

# Exciting new features in nRF Connect SDK v2.4.0



**NORDIC**<sup>®</sup>  
SEMICONDUCTOR

# Today's hosts

Tiago Monte

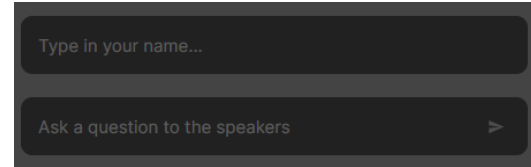


Developer Marketing Manager



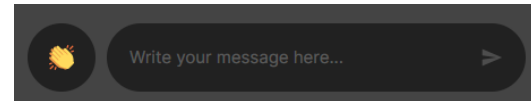
# Practicalities

- 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](https://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
- Development tools updates (including demo)
- PMIC updates (including demo)
- Security updates
- Bluetooth updates
- Wi-Fi updates
- Matter and Thread updates
- Amazon Sidewalk updates (including demo)

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nRF Connect SDK intro



# nRF Connect

## nRF Connect



### nRF Connect SDK

Samples and Applications

Middleware

RTOS

Libraries

Hardware drivers



### nRF Connect for Desktop

Toolchain Manager

Bluetooth Low Energy

Programmer

Cellular Monitor

Power Profiler



### nRF Connect for VS Code

Device Tree Visual Editor

nRF Terminal

nRF Debug

Memory Report

Command-line (CLI)  
and GUI interfaces

Create new board wizard



### Mobile Applications

nRF Connect for Mobile

nRF Mesh

nRF Toolbox

Nordic Thingy

nRF Cloud Gateway

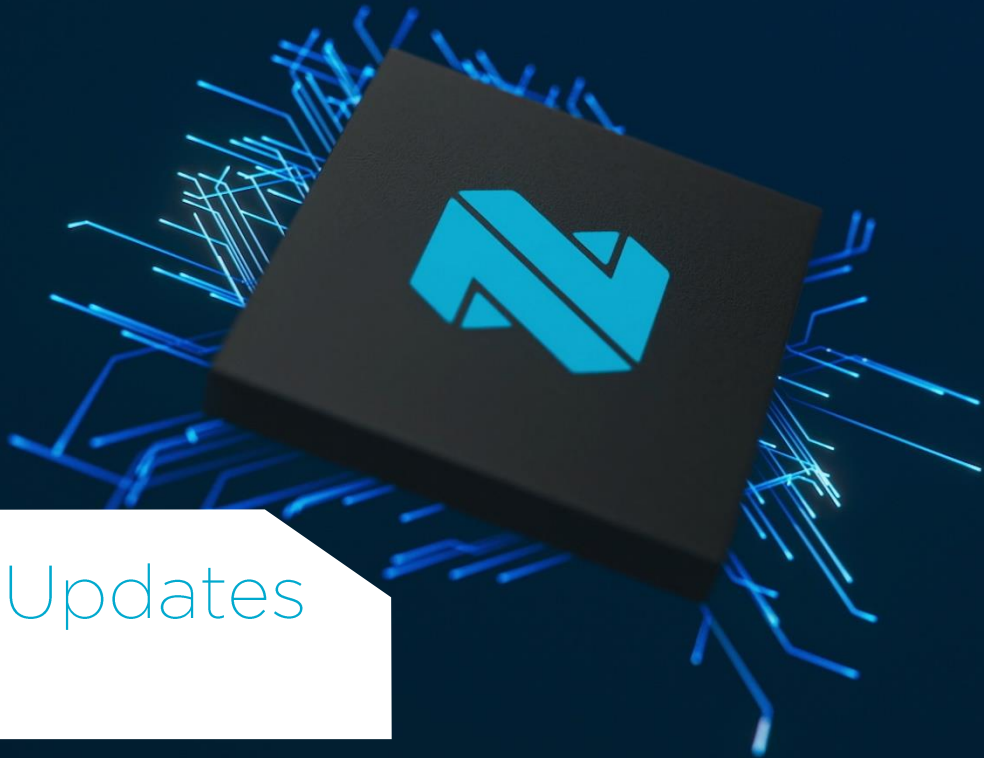
# nRF Connect SDK



- 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





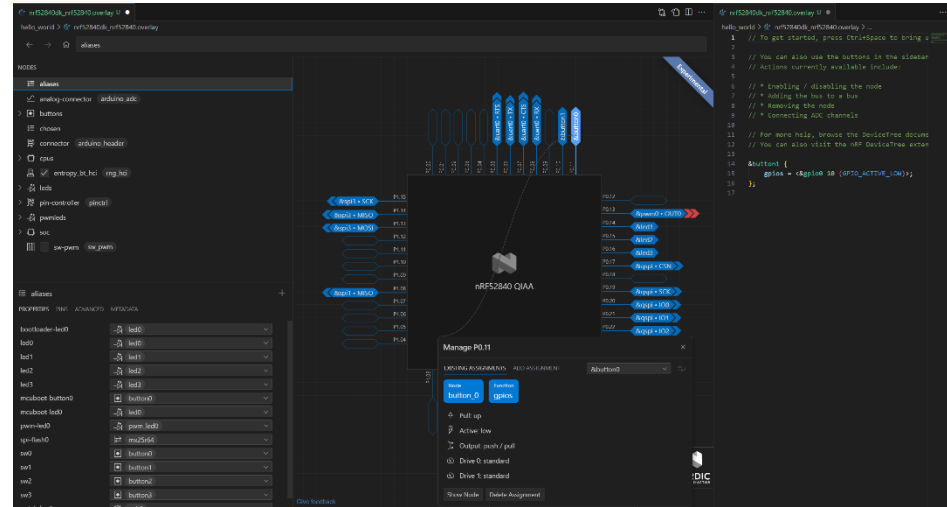


# Development Tools Updates

# nRF Connect for VS Code (IDE) Devicetree Visual Editor



- Now part of Released extension
  - Previously only on pre-release
- Experimental feature
- Visual representation of device tree for easy editing
- Abstracts from the data structure
- Accelerates hardware configuration
- Can be used alongside text editor



# Cellular Monitor

- Evaluate network communication
- Analyze modem traces
- Easily check valid network parameters
- Wireshark integration
- Serial Terminal integration
- Built-in precompiled samples
- Future replacement of LTE Link Monitor and Trace Collector

Cellular Monitor Preview v0.9.0

hRF9160 DK  
030960312-109

DASHBOARD FEEDBACK ABOUT

Stop

Refresh dashboard

Open Serial Terminal

CONNECTION STATUS

TRACE

SSM

LTE CONNECTION

PDN

TRACE OPTIONS

Trace database

1.3.4

Serial port trace capture

LOGGING

Reset device on start

Refresh dashboard on start

Open in Wireshark

Save trace file to disk

Disk Free

511 GB 246 GB

RAW file name File size

BACK\_3392\_2min3sec 764 KB

ADVANCED OPTIONS

Program device

Terminal Serial Port

COM10

LTE Network

RRC EUE 5

ACT LTE-M

OPERATOR DINA

SINR 12

MCC 244

EARFCN 6200

RSRP 115 dB

RSRQ 109 dB

SINR 26 dB

EPS NETWORK REGISTRATION STATUS 5

LOCAL TIME ZONE Unknown

UNIVERSAL TIME Unknown

DAYLIGHT SAVING TIME Unknown

CONNECTION EVALUATION RESULT 0

ENERGY ESTIMATE 8

CELL ID 0020981E

PLAN 24412

PLAN MODE 0

PLAN FORMAT 2

PHYSICAL CELL ID 313

COVERAGE ENHANCEMENT LEVEL 0

CONEVAL TX POWER 4

CONEVAL TX REPETITIONS 1

CONEVAL RX REPETITIONS 8

CONEVAL DL PATH LOSS 96

Device

IMEI 350457791992132

MODEM FIRMWARE mFw\_mF9160\_1.3.4

HARDWARE VERSION mFw\_mF9160\_SICA\_B1A

MODEM UUID f6a7b07b-70f3-4b80-a43a-a7a0764a0b4d

CURRENT BAND 20

SUPPORTED BANDS 1,2,3,4,5,8,12,13,18,19,20,25,26,46

DATA PROFILE 2

MANUFACTURER Nordic Semiconductor ASA

PREFERRED BEARER No Preference

SUPPORTED BEARERS LTE-M NB-IoT CDMA2

FUNCTIONAL MODE 1: Normal

TRACE STATE OPERATION 1

TRACE STATE SET ID 2

LTE-M TX REDUCTION Not set

NB-IOT TX REDUCTION Not set

Power Saving Mode

REQUESTED ACTIVE TIMER 00100001

REQUESTED PERIODIC TAU 00000110

PROVIDED ACTIVE TIMER 00011110

PROVIDED PERIODIC TAU Deactivated - 11100000

LEGACY PROVIDED PERIODIC TAU 01001001

TAU TRIGGERED 0

REQUESTED EDRX 1011

NB-PROVIDED EDRX Unknown

PAGING TIME WINDOW Unknown

Sim

UICC STATUS Initialization OK

IMSI 204080181991051

ICCID 8931980620054220020F

PIN READY

PIN RETRIES 3

PUK RETRIES 10

PIN2 RETRIES Unknown

PIN2 RETRIES Unknown

PDN

ACCESS POINT NAME Basis-iot

PIN TYPE Not set

IPV4 ADDRESS 10.160.14.146

CONTEXT ID 0

Connectivity Statistics

COLLECTING DATA Yes

SUCCESSFUL SMS TX 0

SUCCESSFUL SMS RX 0

DATA TRANSMITTED 0 MB

DATA RECEIVED 0 MB

MAX PACKET SIZE TX OR RX 0 B

AVERAGE PACKET SIZE 0 B

Packet Event View

AT+LNDATAURL?

30.09.2023 18:55:16.197

19/19

448/276

1:07:28

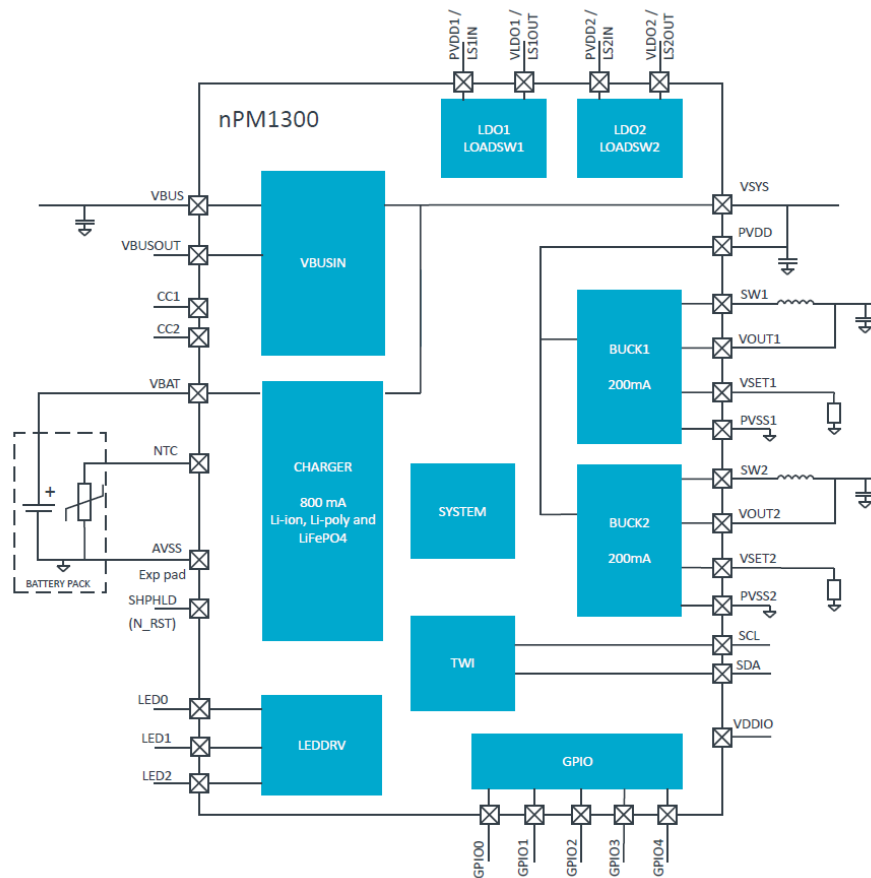
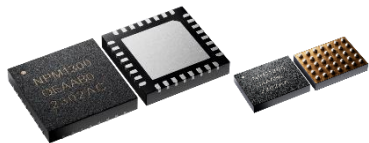
# PMIC Updates

## nRF Connect SDK v2.4.0



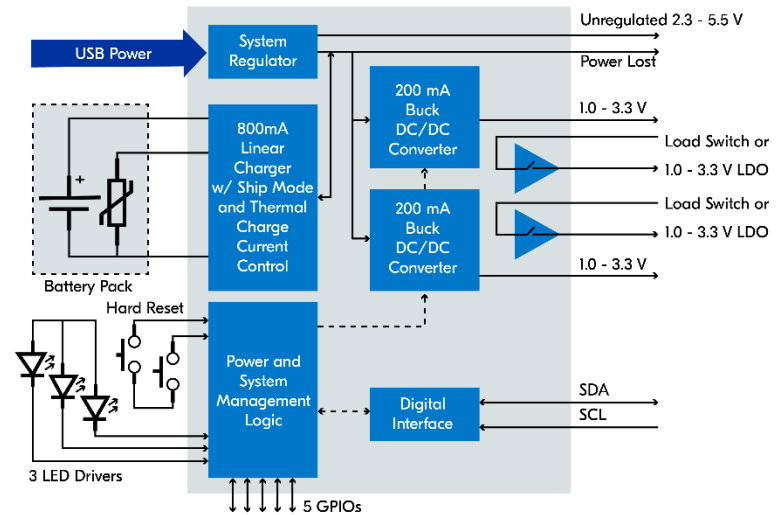
# nPM1300 Overview

- **What:** Highly efficient and ultra-compact PMIC for rechargeable applications up to 1000mAh
- **Why:** Saves components by incorporating important system management functions
  - Ultra low-power, precision fuel gauge
  - Hard reset
  - Watchdog
  - Boot monitor
  - Power fail interrupt
- **Packaging**
  - 5x5 QFN
  - 3.1 x 2.4 mm WLCSP



# PMIC Updates

- Added experimental support for:
  - nPM1300 and nPM1300-EK
  - Charger, BUCKs, LDOs, Load Switches and GPIOs
  - Sample showing [fuel gauge functionality](#): calculates battery state of charge, time to empty, time to full and provides updates of these over the terminal once every second
  - Sample providing a [shell interface](#) that supports PMIC features: BUCKs, LDOs, Load Switches and GPIOs



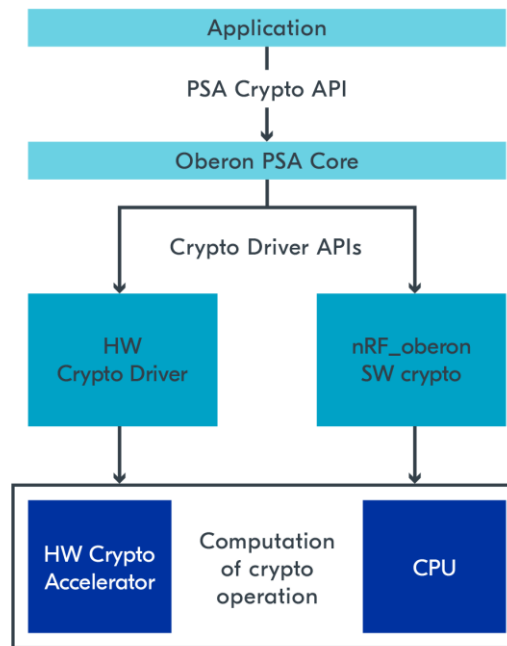


# Security updates

nRF Connect SDK v2.4.0

# Security updates

- Added support for Oberon PSA core library
  - Provides an optimized implementation of the PSA Crypto API that reduces the required flash footprint vs the mbed TLS PSA Crypto implementation
- Improves configuration scheme
- [PSA Certified Crypto API](#)





A smartphone is shown in the center, displaying a green screen with the text "Connecting to Matter Home..." and a Bluetooth icon. To its right is a circular, glowing blue and purple device, likely a Matter Home hub. The background features concentric blue and purple circles, suggesting a wireless signal or connection. A white banner is overlaid on the bottom left of the image.

# Bluetooth Updates

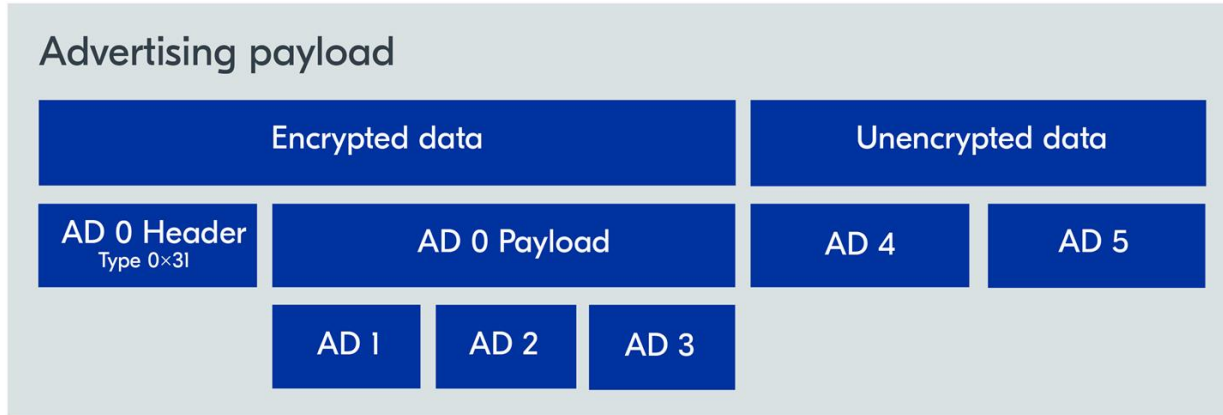
nRF Connect SDK v2.4.0

# Bluetooth LE updates

- Added support for
  - Bluetooth LE: Periodic Advertisement with Responses (PAwR)
    - › Advertiser and scanner role (advertiser role was introduced as experimental in nRF Connect SDK v2.3.0)
    - › Enables bidirectional exchange of application data using connectionless communication
  - Added experimental support for
    - Bluetooth LE: Encrypted Advertising Data (EAD)
      - › Standardized way of encrypting data in advertising and sharing key material required for data encryption
      - › [Encrypted advertising sample](#) available

See the [Bluetooth 5.4 DevZone blog](#) to learn more about these features

# Encrypted Advertising Data (EAD)



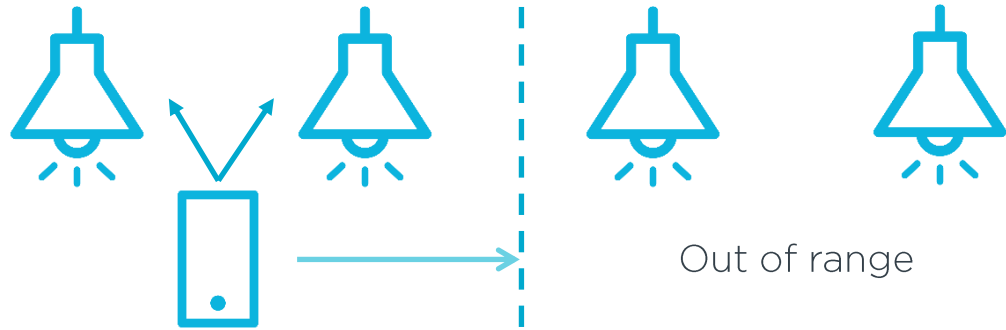
- Mechanism to encrypt advertising data using any advertising transport
- Allows encrypting the entire advertising payload or just a sub-set
- Adds a new AD type (0x31) that encapsulates encrypted data
- Adds GATT characteristic Encrypted Data Key Material
  - Must be read over an encrypted and authenticated link

# Bluetooth mesh updates

- Added experimental support for Bluetooth mesh 1.1 features
  - Remote provisioning
    - › Allows provisioning devices without being in direct RF range of the provisioner.
  - Device Firmware Update (DFU) and BLOB Transfer models
    - › Allows updating the firmware of mesh nodes through the Bluetooth mesh network.
  - Private beacons
    - › Improves privacy of secure network beacons.
  - Enhanced Provisioning Authentication algorithm
    - › Improves security of the provisioning process.
  - Mesh Enhancements
    - › Includes several mesh specification enhancements

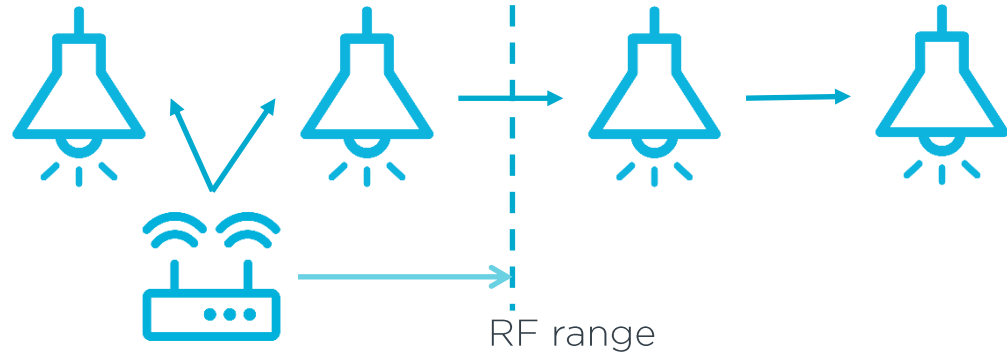
# Remote provisioning - PB-Remote

Mesh v1.0

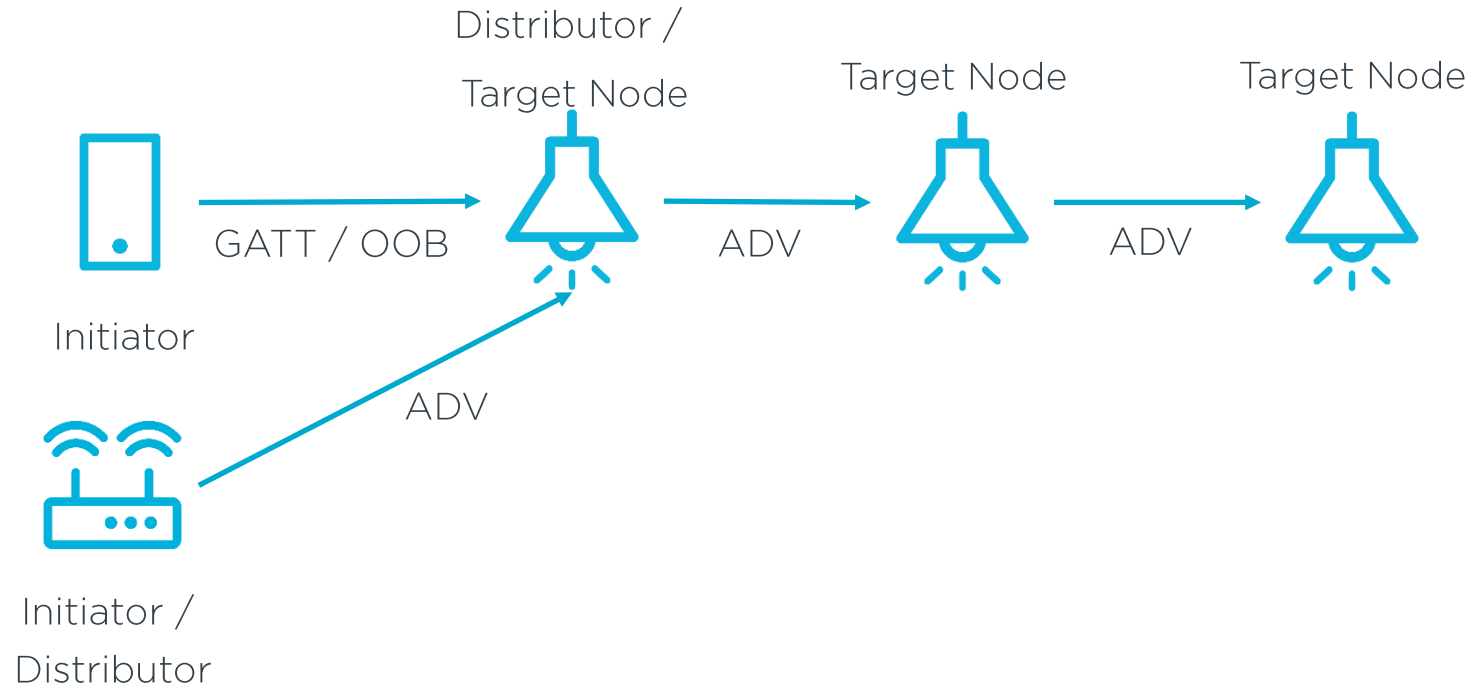


Mesh v1.1

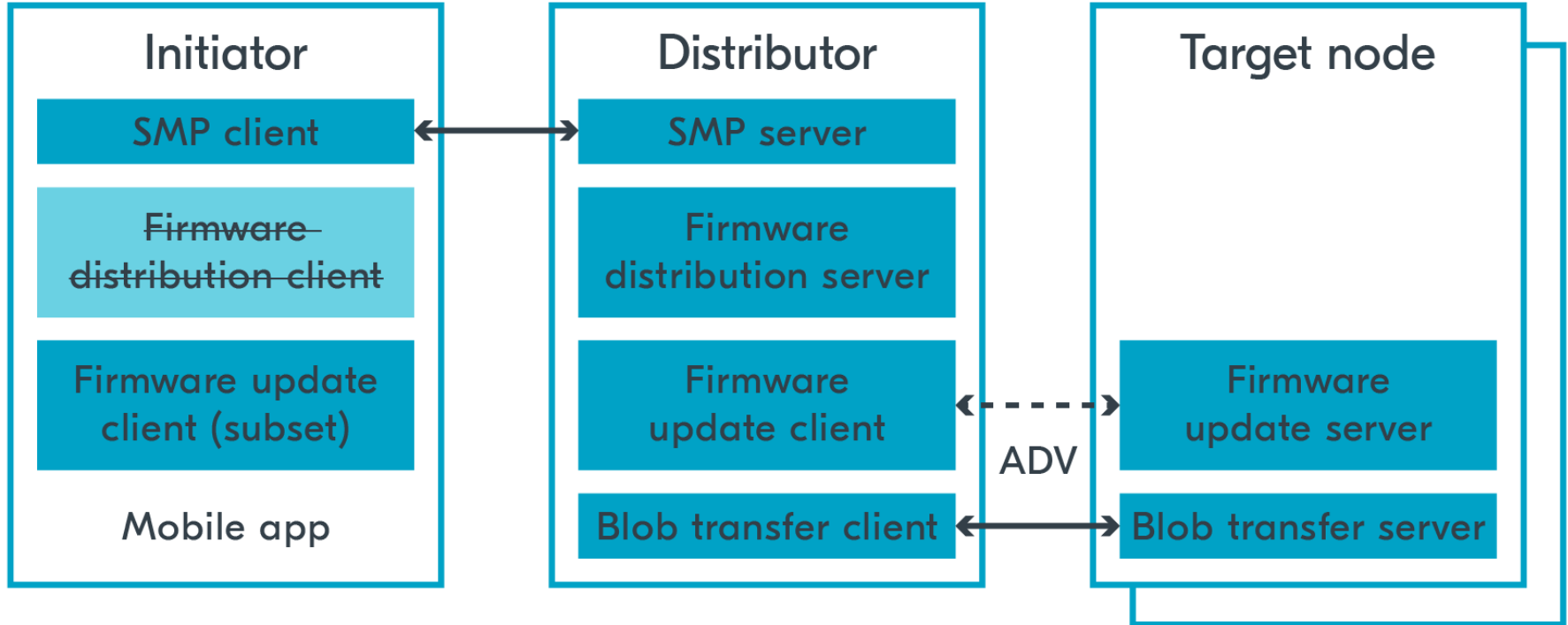
Nodes supporting  
remote provisioning server



# Bluetooth mesh DFU scenarios



# Bluetooth mesh DFU profile



# Bluetooth Networked Lighting Control (NLC)

- Bluetooth profiles for networked connected lighting
  - Address application-level interoperability, sets requirements for applications
  - Bluetooth mesh topology and specified use of Mesh Models required
  - Learn from the Bluetooth SIG [NLC page](#)
- We are adding new samples and improving existing ones to align with NLC
  - New supported sample [Mesh light dimmer and scene selector](#)
  - Improved [mesh light fixture](#) and [mesh sensor](#) samples





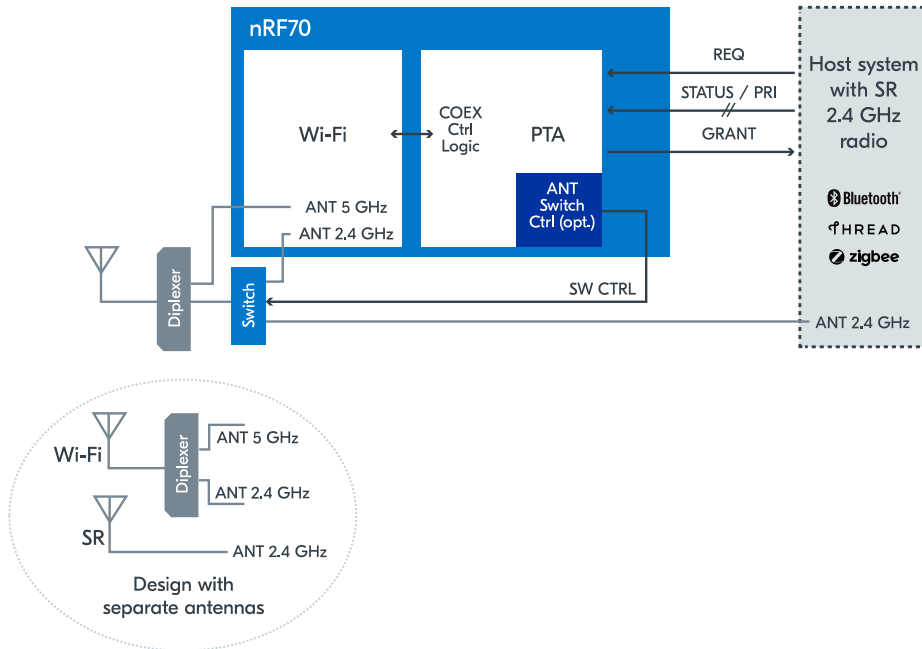
# Wi-Fi Updates

nRF Connect SDK v2.4.0

# Wi-Fi updates

- Added support for
  - Wi-Fi station (STA) mode on the nRF5340 host platform
  - [Bluetooth LE coexistence](#) with Wi-Fi
    - › Added as experimental together with dedicated [sample](#) on nRF Connect SDK v2.3.0
  - [Memfault sample](#) support, using Wi-Fi for uploading data to the Memfault cloud
    - › This sample was previously under [nRF9160 samples](#), and it has now moved to a new [debug samples](#) category
    - › It supports cellular (nRF9160 DK, Thingy:91) or Wi-Fi (nRF7002 DK), depending on the selected target board
    - › [“Building more reliable products with Memfault”](#) webinar -> Watch on-demand to learn more

# Co-existence with short-range 2.4 GHz radios



- Mitigate interference between Wi-Fi and Short Range (SR) radios
  - Bluetooth LE, ZigBee, Thread and proprietary
- Highly-configurable COEX Hardware
  - Shared / Separate antenna mode
  - Flexible output signals
  - 3 or 4-wire COEX interface configurations
- Generic Packet Traffic Arbiter (PTA) design
  - REQUEST, STATUS/PRIORITY, GRANT signaling

A white smart speaker is centered on a wooden shelf. The background is a soft blue with bokeh light effects. The text "Sign up for our Wi-Fi newsletter!" is overlaid on the image, underlined.

Sign up for our Wi-Fi newsletter!

Watch the Introduction to low-power Wi-Fi webinar [on demand](#)



# Matter and Thread Updates

nRF Connect SDK v2.4.0

# Matter updates

- Added support for Matter 1.1 specification (see [CSA blog post](#))
  - Enhances support for Intermittently Connected Devices (ICDs) aka "sleepy devices"
    - › These are typically battery-powered devices like sensors, door locks, switches and more
    - › Reduced likelihood that a device will be reported as offline when users or platforms interact with it
    - › Allows developers to better optimize their products and create better user experiences
  - Improvements for device makers and developers to get started with Matter, and to more easily certify their products
- Matter over Wi-Fi solution has been moved out of experimental and is now supported

# Nordic Semiconductor supports KNX IoT



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- As of today, developers will be able to evaluate KNX IoT technology and build prototypes of KNX IoT products using Nordic's multi-award-winning System-on-Chips (SoCs) and existing nRF Connect SDK

# What is KNX?

- KNX is an open standard (see EN 50090, ISO/IEC 14543) for commercial and residential building automation
- Popular especially for **HVAC (Heating, ventilation, and air conditioning) control in commercial buildings** but can also manage lighting, blinds, shutters, security systems, energy management, audio video, white goods, displays, remote control, etc.
- **The most common form of installation is over twisted pair medium** (in a tree, line or star topology). Other physical communication media are powerline (low adoption), RF (FSK in 868.3 MHz band), or IP links (KNXnet/IP port 3671 has integration solutions for IP-enabled media like Ethernet or Wi-Fi)





# What is KNX IoT?

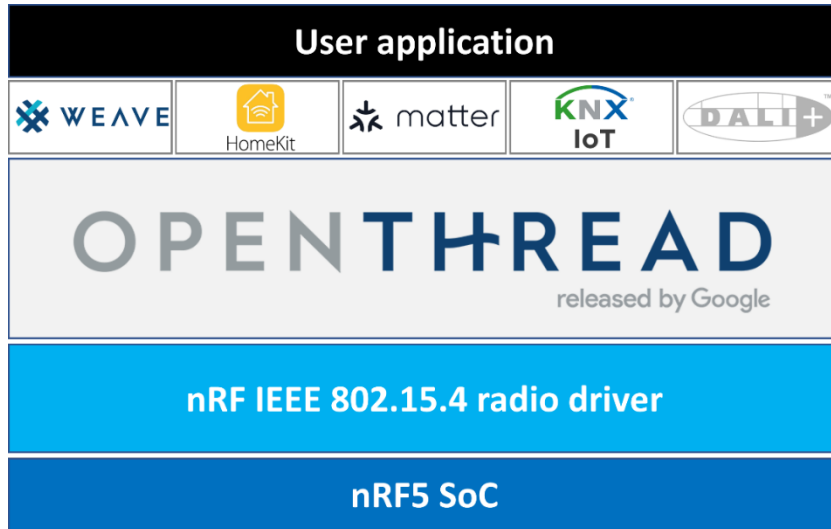
- KNX IoT (KNX IoT Point API) is a new addition to the suite of KNX physical transmission media. The transmission medium is IPv6 (the later Internet protocol standard) thus future-proofing KNX as it can be used on IT equipment and all common IP physical transports
- KNX IoT is backed by an open-source software stack, sponsored by the KNX Association and available at <https://www.production.knx.org/knx-en/for-manufacturers/get-started/knx-iot-stack/>
- KNX IoT was developed in such a way that it can work with Thread and the new open-source software stack is based on this low-power, IPv6-based wireless standard



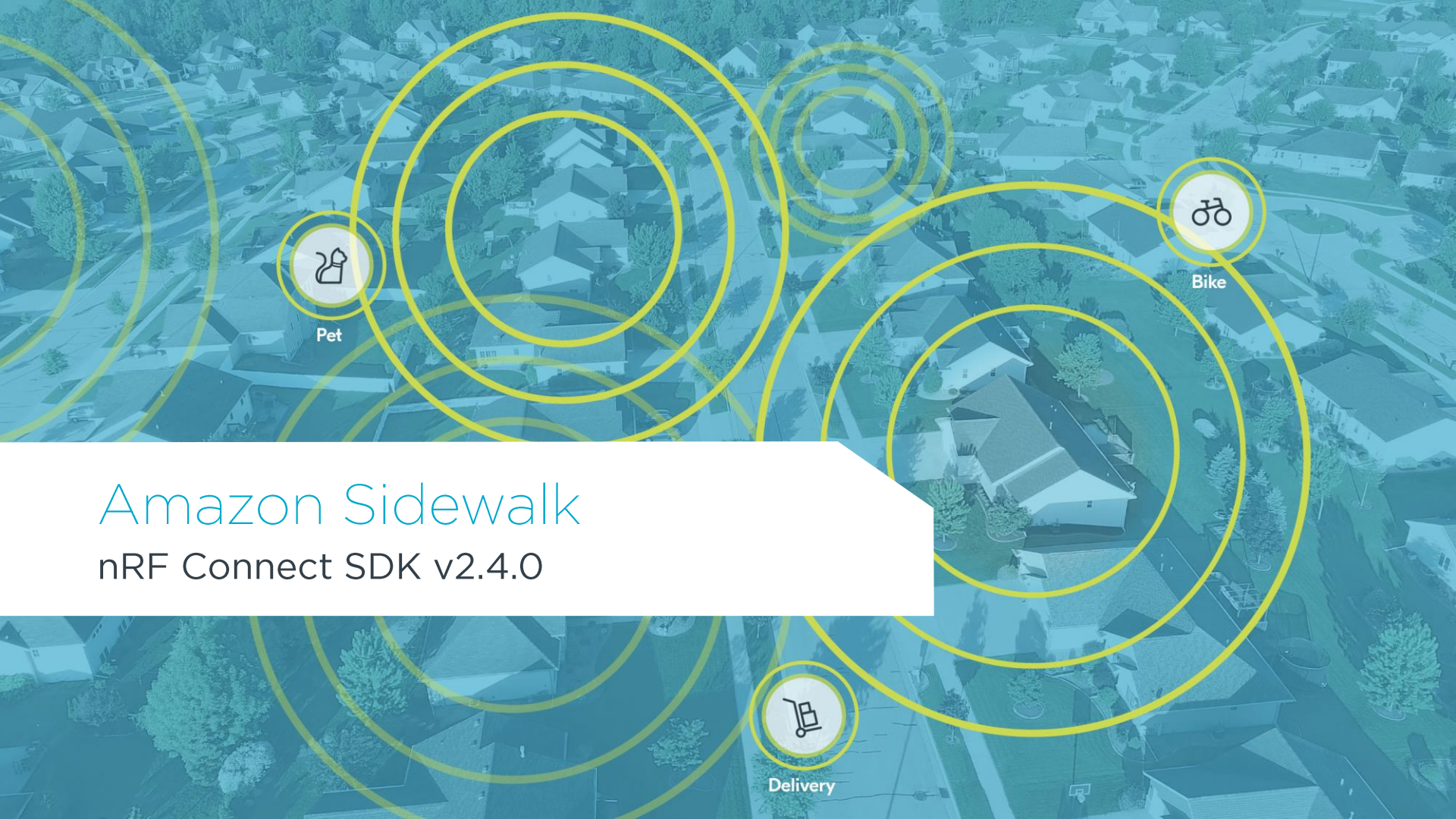
# KNX IoT over Thread – low-power revolution

- KNX RF is limited to Europe, does NOT support IP and does NOT support mesh
- KNXnet/IP is NOT low-power. It is rather meant as a baseline to build a network backbone, not as a transport for sensors/actuators
- **KNX IoT over Thread is a global solution (2.4 GHz ISM band) which enables low-power, IPv6-based mesh networking** (KNX IoT battery-operated sensors can last for years vs. months in case of KNXnet/IP)
- **KNX IoT has great potential in office retrofitting**
  - The cost of adding a sensor using KNX IoT compared to twister pair-based KNX can be 10x lower

# Nordic's KNX IoT solution



- Thread protocol is application layer agnostic and can support many IP-enabled application protocols
- Nordic has used its expertise and many years of experience in Thread technology to enable yet another application layer running on Thread
- KNX IoT open-source stack has been integrated with nRF Connect SDK
- The project is available on [GitHub](#)
  - Experimental support, meant for evaluation and development, not production-ready
  - Requires nRF Connect SDK v2.3.0



Pet



Bike

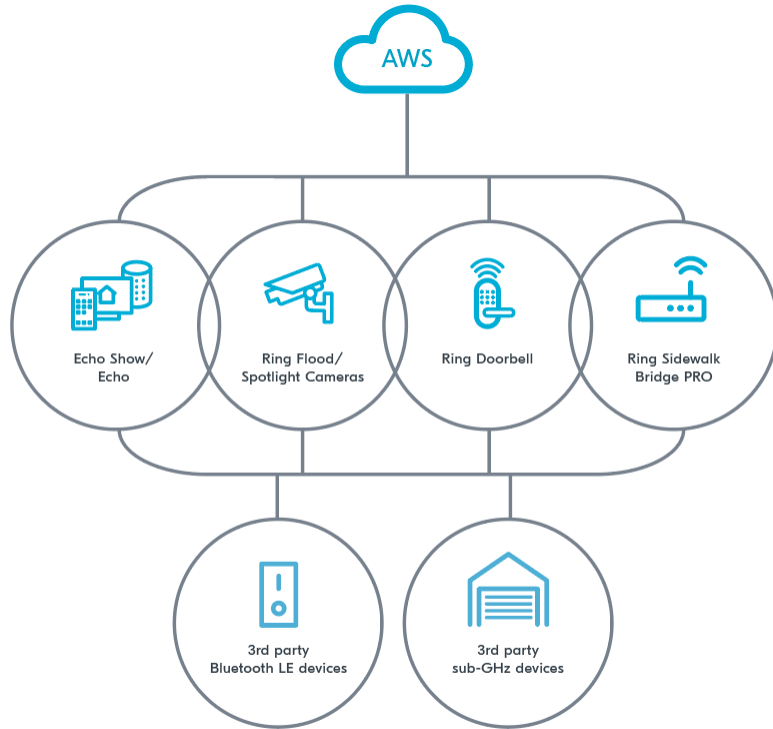


Delivery

# Amazon Sidewalk

nRF Connect SDK v2.4.0

# What is Amazon Sidewalk?

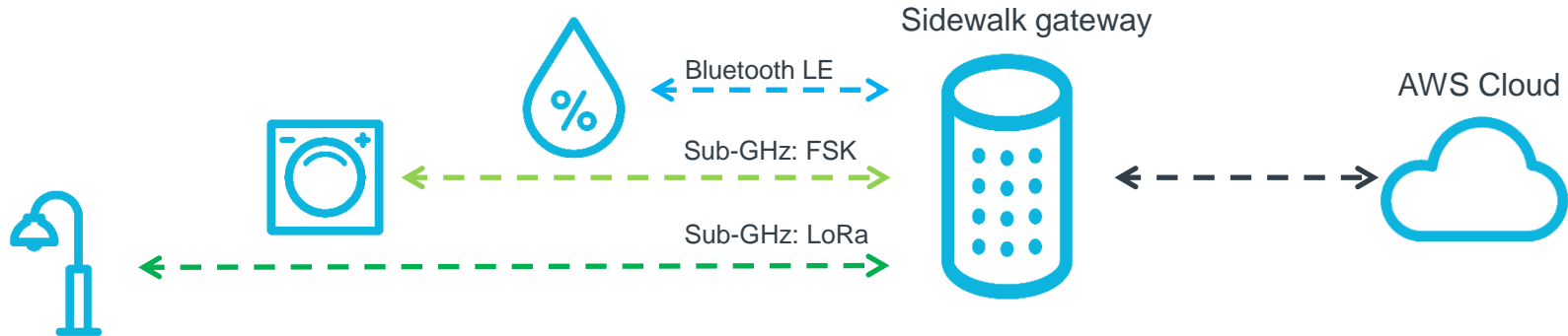


- Amazon Sidewalk is a **community network** that uses Amazon Sidewalk Bridges, such as Amazon Echo and Ring devices, to provide cloud connectivity to IoT devices
- It is operated by Amazon **at no charge** to customers
- Key benefits:
  - Streamlining access to the cloud
  - Asset tracking and finding lost items
  - Providing connectivity

Sidewalk is currently only available in the US

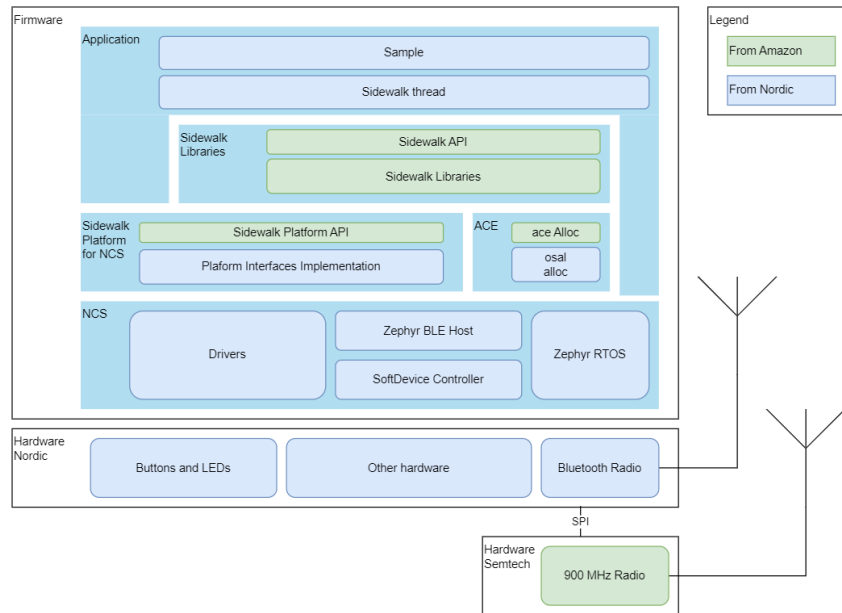
# Amazon Sidewalk variants

- **Sidewalk over Bluetooth LE** - shorter range variant targets applications within the home. Provides the highest throughput (1 Mbps)
- **Sidewalk over sub-GHz** - long range variant designed to provide "all neighborhood" coverage, but without incurring the cost of using a cellular network connection
  - Sidewalk over FSK - a long range option which provides higher throughput (50 kbps) than Sidewalk over LoRa, but its range is shorter
  - Sidewalk over LoRa - the longest possible range but throughput is the lowest (2 kbps)



# Amazon Sidewalk in nRF Connect SDK

- Amazon Sidewalk SDK integration
- Qualified Bluetooth 5.3 LE protocol stack
- Semtech's sub-GHz radio transceiver library integration
- Support for multiprotocol operation of Bluetooth and Semtech's sub-GHz radio
- Distributed as an nRF Connect SDK add-on available at <https://github.com/nrfconnect/sdk-sidewalk>
- Requires nRF Connect SDK v2.3.0

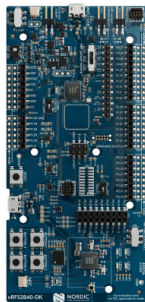


# Sidewalk samples and applications

## Template Bluetooth LE and Template sub-GHz

- Those samples provide templates for Sidewalk End Node applications
- The purpose of the templates is to create a secure communication channel between the end device and the AWS IoT Core for Amazon Sidewalk

nRF52840-DK  
(+SX1262/MB2CAS)



Sidewalk  
gateway



AWS IoT Core for  
Amazon Sidewalk



Bluetooth LE or Sub-GHz



Secure end-to-end communication channel



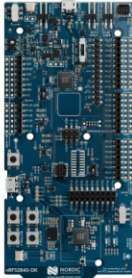


# Sidewalk samples and applications

## Sensor monitoring

- This sample demonstrates sensors monitoring (temperature) and actuators control (LEDs, buttons) over Sidewalk network
- An application server (cloud backend with web UI) compatible with this sample is provided by Amazon

nRF52840-DK  
(+SX1262MB2CAS)



Bluetooth LE  
or Sub-GHz

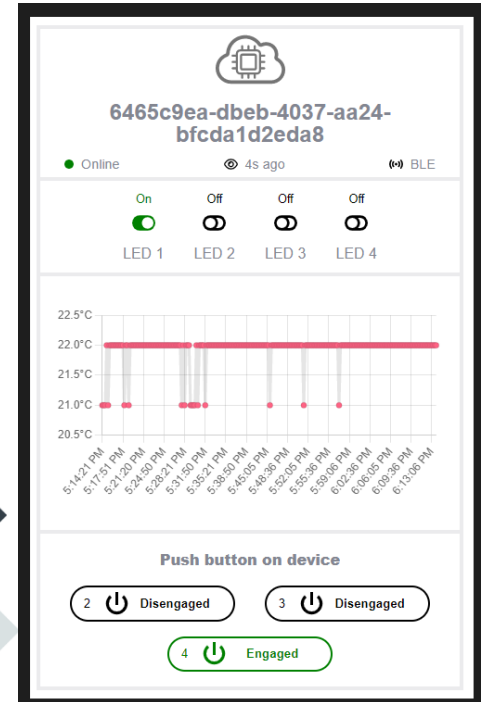
Sidewalk  
gateway



AWS  
Cloud



Secure end-to-end communication channel



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