



Exciting new features in nRF Connect SDK

Learn about the next generation SDK v.1.4.0 for Nordic wireless solutions

Webinar

Nordic Semiconductor

November 2020

Duration: 60 min

Today's hosts

Bjørn Kvaale



Product Marketing Engineer



Krzysztof Loska



Technical Product Manager
Short-range wireless



Joakim Tønnesen

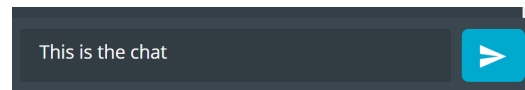
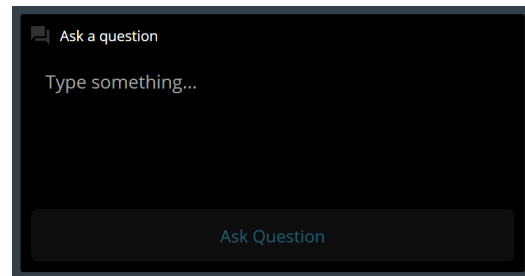


Technical Product Manager
Cellular IoT



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



Content

- Intro to the nRF Connect SDK and basic terminology (15 min, Bjørn)
- Short-range updates in nRF Connect SDK v1.4 (15 min, Krzysztof)
- Cellular IoT updates in nRF Connect SDK v1.4 (15 min, Joakim)
- Q&A (15 min)

nRF Connect



nRF Connect



nRF Connect SDK

Samples and Applications

Middleware

RTOS

Libraries

Hardware drivers



nRF Connect for Desktop

Getting Started Assistant

Toolchain Manager

Bluetooth Low Energy

Programmer

LTE Link Monitor

Trace Collector



nRF Connect for Cloud

Examples

Device Management

SIM Management



Mobile Applications

nRF Connect for Mobile

nRF Mesh

nRF Toolbox for Bluetooth LE

Nordic Thingy

nRF Cloud Gateway

nRF Connect SDK intro

and basic terminology

nRF Connect SDK

- One code base and toolchain for nRF52, nRF53 and nRF91 Series
- Optional for nRF52 Series
- Production support for nRF52 and nRF91 Series
- Development support for nRF52 Series (\geq v1.3.0 tag)



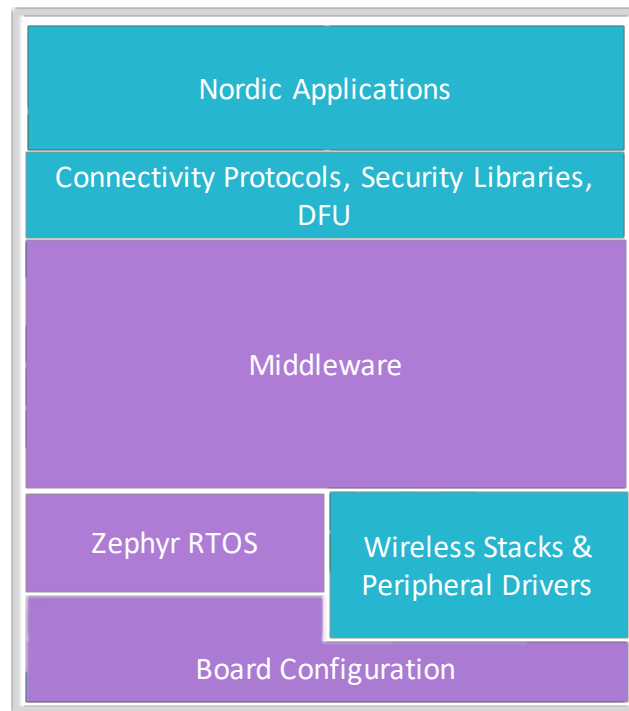
nRF Connect SDK

- Includes Bluetooth LE, Bluetooth mesh, Thread/Zigbee and LTE-M/NB-IoT support
- Bluetooth 5.1 and Bluetooth 5.2 support in development
- Includes Zephyr RTOS
 - Designed and built for low-power embedded applications
 - Independently governed by Linux Project



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

Supported for Development and Production

Features “supported for Development” may be used for development, but not recommended for volume production.

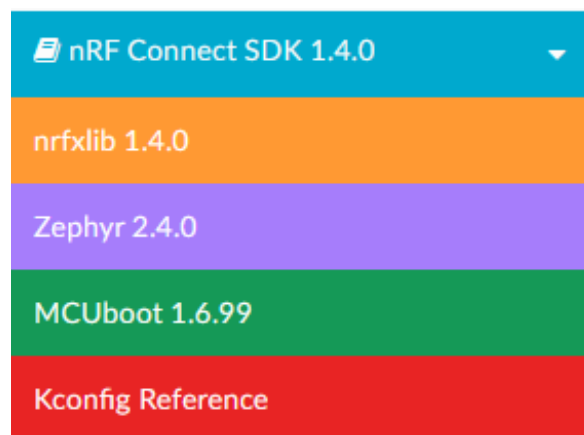
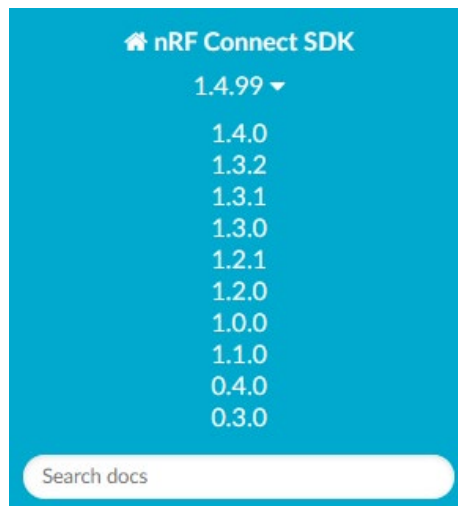
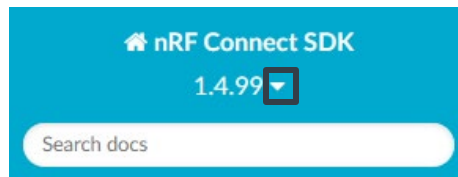
- Technical support is available
- Reported bugs may not be resolved until supported for Production
- Implementation may be partial
- APIs may change going to production
- Incomplete verification
- Suitable for prototype / evaluation

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

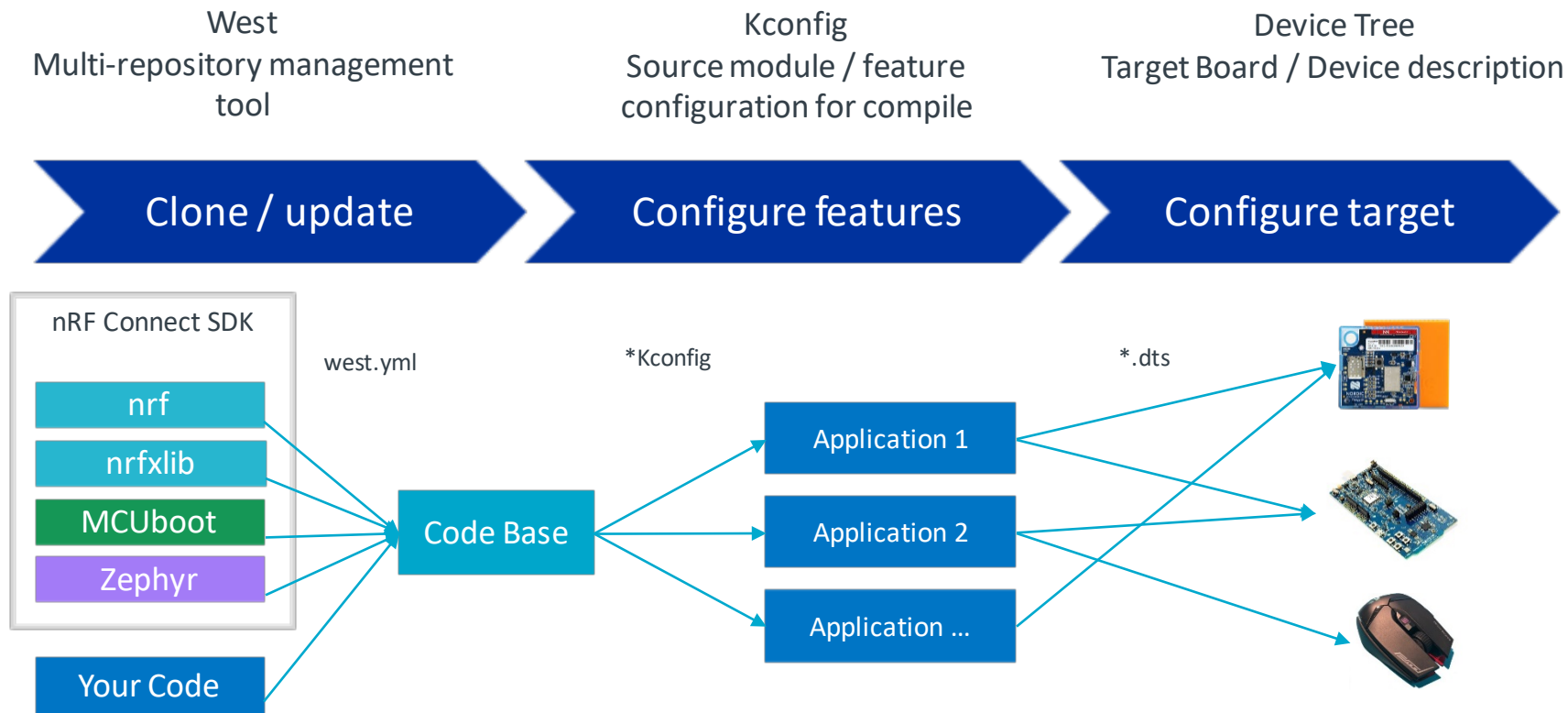
- Technical support is available
- Reported critical bugs will be resolved in both Master and latest Tag version of nRF Connect SDK.
- Complete implementations
- Verified for product development
- Suitable for integration in end-products

nRF Connect SDK documentation

- [Documentation link](#)
- Click on arrow in top left to choose documentation tag
 - 1.4.99 refers to master branch
 - Latest tag is 1.4.0
- Click on arrow in bottom left to switch to nrfxlib, Zephyr or MCUboot doc

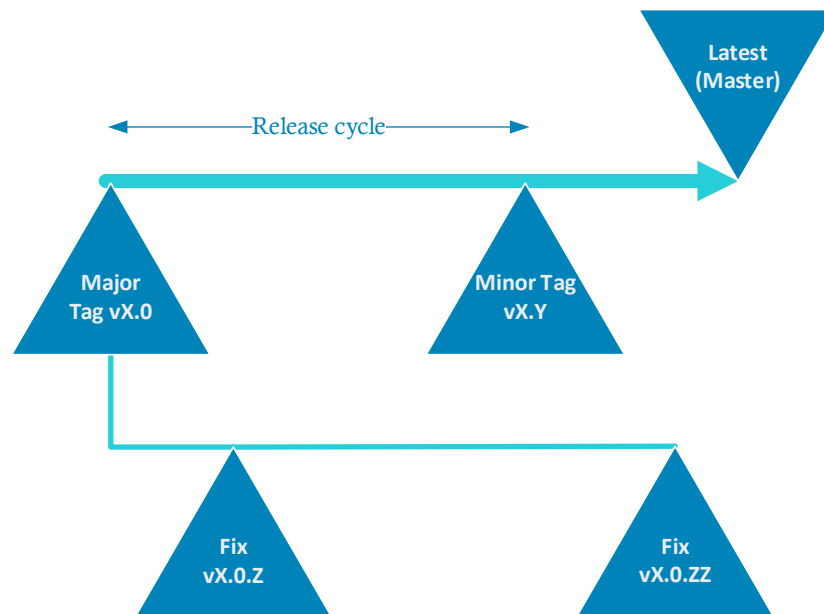


Manage Source Code and Configurations



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



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, 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

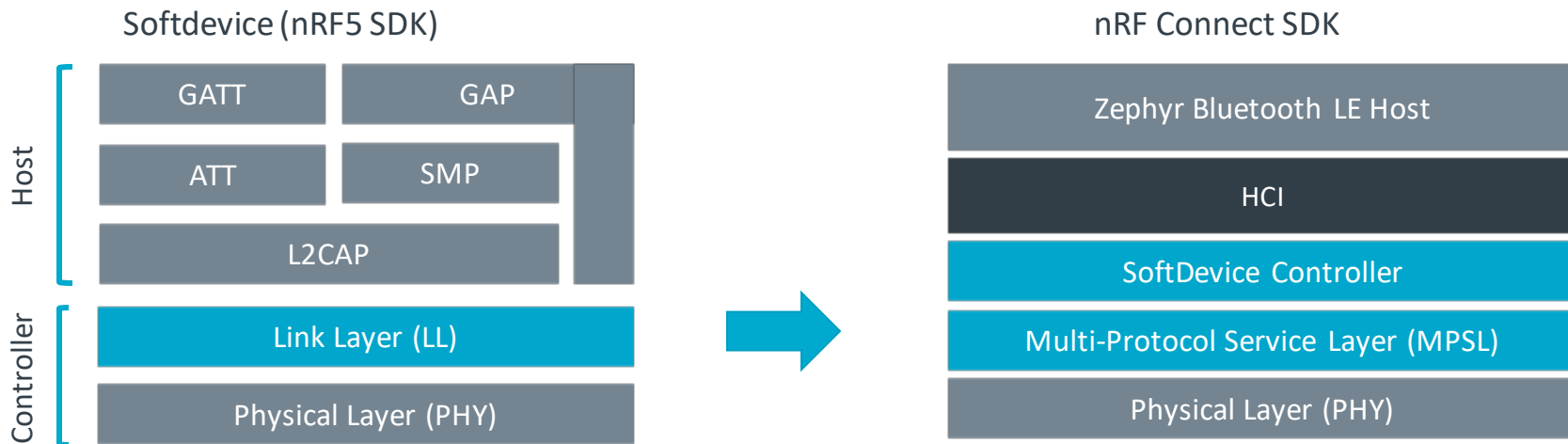
nRF Connect SDK

Short-range updates

nRF Connect SDK v1.4

SoftDevice Controller

- Renamed nRF Bluetooth LE Controller to SoftDevice Controller.
API was updated accordingly
- The standalone SoftDevice Controller library is now the default Bluetooth LE Controller for Bluetooth samples (except the Bluetooth mesh samples)



SoftDevice Controller – new features

- Bluetooth Core Specification version 5.2 qualified controller subsystem (introduced in nRF Connect SDK 1.3.1)
- Reduced the image size when linking the final binary. Now, only the requested features are included



Bluetooth samples

- GATT Bond Management Service (BMS) and associated *Bluetooth: Peripheral Bond Management Service (BMS)* sample
- *Bluetooth: Direct Test Mode* sample
- *Bluetooth: Central Heart Rate Monitor with Coded PHY* and *Bluetooth: Peripheral Heart Rate Monitor with Coded PHY* samples (external contribution)

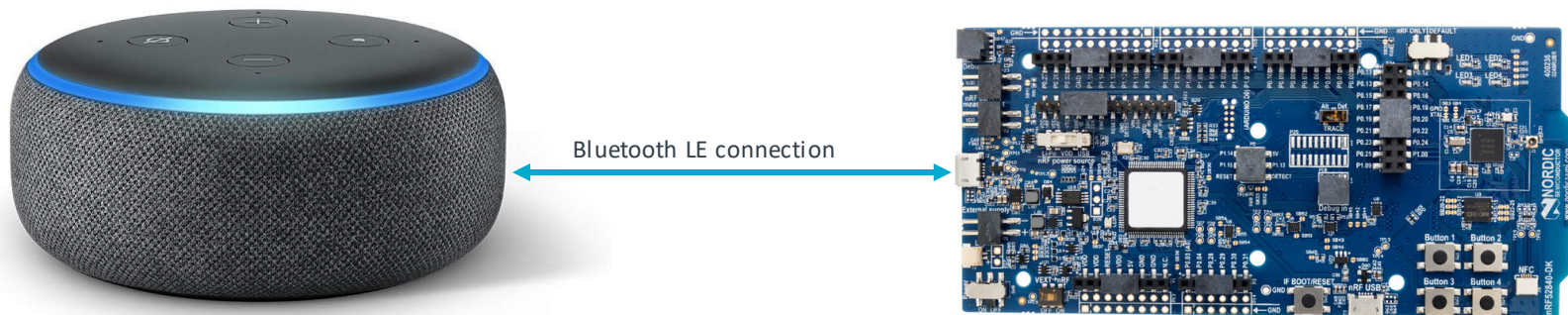


HEART RATE
MONITOR



HRM

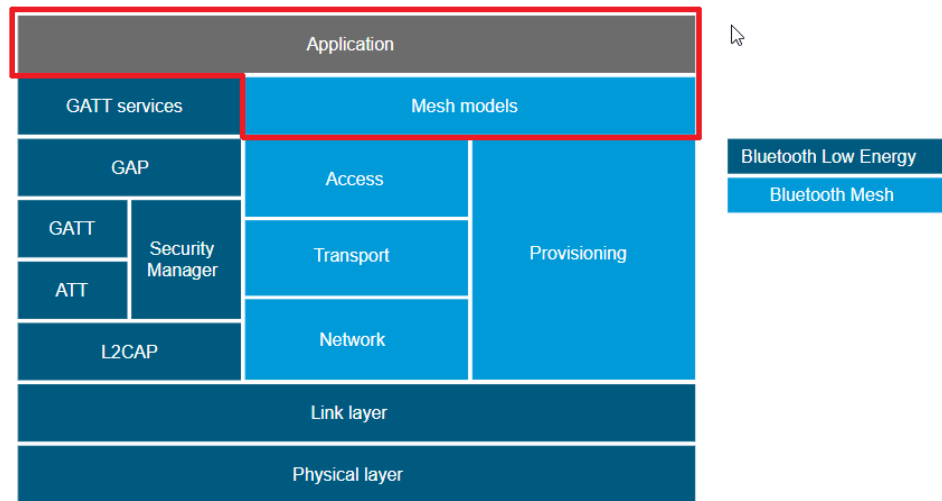
Bluetooth samples - Alexa Gadgets



- Alexa Gadgets are accessories to Amazon Alexa. Nordic integrated parts of Alexa Gadgets Toolkit into nRF Connect SDK to facilitate designing interactive devices capable of direct communication with Alexa
- *Bluetooth: Alexa Gadgets Peripheral* sample - This sample demonstrates how a Bluetooth LE device can connect to an Amazon Echo device using the Alexa Gadgets Bluetooth Service and Profile

Bluetooth mesh updates

- Time models
- Light CTL models
- Scene models
- Mesh Device Properties v2.0
- *Bluetooth: Mesh Light Control* sample
- *Bluetooth: Mesh sensor client* and *Bluetooth: Mesh sensor server* samples



Thread updates

- Added production support for nRF52833 and nRF52840 for Thread, including multiprotocol operation with Bluetooth Low Energy
 - Updated *Thread: CoAP Client* sample with multiprotocol extension based on Bluetooth LE Nordic UART Service (NUS)
 - Enabled Thread v1.1 certification by inheritance
- Initial support for Thread 1.2 functionalities
- Support for Network Co-Processor (NCP) architecture

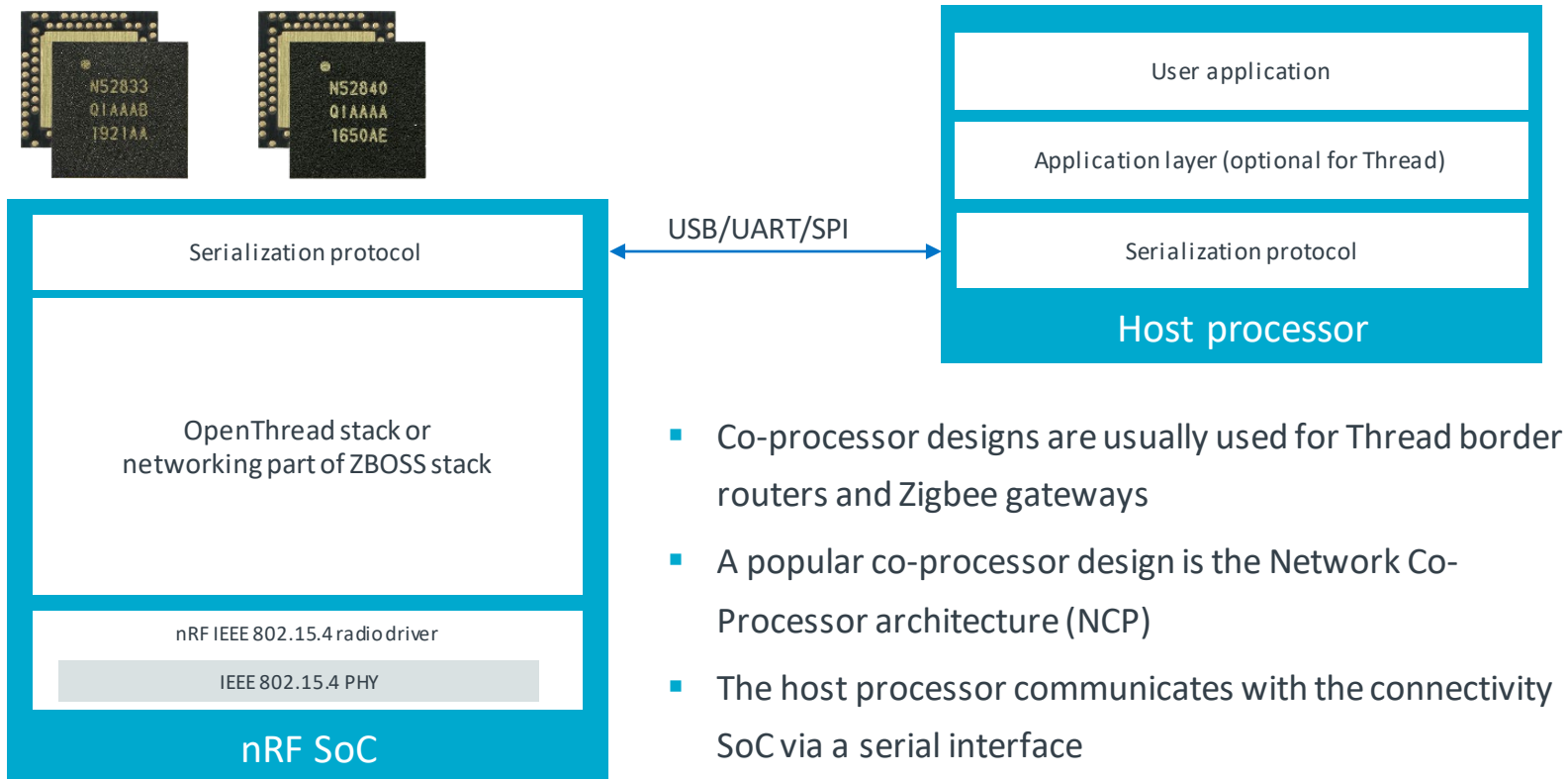
The Thread logo, featuring a stylized 'T' icon followed by the word 'HREAD' in a bold, sans-serif font.

Zigbee updates

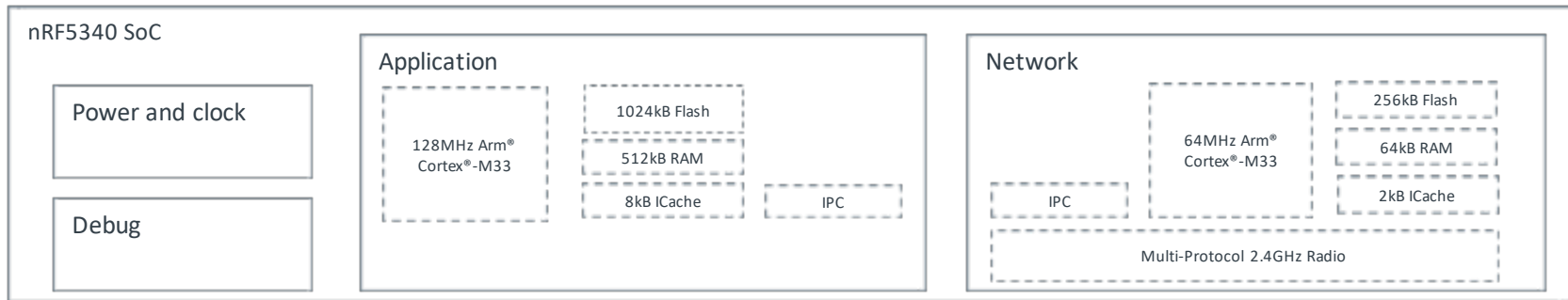
- Added development support for multiprotocol operation of Zigbee and Bluetooth Low Energy
 - Updated *Zigbee: Light switch* sample with multiprotocol extension based on Bluetooth LE Nordic UART Service (NUS)
- Zigbee FOTA (DFU) support for nRF52840
- Support for Command Line Interface (Zigbee shell)
- Support for Network Co-Processor (NCP) architecture



Thread NCP and Zigbee NCP architectures

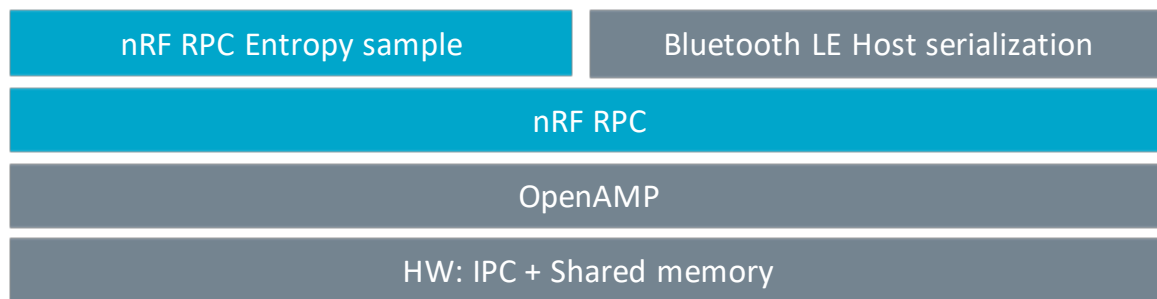


nRF5340 Network Core DFU



- nRF5340: Network core bootloader sample - This sample implements an immutable first stage bootloader that has the capability to update the firmware on the network core of the nRF5340
- Available by default if an nRF53 sample is configured to include MCUBoot

Remote procedure call library (nRF RPC)

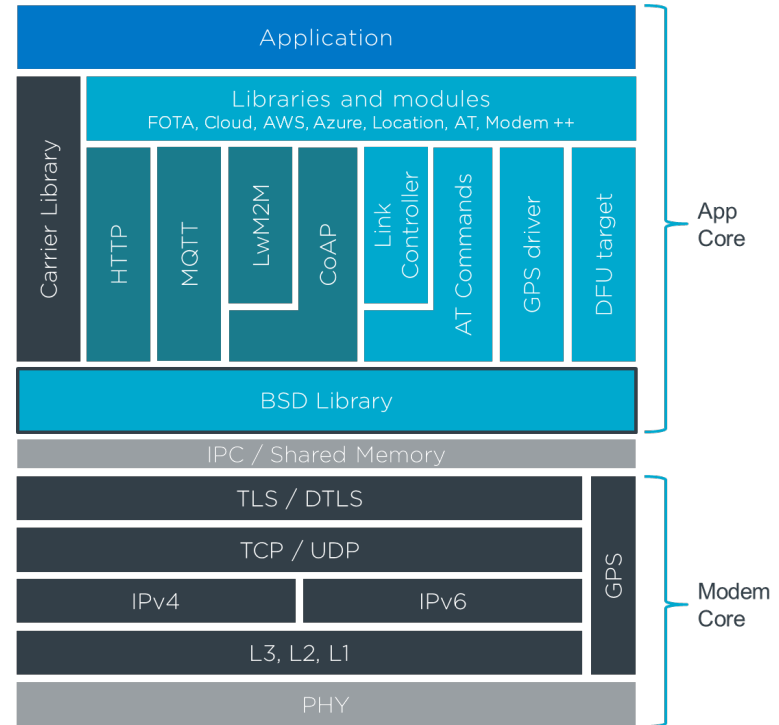


- The nRF RPC library allows for calling a function on remote processors from a local processor, in both synchronous and asynchronous way
- *nRF5340*: *nRF RPC Entropy* sample demonstrates how to use the nRF RPC by implementing the entropy driver in nRF5340 which is a dual core device
- In future nRF RPC can be used to serialize APIs of the Bluetooth LE Host running on the network core to use them in the application core

Cellular IoT

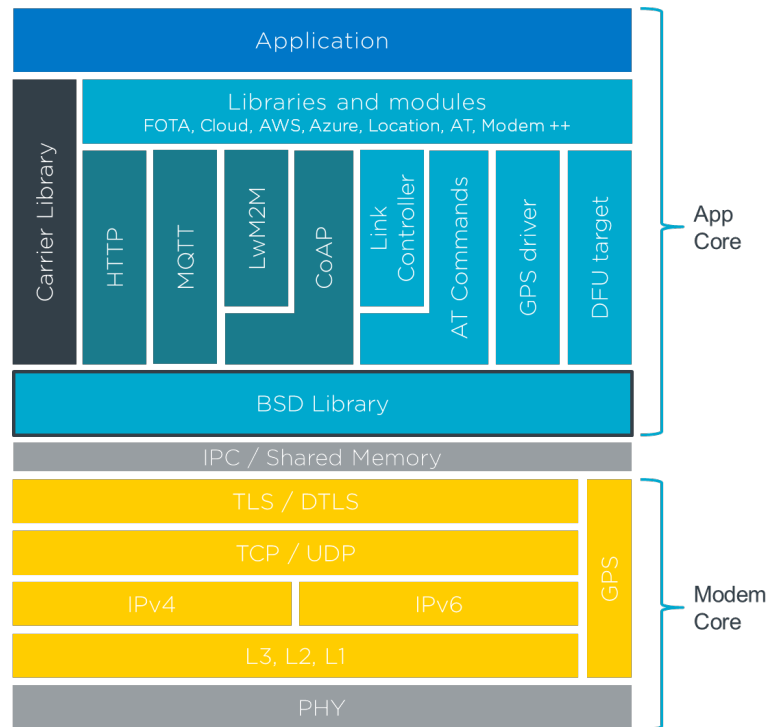
nRF Connect SDK

Overview



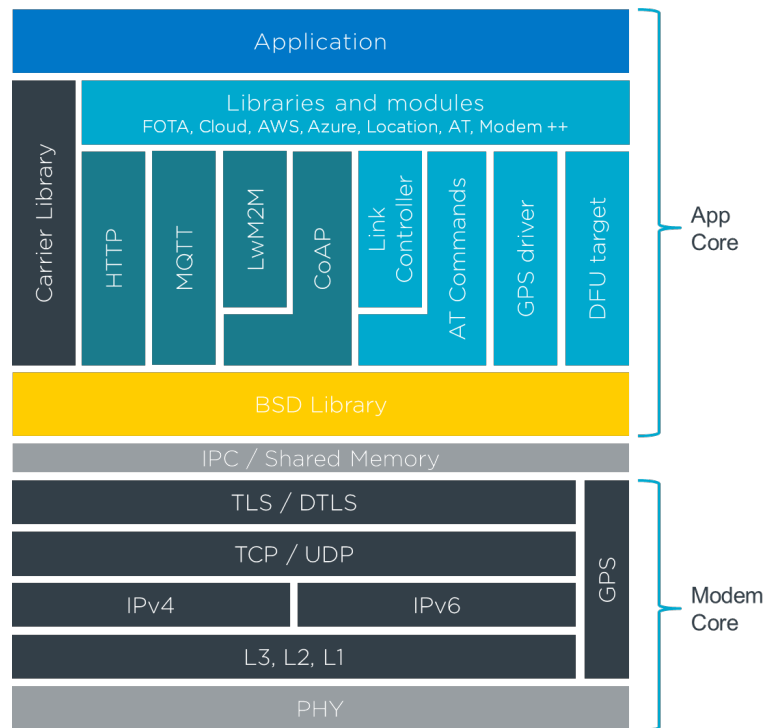
Modem Firmware

- Closed source
- Precompiled image download from nordicsemi.com
- Handles everything up to TLS / DTLS layers
- Also includes GPS



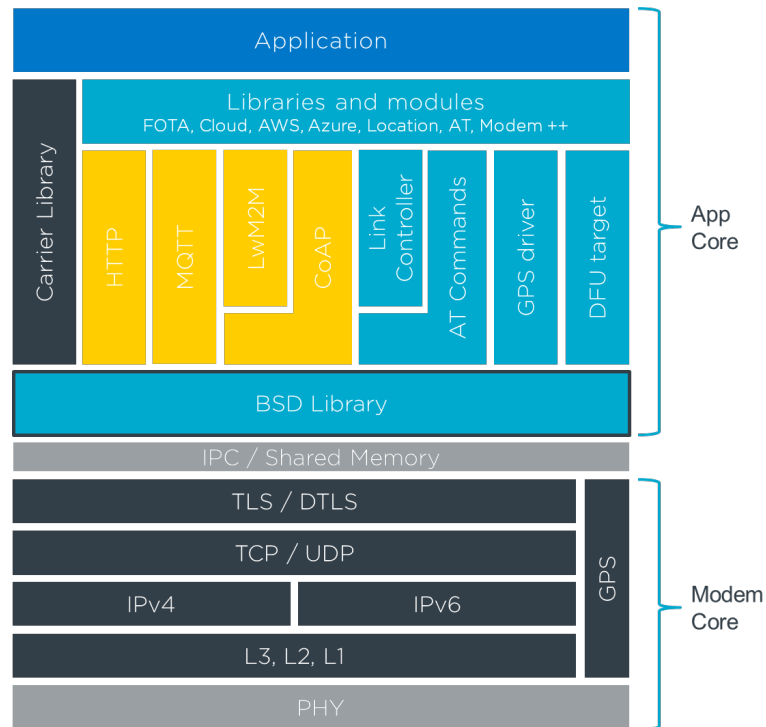
BSD Socket API

- Interface for operating the modem.
- 8 generic sockets.
 - UDP, TCP, TLS, DTLS and AT commands.
- 10 packet data network (PDN) sockets.
- GPS / Assisted GPS socket.
- Modem DFU socket.



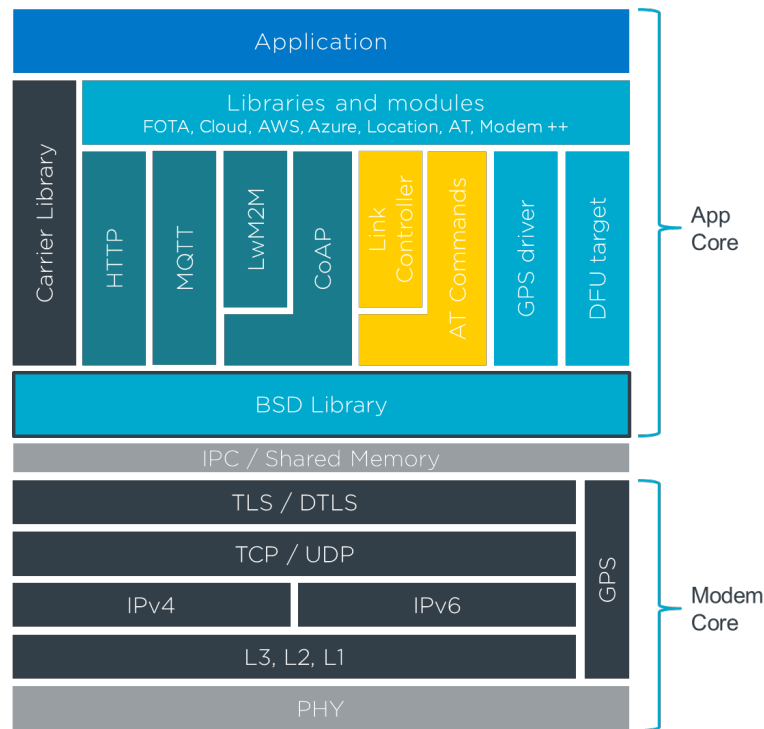
Internet Protocols

- Using TCP, UDP, TLS and DTLS generic sockets.
- Leverages code available in Zephyr RTOS
- Example usage in nRF Connect SDK
 - CoAP client
 - HTTPS client
 - LwM2M client
 - Simple MQTT
 - UDP
- Examples of direct socket usage available in Zephyr RTOS



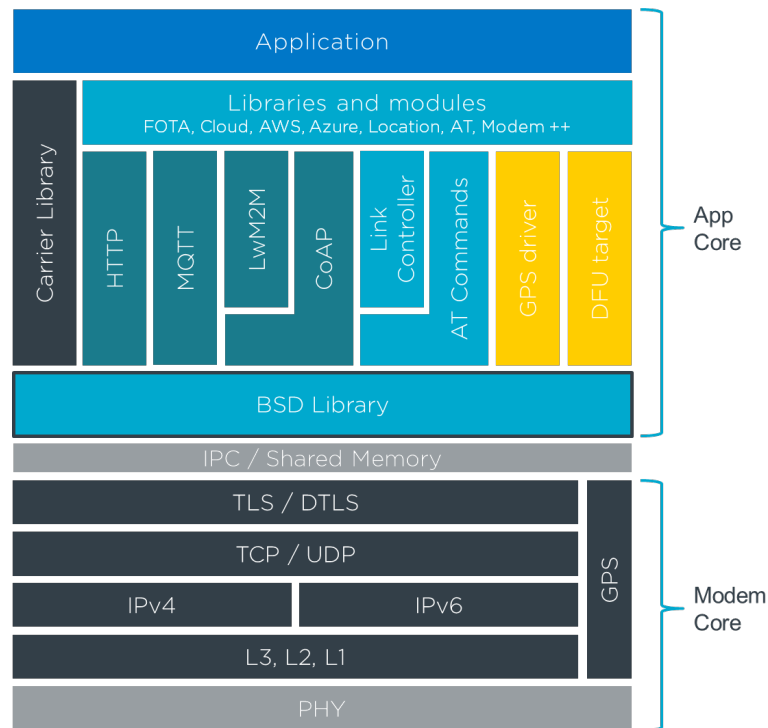
LTE Link Controller and AT Commands

- API and configurations cellular connections.
 - Configuring LTE modes (NB-IoT / LTE-M)
 - Access Point Name (APN)
 - Packet Data Network (PDN)
 - Enabling GPS
 - Power Saving Mode (PSM)
 - Extended Discontinuous Reception (eDRX)
 - LTE band lock
- LTE Link controller provides an easy to use API for certain AT commands.



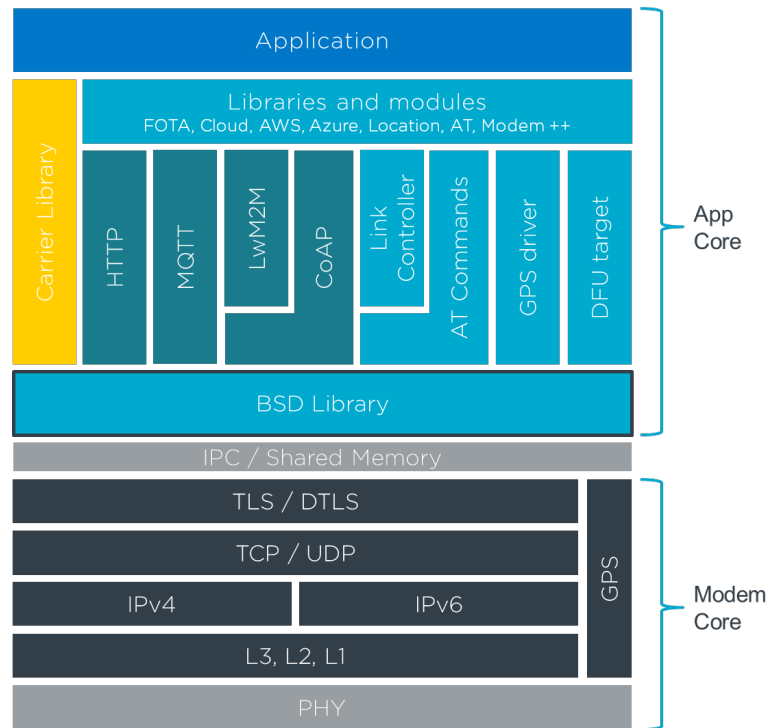
GPS and DFU Utility

- GPS driver
 - Easy usage and configuration
 - Navigation mode; Single fix, continuous or periodic
 - Power mode; performance or power save)
 - Assistance data; almanac and ephemeris
 - Event handling etc.
 - On top of the BSD library GPS socket.
- DFU target
 - Provides common interface for device firmware upgrade.
 - On top of BSD library DFU socket.



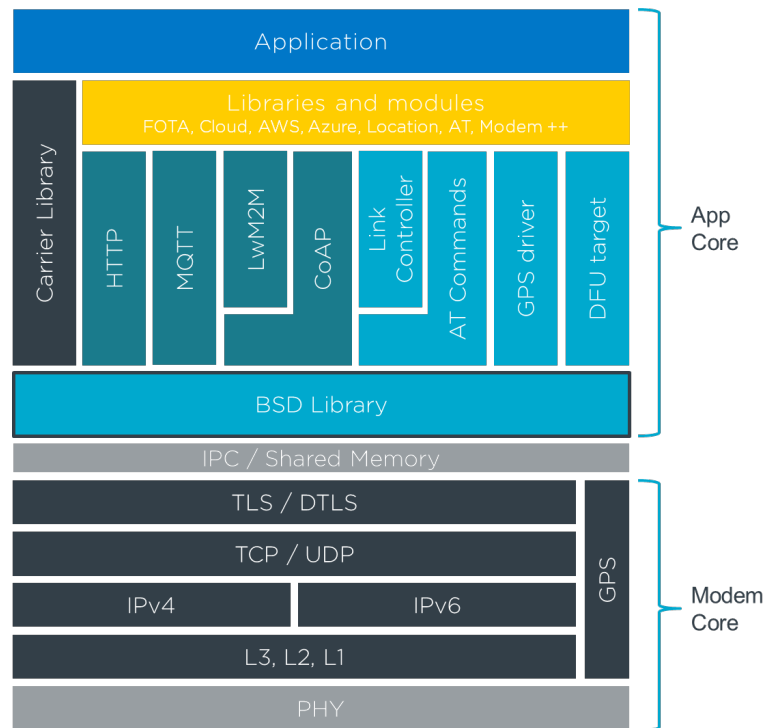
Carrier LwM2M library

- Device management.
- Required by some carriers.
 - Like Verizon and AT&T
- Using LwM2M for device management.
- Modem upgrade, connection statistics, device status etc.
- Provided as certified binaries and latest development snapshots.



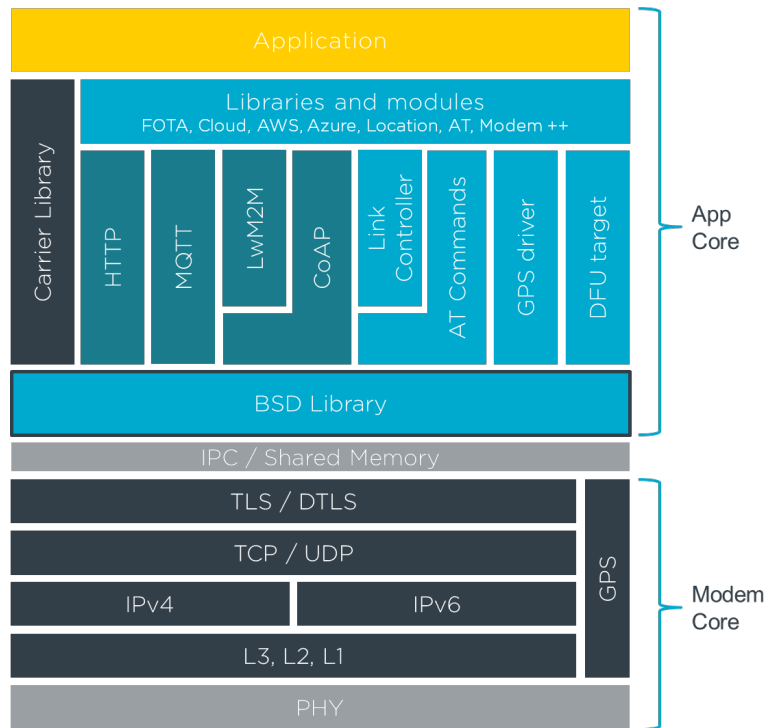
nRF Connect SDK libraries

- Cloud and internet connection
 - nRF Connect for Cloud
 - AWS FOTA, AWS IoT, AWS jobs
 - Generic Cloud API
 - CoAP utils
 - Download client
 - FOTA download
- Location and GPS
 - SUPL bases assisted GPS
 - nRF Cloud assisted GPS
- Modem
 - Modem key / certificate management
 - SMS subscriber



Applications and samples

- Asset Tracker
- Serial LTE modem, AT Client
- A-GPS, GPS sockets and SUPL client library
- AWS FOTA, AWS IoT
- Cloud client
- HTTP, MQTT, CoAP, LwM2M Clients
- Download client
- HTTP application update
- LTE Sensor Gateway
- LwM2M carrier
- Zephyr RTOS samples



Cellular IoT updates

nRF Connect SDK v1.4

Device management

- Carrier LwM2M library v0.10.0
 - Not certified yet! For development for AT&T and Verizon.
 - Reduced memory footprint.
 - Improved power consumption.
- Application LwM2M client
 - Added bootstrap support.
 - Added support for modem and application FOTA
 - Fine-tuned CoAP/LwM2M parameters for NB-IoT networks.



Microsoft Azure support

- Azure IoT hub library and example
 - MQTT over TLS
 - Device provisioning service (DPS)
 - Device twin
 - Messages “device to cloud” and “cloud to device”
 - Direct method
- Firmware over the air (FOTA) library and example
 - Using device twin to provide firmware upgrade information
 - Download over HTTP(S)



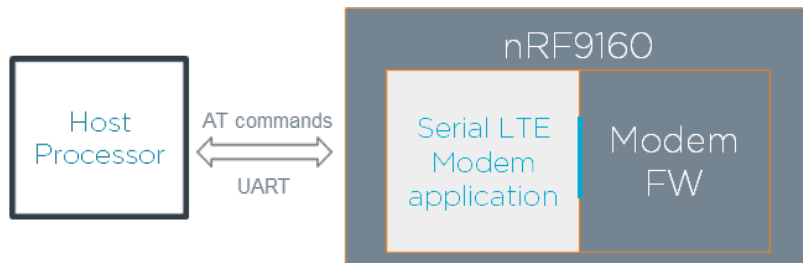
Low power features

- LTE Link controller
 - API for configuring eDRX Paging Window (PTW)
 - Support for release assistance indication (RAI)
- Power optimized UDP sample
- Improved online power profiler



Serial LTE modem

- Added TLS server support.
- Added support for the MQTT username and password.
- Added data mode support for TCP/UDP proxy client/server.
- Added support for the HTTP client service.
- Added FOTA support.



Modem firmware v1.2.2

- Added 3 satellite first fix, low accuracy mode.
- Improved GPS hot start sensitivity.
- Improved GPS time-to-first-fix in poor signal conditions.
- Adds TCP server support.
- Various improvements to LTE-M, NB-IoT and GPS stability and performance.
- See release notes for all details.



nRF Connect SDK v1.4.0 Summary

Features	Description
Modem firmware	<ul style="list-style-type: none">• GPS improvements• Stability and performance improvements• TCP server support
Device management	<ul style="list-style-type: none">• Carrier device management library update v0.10.0 (LwM2M AT&T and Verizon)• Application LwM2M client improvements<ul style="list-style-type: none">• Bootstrap support• FOTA support for modem, application and bootloader.
Cloud support	<ul style="list-style-type: none">• Microsoft Azure IoT Hub libraries and samples
Power consumption features	<ul style="list-style-type: none">• Power optimized sample in nRF Connect SDK• Improved online power profiler.• LTE Link controller library updates
Serial LTE Modem	<ul style="list-style-type: none">• TCP, TLS, UDP, DTLS server• Pass through data mode• FOTA support

Q&A