

Exciting new features in nRF Connect SDK v2.2.0



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Today's hosts

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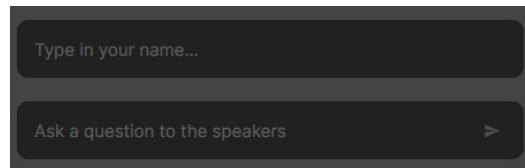


Developer Marketing Manager



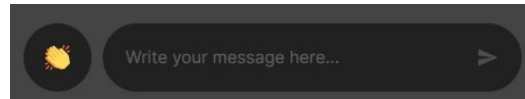
Practicalities

- Duration: 50 min presentation, 10 min Q&A
- Questions are encouraged!
 - Please type questions on the top of the right sidebar
 - All questions are anonymous
 - Try to keep them relevant to the topic
 - We will answer them toward the end
- The chat on the bottom of the right sidebar is not anonymous, and it 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



Type in your name...

Ask a question to the speakers >



Write your message here... >



Agenda

- Intro to the nRF Connect SDK
- Generic updates
- Security, ANT, Bluetooth, Thread, Wi-Fi and Matter updates in nRF Connect SDK v2.2.0
- Cellular IoT updates in nRF Connect SDK v2.2.0
- Q&A

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121 Repos, C/C++
Python, Javascript

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nRF Connect SDK intro

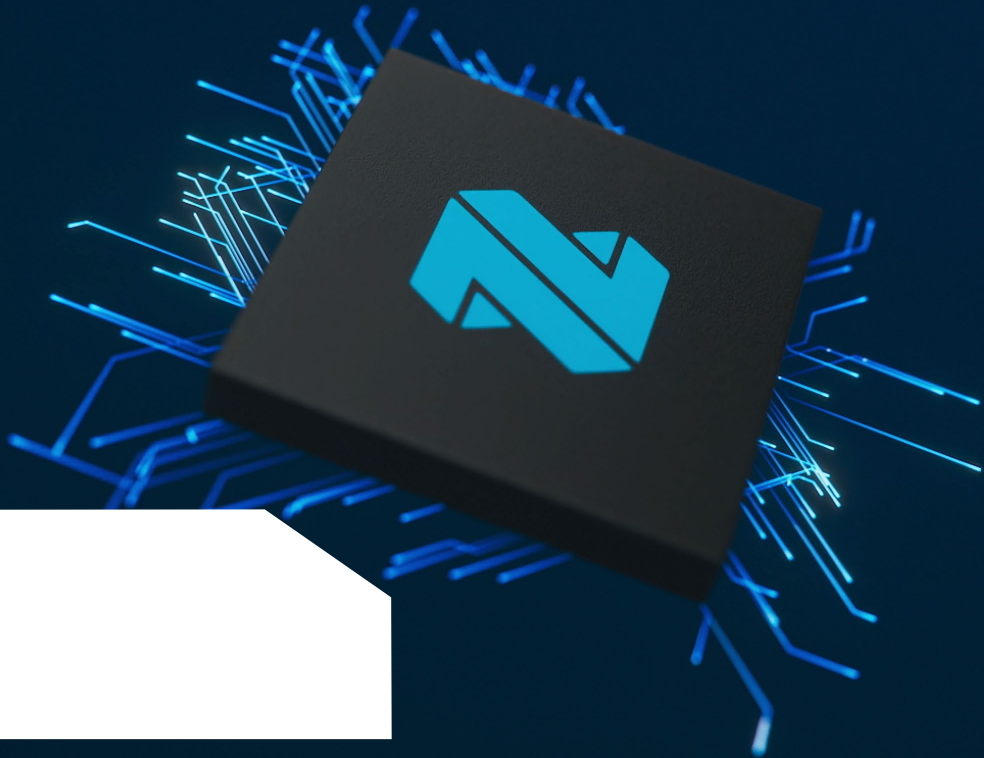


nRF Connect SDK



- One code base and toolchain for nRF91, nRF70, nRF53, nRF52 and nRF21 Series
 - Optional for nRF52 Series (\geq v1.3.0)
- Includes ANT, Bluetooth Low Energy, Wi-Fi, LTE-M, NB-IoT, GNSS, 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 v2.2.0

Generic Updates

- Introducing nRF Util
- nRF Connect for VS Code improvements
- TX Power envelope updates

nRF Util v7.x.x

- Major upgrade (6.x.x -> 7.x.x)
- Unified command line utility for Nordic products
- functionality is provided through installable and upgradeable commands
 - nrf5sdk-tools
 - device
 - completion
- Flash, recover, and erase all Nordic devices
 - nRF5 SDK DFU
 - MCUboot DFU support (nRF Connect SDK)
 - J-link support
- Provided as a binary (No Python packages dependencies)



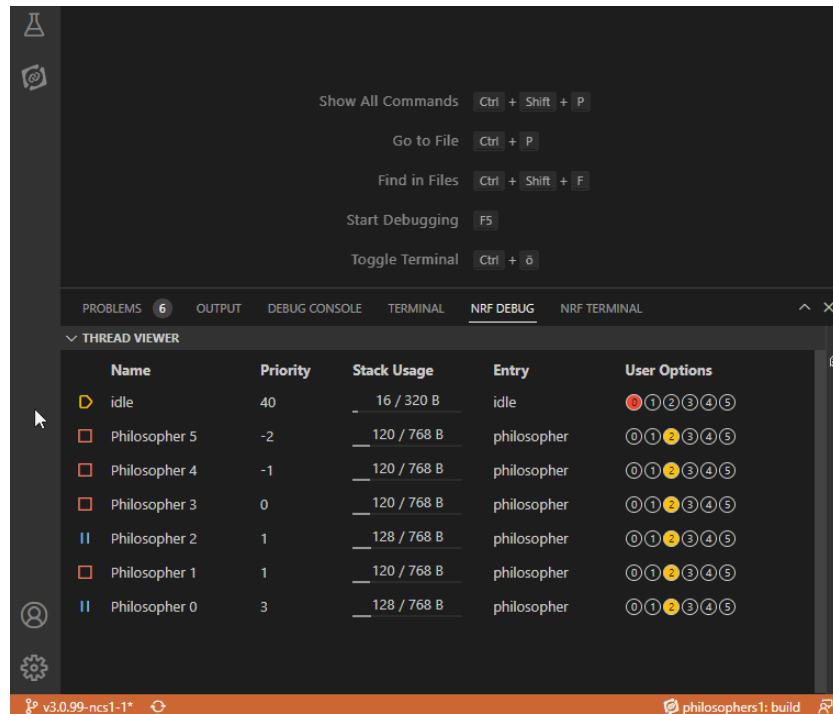
nRF Util demo

- Setup [guide](#)
- List connected Nordic devices
- Flash a DK (nRF52833 DK using J-link)
- Flash a Thingy:91 using MCUboot serial recovery
- Flash an nRF52840 Dongle using nRF5 DFU
- Scripting options



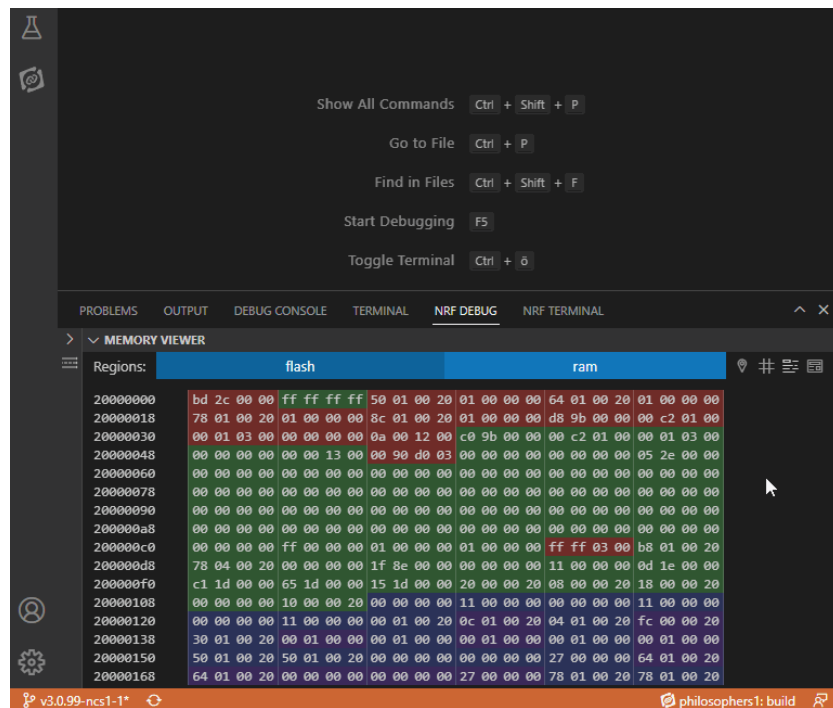
nRF Connect for VS Code

- Debugging improvements (nRF Debug)
 - Live stack usage with bar graph (per thread)
 - Thread state with icons (Ex: Running, Ready, Waiting)
 - Thread name with link to thread declaration
 - Thread entry with link to source code



nRF Connect for VS Code

- Symbol name for memory location:
 - Show symbols in memory (RAM and Flash)
 - Link to symbol declaration in source code
 - › Address
 - › Size
 - › Current index



nRF Connect for VS Code

- Symbol name for memory location:
 - Show symbols in memory (RAM and Flash)
 - Link to symbol declaration in source code
 - › Address
 - › Size
 - › Current index
 - Peripherals view
 - › Added interactions (Read/Write)
 - › Ex: Manually trigger the TIMER peripheral

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TX power envelope updates

- Improved output power control with nRF21540 FEM
- Uses built-in software power model on the SoC side to compensate for temperature, carrier frequency, FEM supply voltage and input power

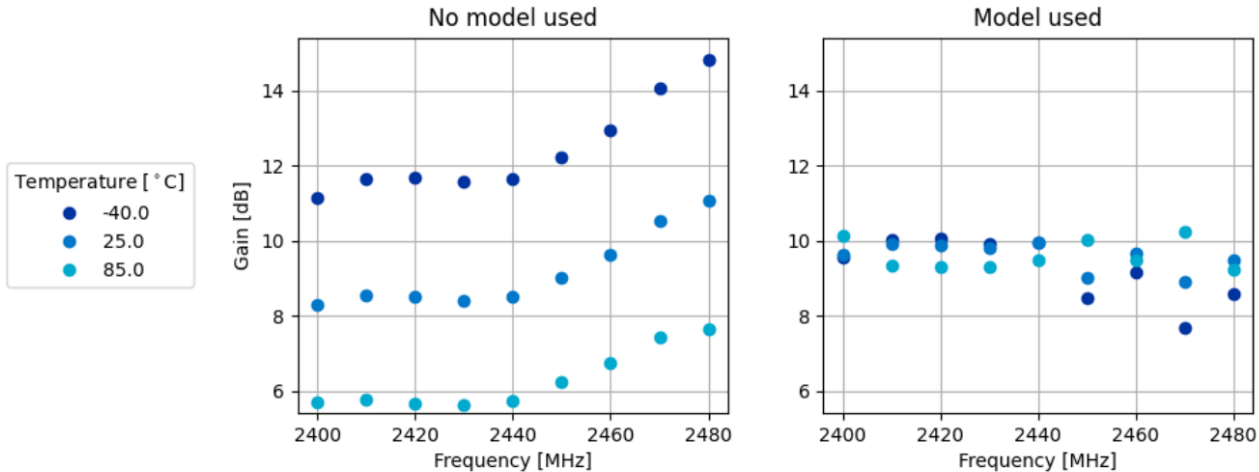


Figure 2a. nRF21540 gain vs temperature over frequency sweep for 10dB setting




Security updates

nRF Connect SDK v2.2.0

PSA certification update

PSA Certified Level 1 Details


Certificate Number:	0632793519348 - 10210
Date of Issue:	07/11/2022
Test Lab:	Riscure
Certification Holder:	Nordic Semiconductor
Certified Product:	nRF52840 Series
Hardware Version:	nRF52840-QIAA-F, nRF52840-QFAA-F, and nRF52840-CKAA-F
Software Version:	nRF Connect SDK v2.1.0
Certification Type:	PSA Certified Level 1 v v2.2 REL 01
Developer Type:	PSA Certified – Chip



[VIEW CERTIFICATE](#)

PSA Certified Level 1 Details

Certificate Number:	0604565273079 - 10016
Date of Issue:	10/07/2020
Test Lab:	Riscure
Certification Holder:	Nordic Semiconductor
Certified Product:	nRF52840 Series
Hardware Version:	QIAA-D00 and CKAA-D00
Software Version:	nRF5 SDK version 16
Certification Type:	PSA Certified Level 1 v1.2
Developer Type:	PSA Certified – Chip



[VIEW CERTIFICATE](#)

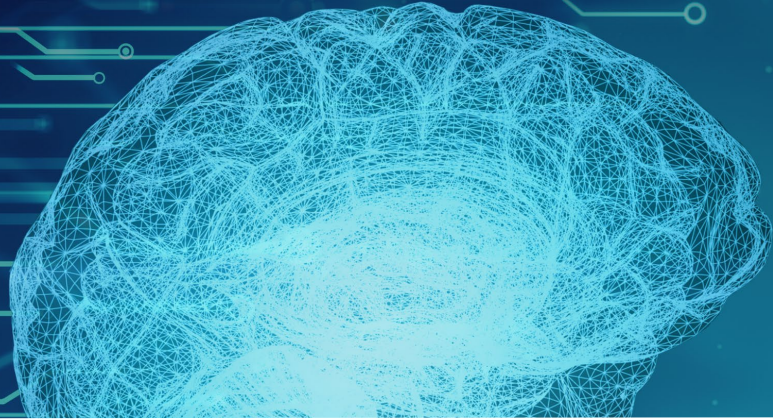
- nRF52840 has been re-certified for PSA Level 1 with nRF Connect SDK
- Existing listing on PSA certified products list has been updated
- Two certificates are now available, depending on the associated SDK

Trusted Firmware-M updates

Arm Platform Security Architecture (PSA) best practice demonstrated on nRF5340 and nRF9160 using Trusted Firmware-M.

New samples:

- [Provisioning image](#): provisions Hardware Unique Keys to secure storage and transitions security lifecycle state.
- [TF-M: PSA template](#): combines TF-M, nRF Secure Immutable Bootloader and MCUboot as a starting point for secure application development following Arm PSA best practice and enforcing correct transition and usage of the PSA lifecycle states.

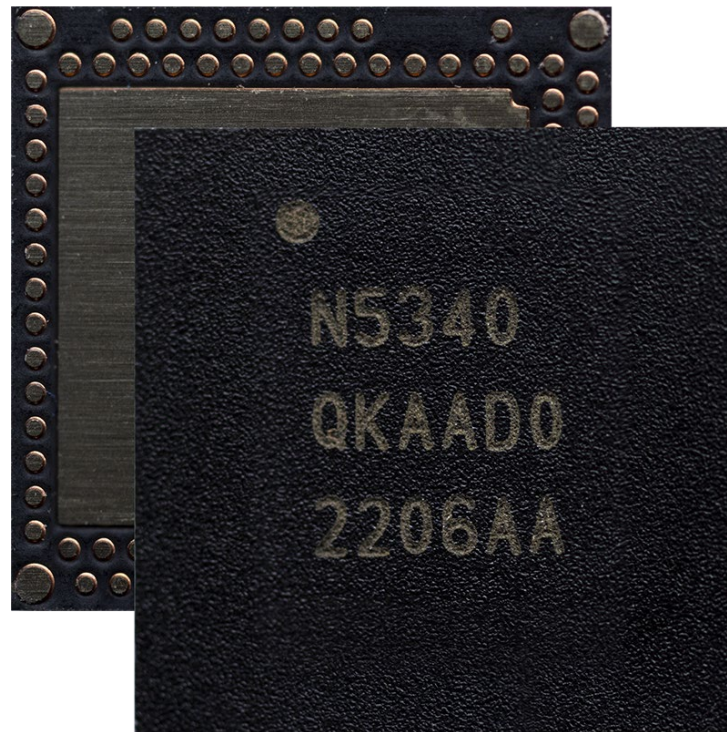


ANT updates on nRF5340

nRF Connect SDK v2.2.0

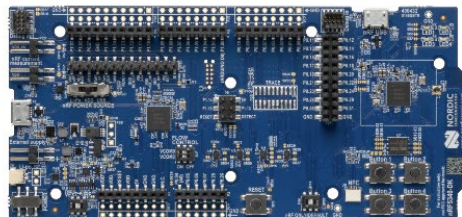
Experimental ANT support

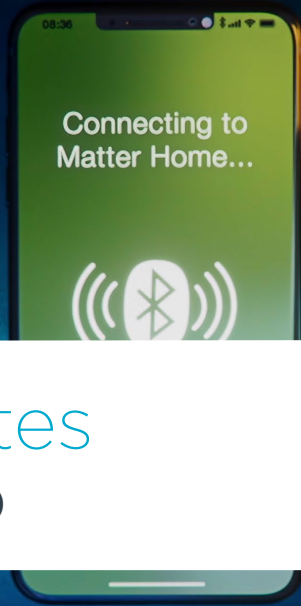
- Experimental ANT support on nRF5340 SoC
- Garmin Developer Virtual Conference Webinars
 - [Introducing ANT support to the nRF5340 SoC and nRF Connect SDK](#)
 - [Getting Started with ANT for nRF Connect SDK](#)



Demo

- [ANT for nRF Connect SDK documentation](#)
(requires authorization)
- Sends simulated HRM values from an nRF5340 DK to an ANT-connected watch



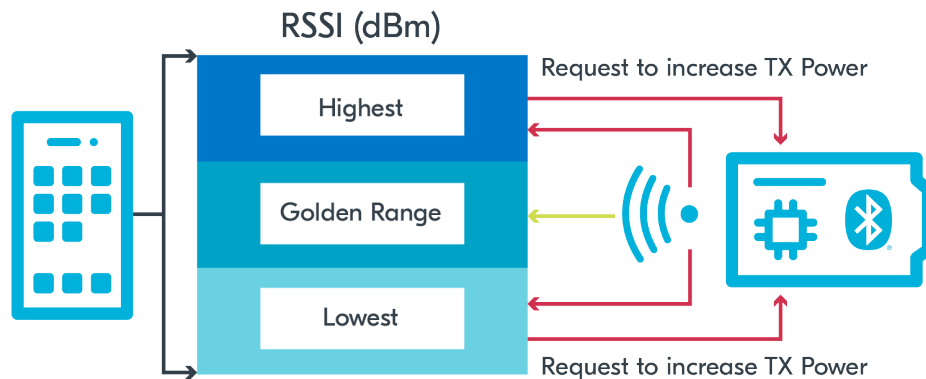


Bluetooth updates

nRF Connect SDK v2.2.0

LE Power Control Request

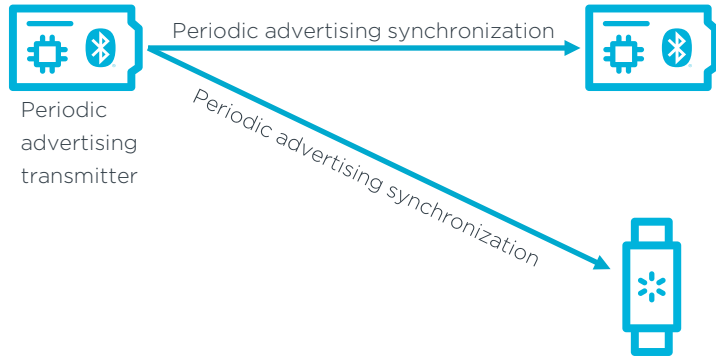
- LE Power Control Request experimental support
 - Softdevice controller support with HCI commands
 - Enables requesting a change in TX power from a peer device
 - The goal is to have RSSI within a “golden range” of optimum RSSI
 - Too high or too low RSSI can lead to decreased link quality (saturation, errors, retransmissions)



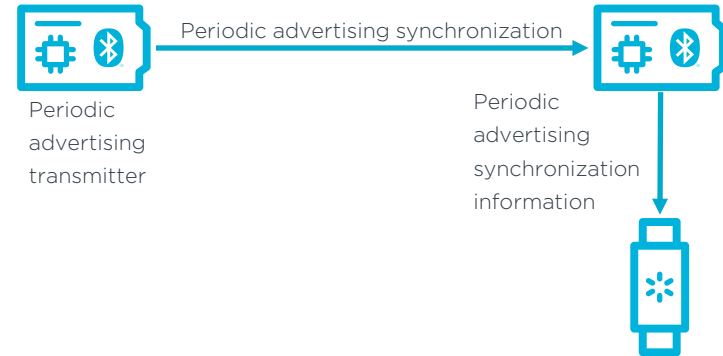
Periodic Advertising Sync Transfer Sending

PAST Sending Experimental support

Without PAST both devices need to go through periodic advertising synchronization process which requires **time** and **energy**



With PAST the periodic advertising synchronization information can be sent over Bluetooth LE, saving time and energy



Bluetooth mesh Updates

- Performance and reliability improvements in terms of reduced latency and increased relay throughput under high network load
 - Achieved by changing default advertiser implementation in Bluetooth mesh subsystem from *adv_legacy.c* to *adv_ext.c*
- Bluetooth mesh distance measurement vendor model
 - Allows measuring the distance between different Bluetooth mesh devices
 - Utilizes the distance measurement library
 - Experimental support



Thread v1.3 and Matter

nRF Connect SDK v2.2.0

Matter 1.0 in nRF Connect SDK

For Thread and Bluetooth LE

- Matter over Thread no longer experimental
- Added documentation for
 - Matter OTA
 - Multi-fabrics feature
 - Commissioning and Topology
 - Security and certification
 - ...
- [Matter light switch](#) sample added Wi-Fi support





Wi-Fi Updates

nRF Connect SDK v2.2.0

Wi-Fi

- Added Wi-Fi location in nRF Cloud Location Services
- Experimental support for Target Wait time (TWT)
 - Negotiating sleep schedule with Wi-Fi access point to drastically reduce energy consumption
- Added Wi-Fi samples:
 - Radio test sample
 - Scan sample
 - Station sample
 - Provisioning Service sample
- Added powersaving to Wi-Fi shell sample with TWT

A white smart speaker is centered on a wooden shelf. The background is a soft blue with bokeh light effects. The text is overlaid on the image.

Sign up for our Wi-Fi newsletter!

Contact sales to get samples soon!

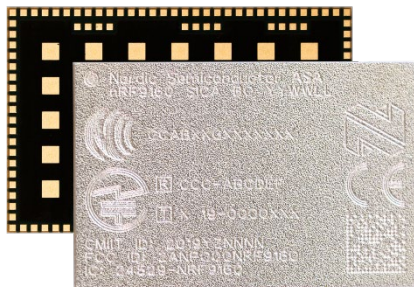


Cellular IoT updates

nRF Connect SDK v2.2.0

Complete low power cellular IoT solution

nRF9160



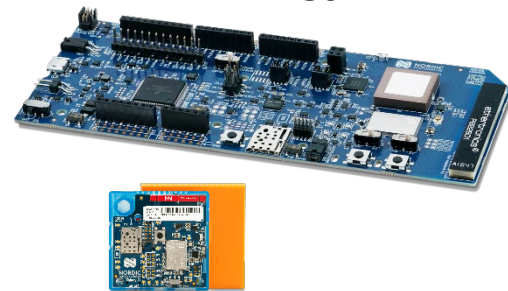
Dedicated application processor and memory
Multimode LTE-M / NB-IoT modem with integrated
RFFE and GNSS support
Ultra Low Power

nRF Connect



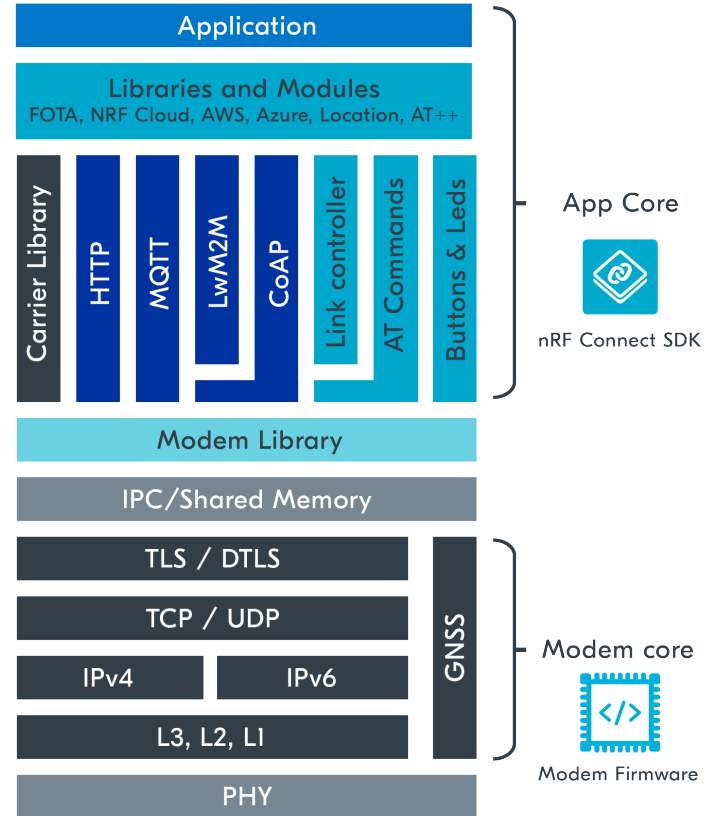
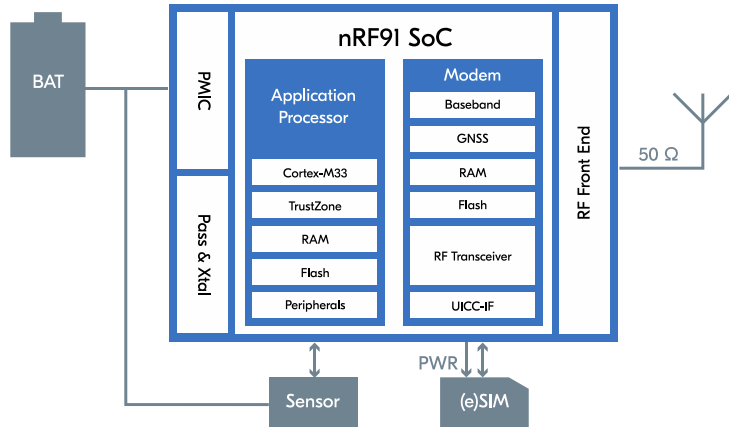
nRF Connect SDK
nRF Connect for Desktop
nRF Cloud Services

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

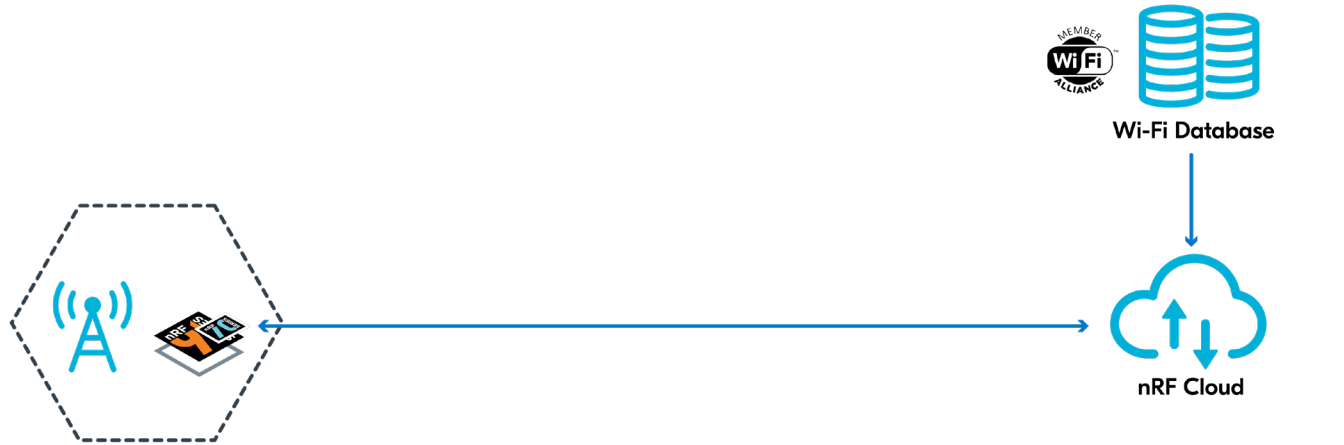


Cellular Highlights

- Added support for Wi-Fi location in [nRF Cloud Location Services](#)
- Experimental support for [AS Release Assistance Indication \(RAI\) with LwM2M](#) with demo

Wi-Fi Location Services with nRF Cloud

Location data using Wi-Fi method



1 Device inquires its Wi-Fi network surroundings

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Request
{
  "macAddress": "string",
  "ssid": "string",
  "signalStrength": -42,
  "frequency": 2412,
}
```

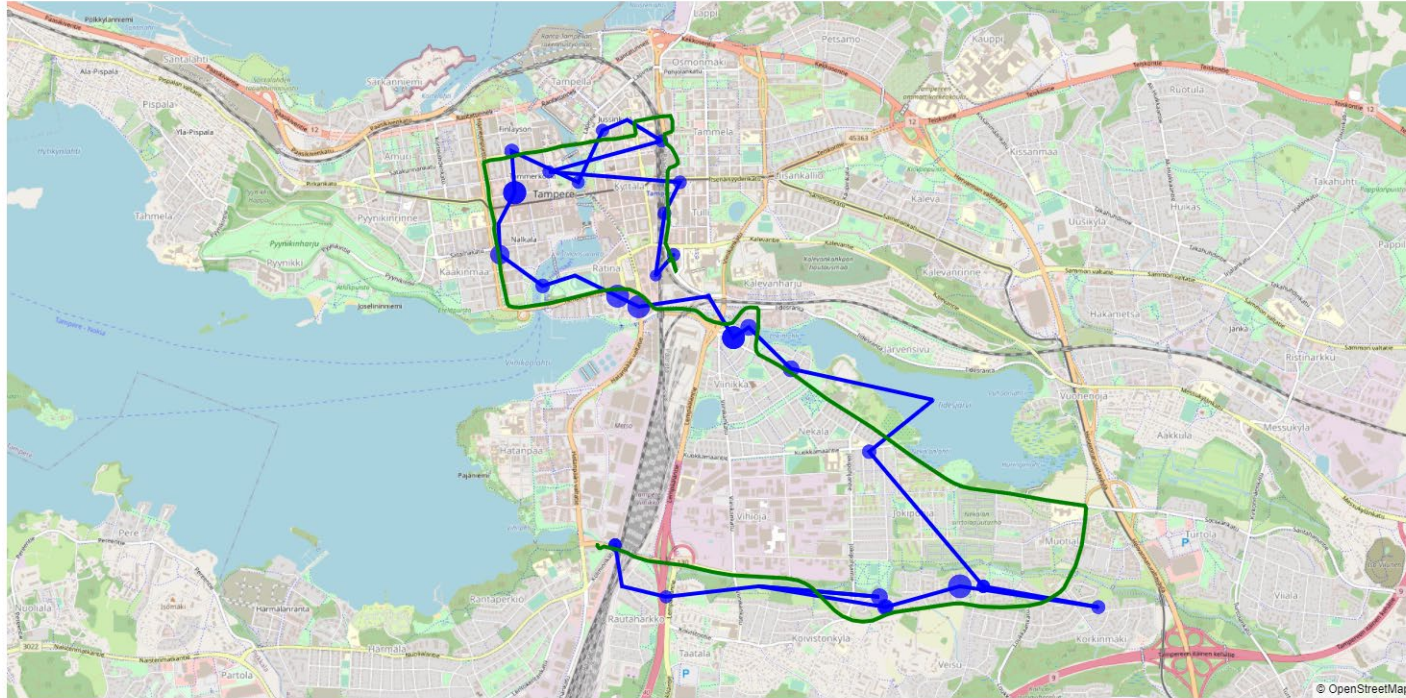
2 Device connects and sends Wi-Fi details to cloud

3 Cloud calculates position of device

4 Cloud can send position to device or it can be used elsewhere

```
Response
{
  "lat": 45.524098,
  "lon": -122.688409,
  "uncertainty": 30,
}
```

Test drive #1 in Tampere: Multi-Cell Location



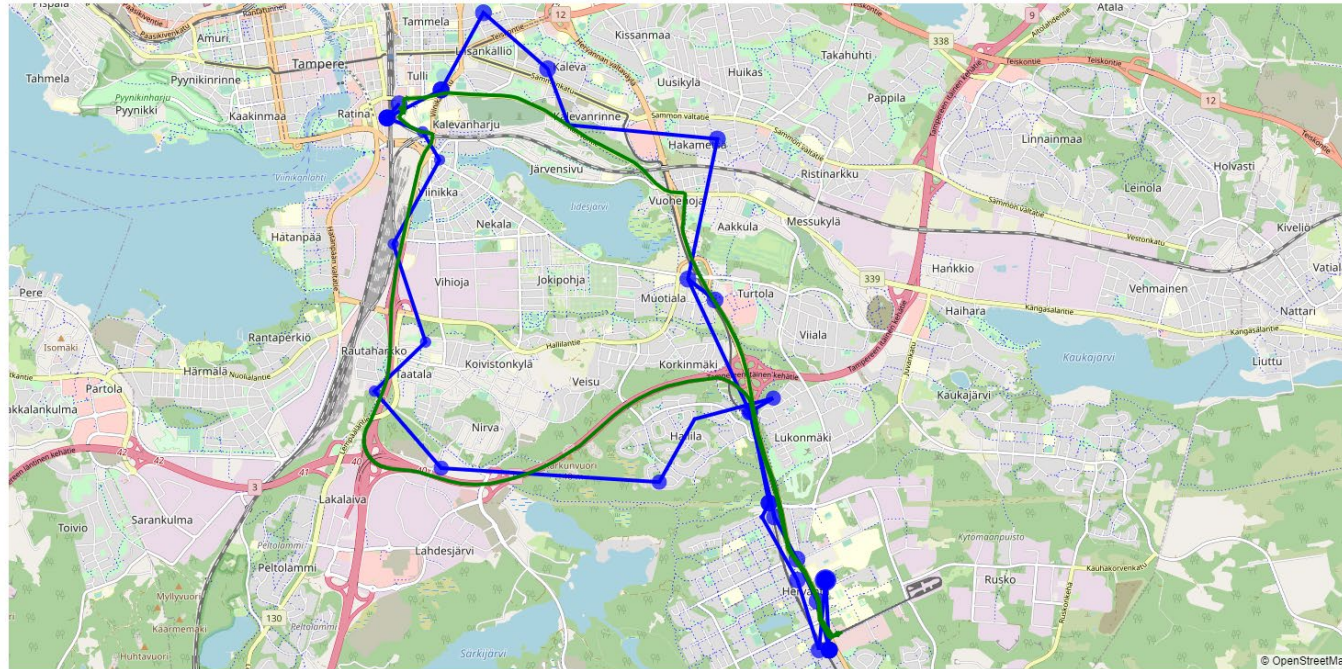
- CELL
- GNSS

Test drive #1 in Tampere: Wi-Fi Location



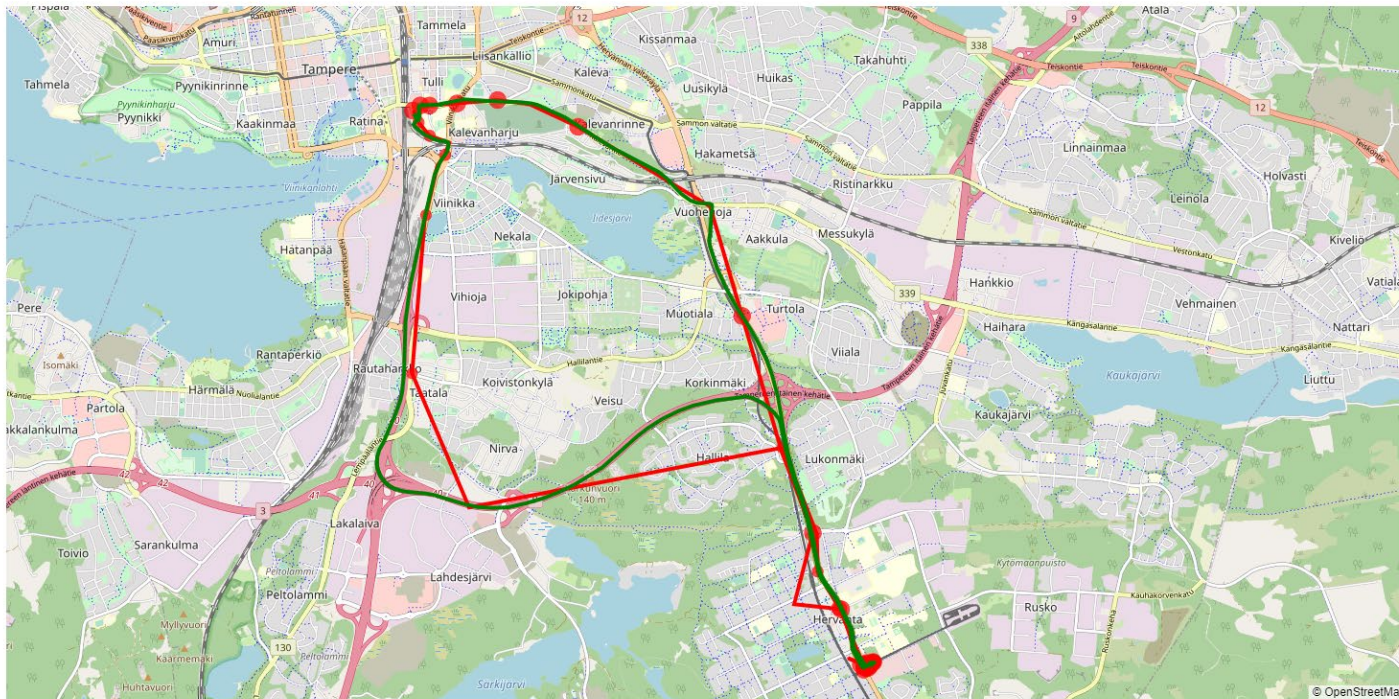
- Wi-Fi
- GNSS

Test drive #2 in Tampere: Multi-Cell Location



- CELL
- GNSS

Test drive #2 in Tampere: Wi-Fi Location



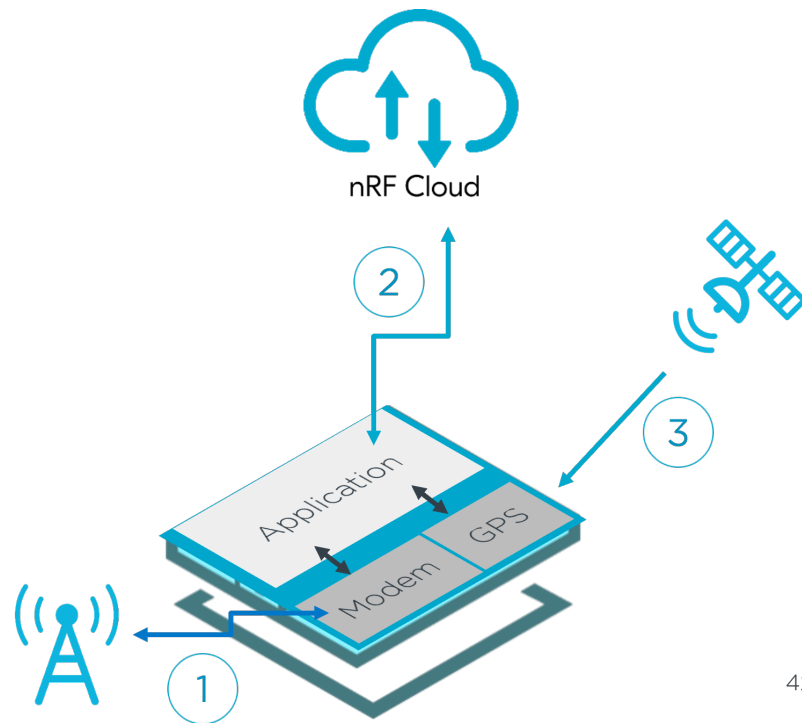
- Wi-Fi
- GNSS

Different Location Services / Features

Feature	Accuracy	Power savings	Requires GPS	Description
Assisted GPS (A-GPS)	High	Good	Yes	<ul style="list-style-type: none"> Provides assistance data to the device. Enables a faster time-to-first-fix (TTFF) for the GPS modem. Gets assistance data over the cellular connection and uses the GPS modem to obtain a fix. Typical 4 meters accuracy
Predicted GPS (P-GPS)	High	Better	Yes	<ul style="list-style-type: none"> Provides up to two weeks of predicted assistance data to the device. Enables a faster time-to-first-fix (TTFF) for the GPS modem. While it still uses the GPS modem, the power savings comes from reducing the frequency to request new assistance data. Typical 4 meters accuracy
Single-Cell (SCELL)	Low	High	No	<ul style="list-style-type: none"> Gets the coarse location of the device based off of the nearest cell tower. Typical 1000 meters accuracy Saves power by eliminating the need to use the GPS modem.
Multi-Cell (MCELL)	Medium	High	No	<ul style="list-style-type: none"> Gets the coarse location of the device based off of the nearest cell towers. Provides a higher level of accuracy by using multiple cell towers to obtain location. Typical 300 meters accuracy Saves power by eliminating the need to use the GPS modem.
Wi-Fi	Medium/high	High	No	<ul style="list-style-type: none"> Get location based on nearby Wi-Fi networks. At least two Access Points are required. Typical 30 meters accuracy Saves power by eliminating the need to use the GPS modem.

GPS vs A-GPS and P-GPS

- Will post a [DevZone blog post](#) soon to compare and contrast
 - Can subscribe to get DevZone blog updates
- Will include PPK2 measurements and a video
- TTFB improvements and optimized current





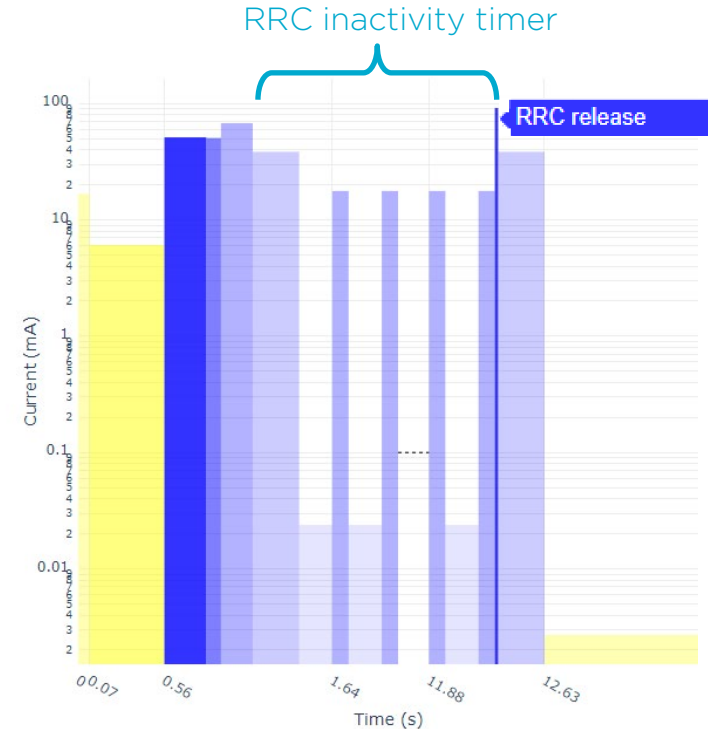
www.nordicsemi.com/cloudservices

AS Release Assistance Indication (RAI) with LwM2M

- Experimental support in LwM2M client
- AS RAI needs to be supported on the cellular network

AS Release Assistance Indication

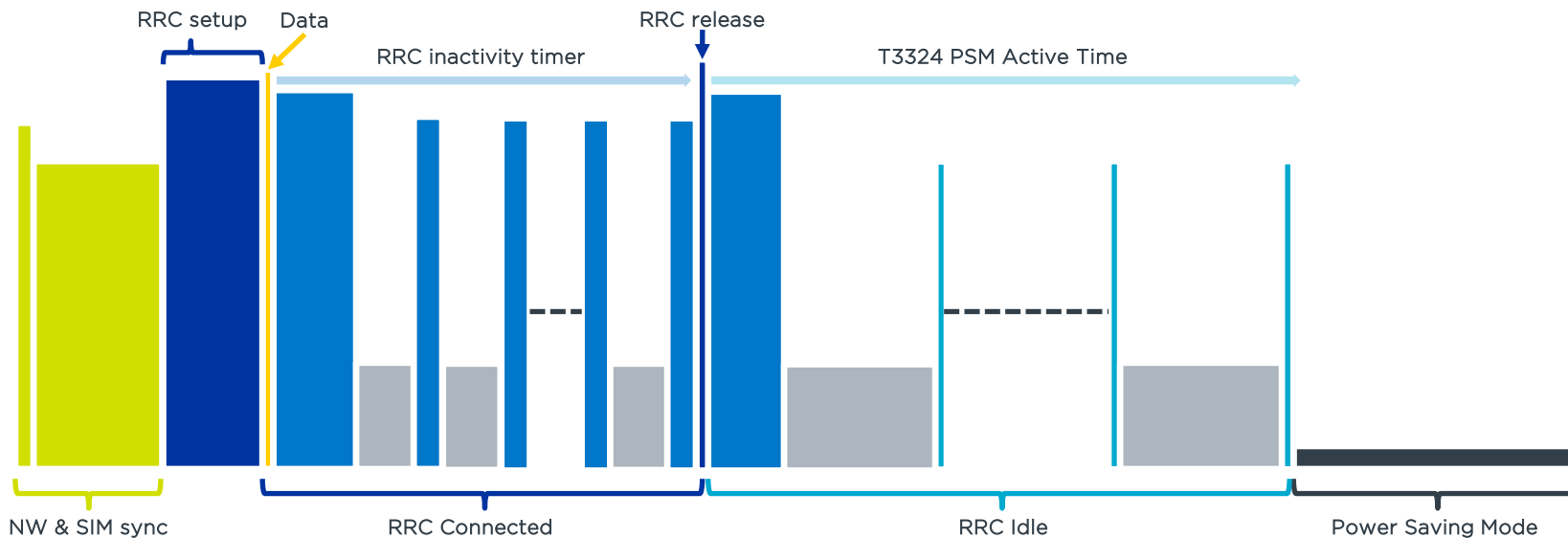
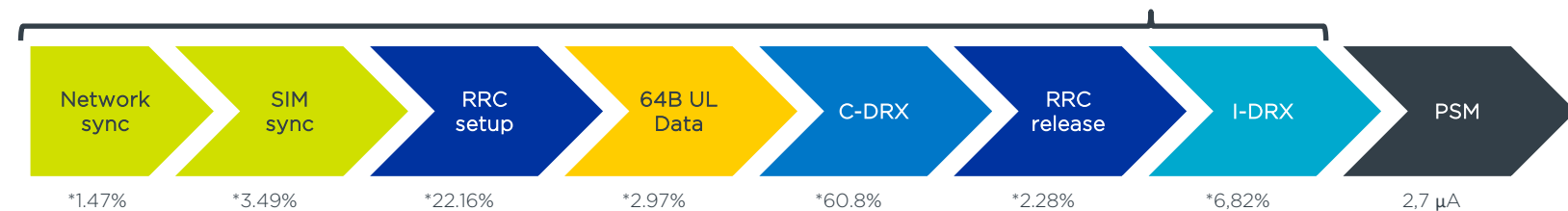
- Skip the network dependent “RRC inactivity timer”
- Switch quickly from RRC connected mode to IDLE/PSM if there is no more data to send or receive.
- A lot of power to be saved since radio needs to stay ON after each send/recv. in this RRC inactivity timer.
- AT Command : [AT%RAI](#) plus [socket options](#)



* Numbers from nRF9160 SiP on Telenor network in Norway.

Without AS RAI

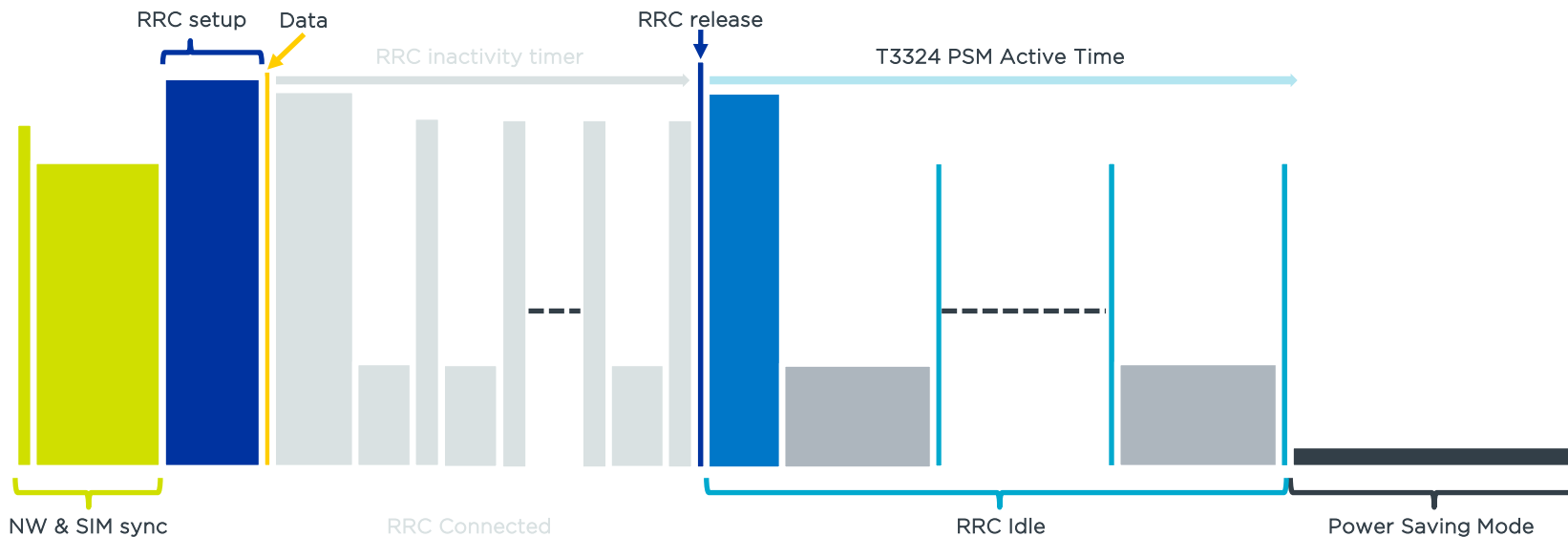
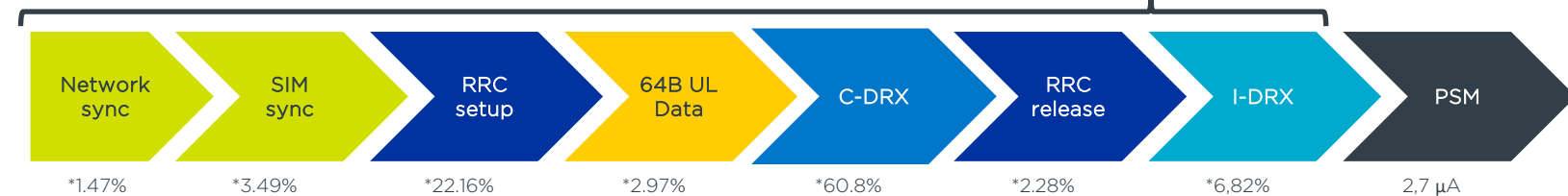
LTE Event charge *84.36 mC



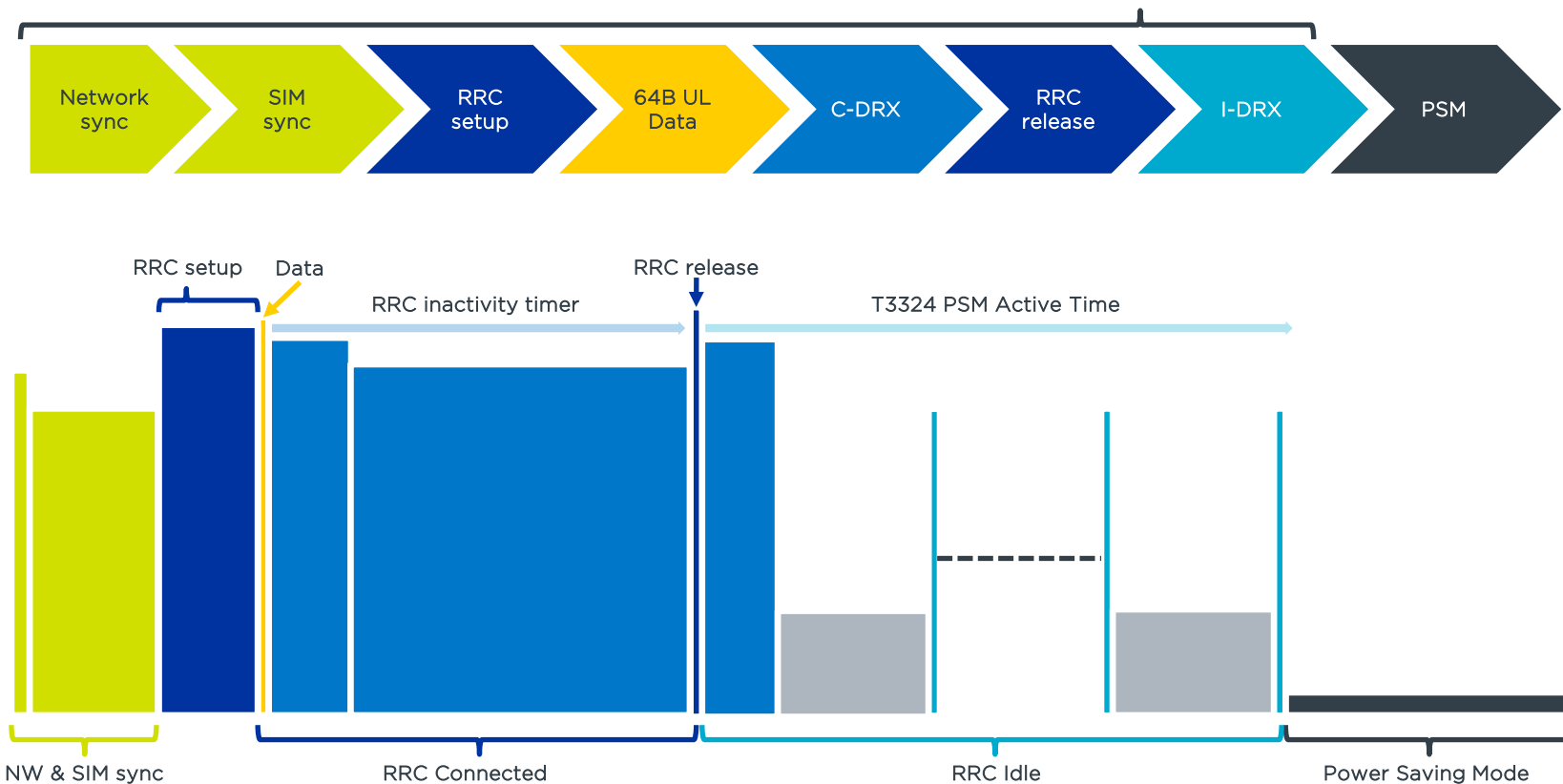
With AS RAI

* Numbers from nRF9160 SiP on Telenor network in Norway.

LTE Event charge > *33.07 mC
<60.8% improvement



Without AS RAI Demo



Supported Modem firmware



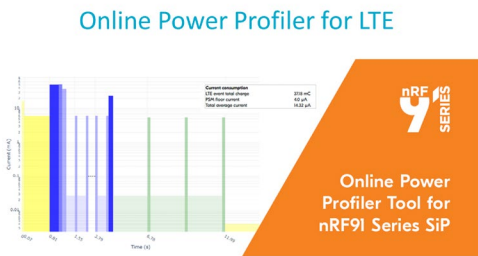
- [mfw_nrf9160 v1.3.3](#)
- [Compatibility matrix](#)
- [nRF9160 Certification web page](#)

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
	2.0.0
1.3.2	1.8.0
	1.9.0
	1.9.1
	2.0.0
	2.1.0
1.3.3	2.1.0
	2.2.0

Table 1. nRF9160 modem firmware and nRF Connect SDK versions

Tools for saving power

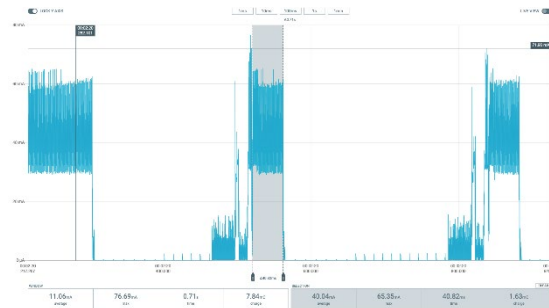
Online Power Profiler



Power Profiler Kit II



Power optimization guide



Get on it

#1

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Q&A