, 18:00 CEST	Expand cellular IoT coverage with Ibasis IoT connectivity
June 30, 10:00 CEST	How cloud helps your IoT devices to get location data
July 1, 09:00 CEST July 1, 20:00 CEST	Exciting new features in nRF Connect SDK v1.6

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Q&A