Wireless IoT Entwicklung mit Nordic Semiconductor

Einleitung und SDK Überblick

Nordic Semiconductor

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February 2026

Agenda des Workshops

- Einleitung von Nordic zum nRF Connect SDK
- Hands-on Kapitel 1: IDE Einführung & Blinky Applikation
- Hands-on Kapitel 2: Bluetooth Peripheral LED & Button Service (LBS)
- Hands-on Kapitel 3: Nordic PMIC & Fuel Gauge Integration

We are Nordic

Simplifying lives through all things connected

Fabless semiconductor company

Founded in Norway, 1983

~1,350 employees

$511 MUSD revenue, CY 2024
OSEBX: NOD

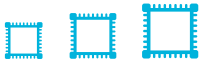
ISO 9001 certified

Global presence

Complete solution

Faster time-to-market

Next-gen hardware



ICs, SoCs, SiPs, PMICs

3rd party modules

Embedded SW stacks

Embedded software

nRF Connect SDK
Unified software

Mobile Apps

Extensive SW/HW development tools

World-class support

DevZone

Developer community

DevAcademy

Online hands-on trainings

NORDIC SOLUTION PARTNER · NORDIC DESIGN PARTNER · NORDIC MODULE PARTNER

Extensive technology partner program

Customer device

Consumer

Healthcare

Industrial

Cloud lifecycle services

nRF CLOUD
powered by Memfault

Device management

Embedded observability

Location services

Bluetooth · matter · THREAD · LTE-M · NB-IoT · nRF · Wi Fi

Nordic product overview

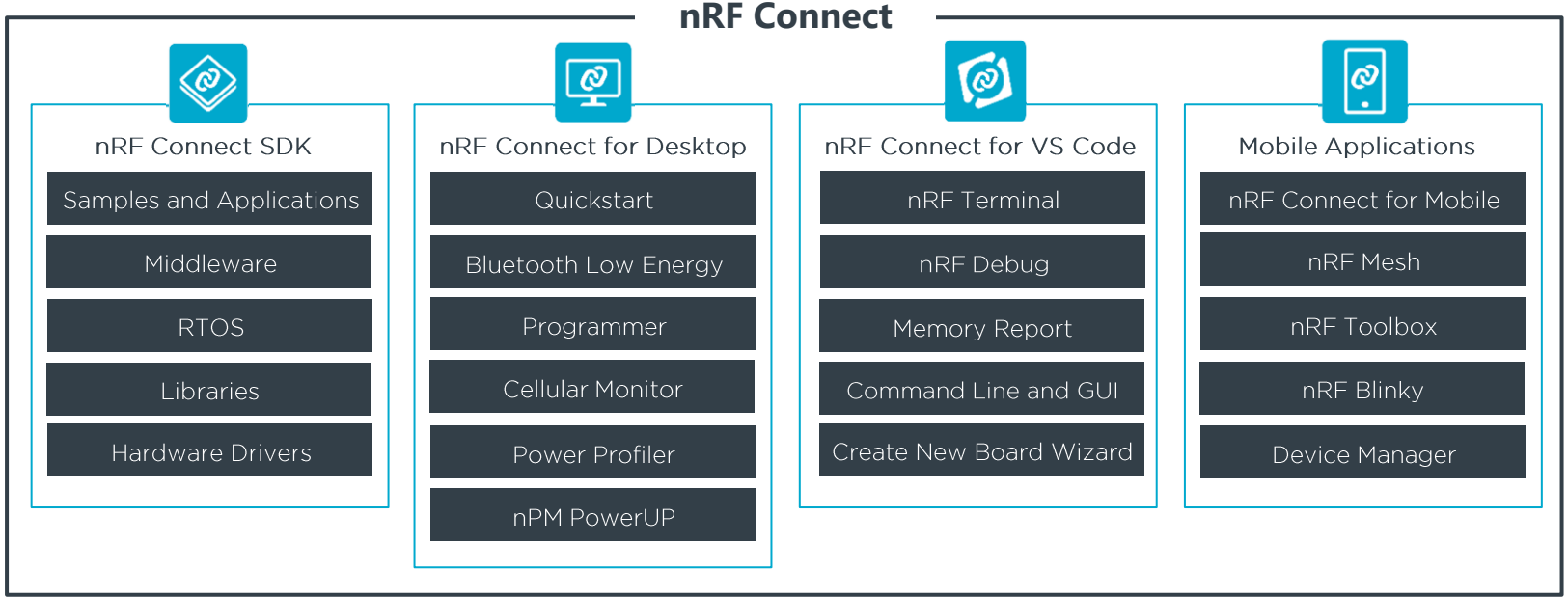
Cloud support across all our wireless connectivity solutions

Short-Range	Cellular IoT	Wi-Fi 6 IoT	Power Management
nRF54 SERIES Bluetooth, THREAD, matter, zigbee nRF CLOUD powered by Memfault	nRF91 SERIES LTE-M, NB-IoT, GNSS nRF CLOUD powered by Memfault	nRF7C SERIES Wi Fi, matter nRF CLOUD powered by Memfault	nPM FAMILY

nRF Connect SDK

Introduction

nRF Connect Platform Overview



nRF Connect SDK

Unified code base and toolchain for all Nordic SoCs

Bluetooth · THREAD · matter · ANT · zigbee · Wi-Fi · LTE-M · NB-IoT · GPS

- Modern tools and SDK
- In the market since 2018
- Based on Zephyr RTOS
- Strong focus on open-source
- Future-proof, modular approach

- Single SDK for all Nordic product series
- Bluetooth v6 qualified Host and Controller stack since v2.8.0

nRF Connect SDK Code Base

- Code base consists of several integrated repositories
  - Code coming from Nordic (blue)
  - Code coming from Open Source (OS) repositories (purple)

- Contains an RTOS, application code, connectivity protocols, wireless stacks, peripheral drivers & more

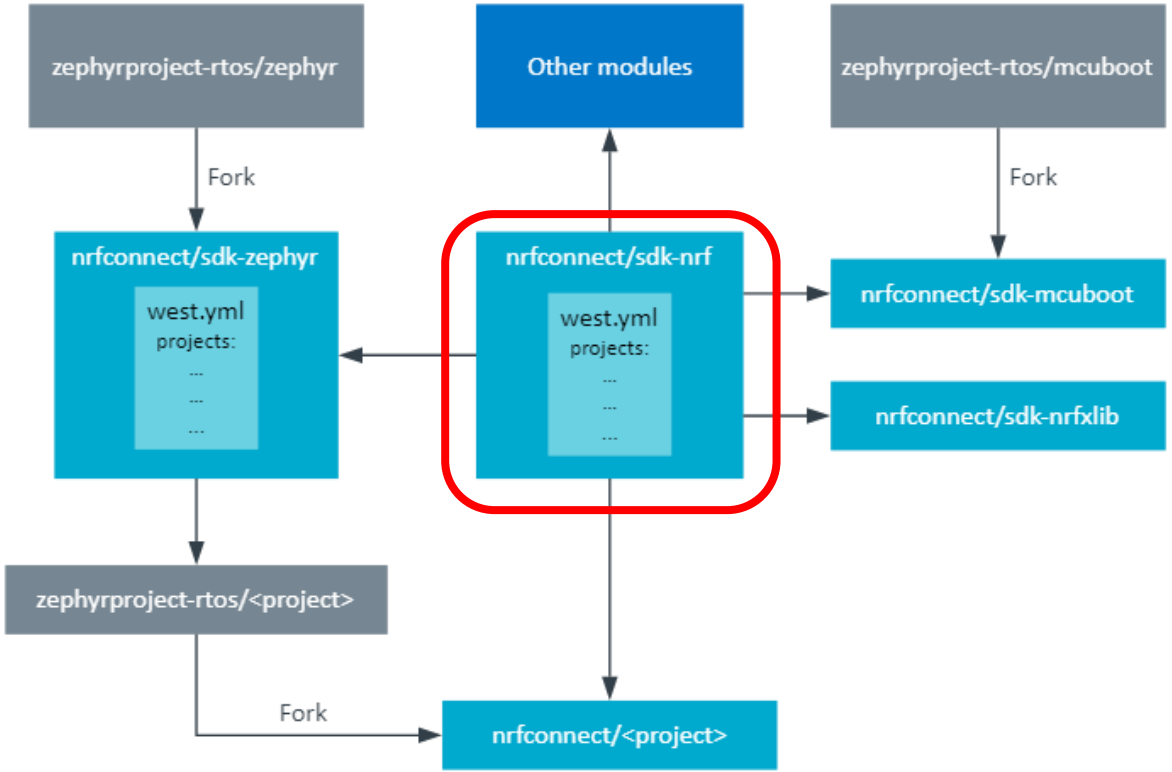
nRF Connect SDK Repositories

- nRF: Application & connectivity protocols
- nrfxlib: compiled libraries where Nordic cannot distribute source code
- nrfx: peripheral drivers
- Zephyr: RTOS & board configuration (OS)
- MCUboot: Secure Bootloader (OS)
- Other repositories
  - Trusted Firmware-M, Matter, etc.

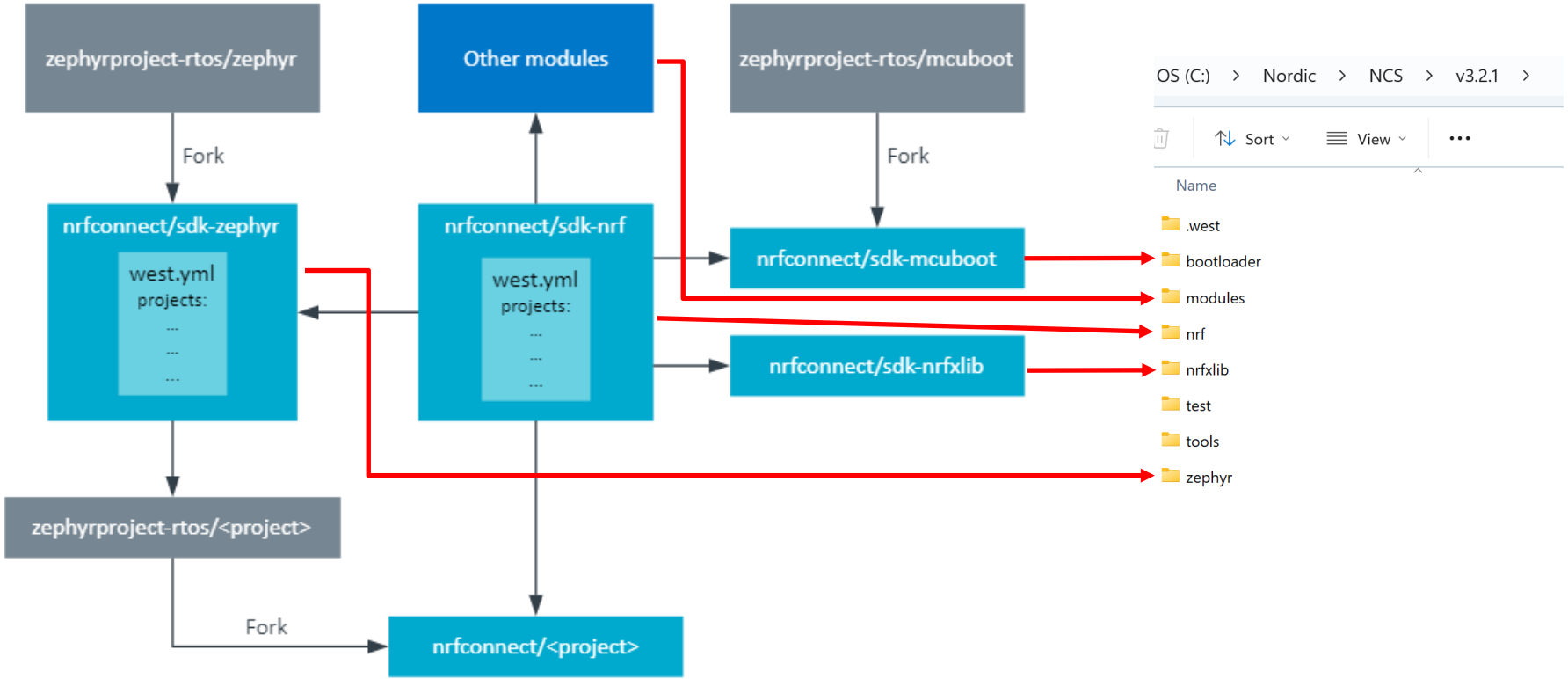
Nordic and Open Source (OS) code

nRF Connect SDK Structure

- The nRF Connect SDK is structured as star topology, with the sdk-nrf repository being in the center.
- The sdk-nrf repository contains the manifest file west.yml in its root folder, which lists and points to all other repositories included in the SDK.

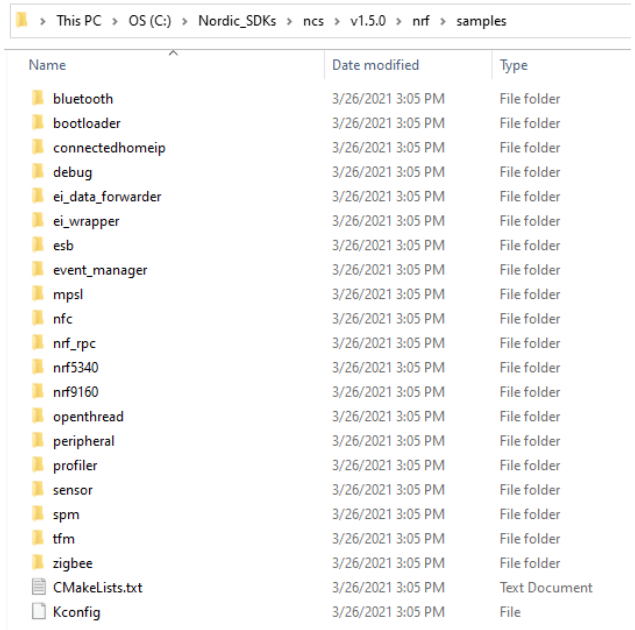


Repository Structure vs. Installation Paths

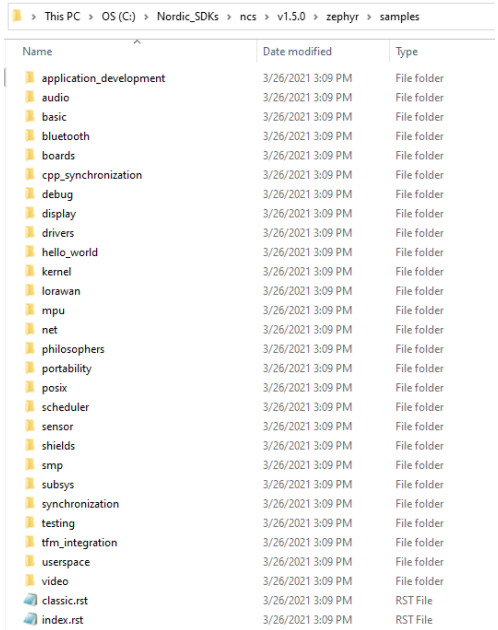


Code Examples

Code Examples can be found from Nordic or Zephyr.



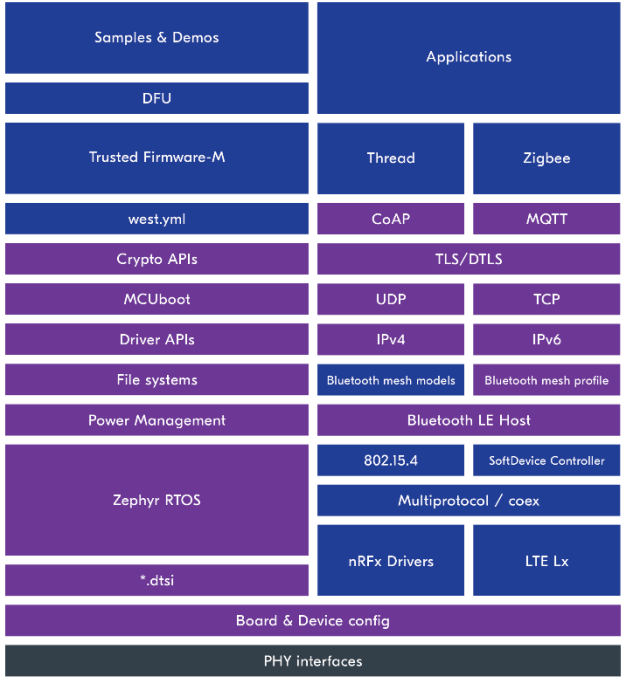
Nordic examples -> **nrf/samples**



Zephyr examples -> **zephyr/samples**

nRF Connect SDK Code Base in Detail

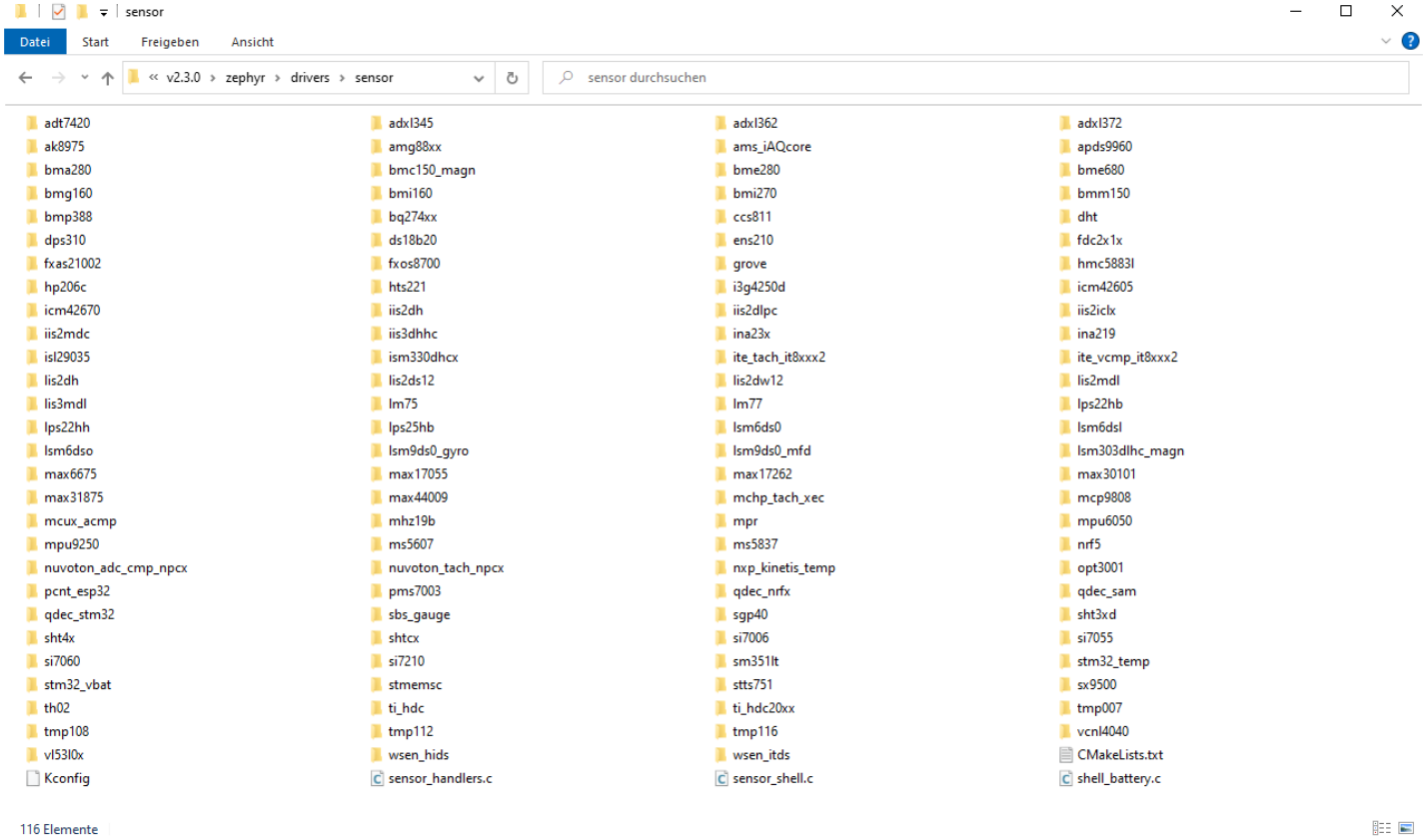
- Code management, build and configuration tools allow developers to focus on the components required for their specific designs while having a powerful solution toolbox available
- Zephyr includes a lot of fundamental pieces of code and functionality
  - Middleware & messaging protocols (IP, HTTP, MQTT, CoAP, Modbus, …)
  - Device drivers (e.g. sensors)
- → Use Zephyr as building block with the pieces that you need!



Why the Zephyr RTOS?

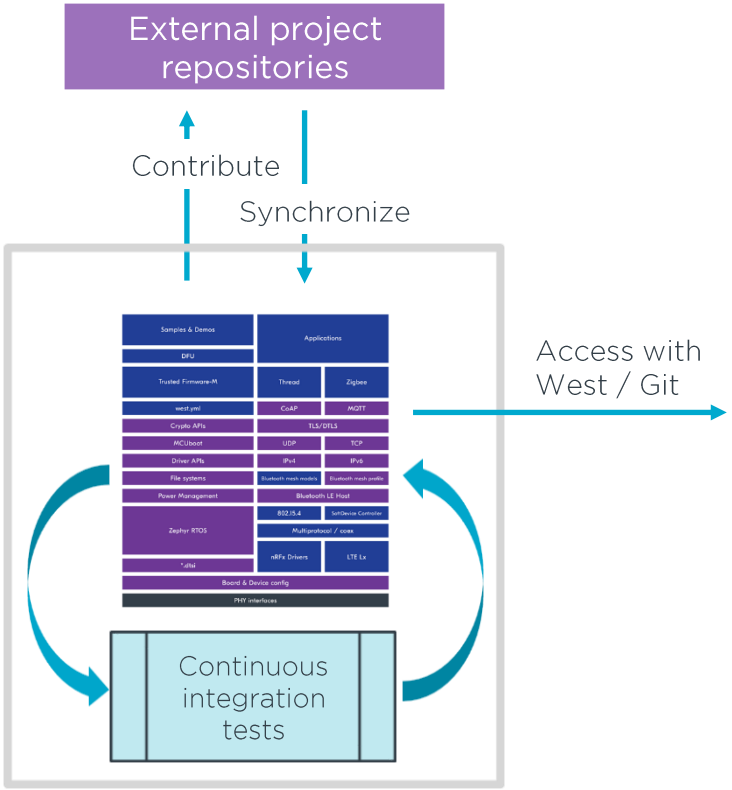
- Zephyr is designed & built for low power wireless
- Zephyr is an independent technology project
  - Governed under the Linux Foundation
  - Contributions made by over 1000 industry embedded experts
- Zephyr is scalable
  - Very small configurations for memory constrained devices
  - Powerful, feature-rich, configurations for large memory, high-processing power devices (multiple MBs)
  - Designed for low power applications
- Zephyr includes a lot of fundamental pieces of code
  - Nordic can focus on other important features
- Nordic has been a member & contributor since 2016

Leverage code that is fully integrated



Nordic Synchronizes with External Repos

- nRF Connect SDK is a single platform
- All source code is distributed by Nordic
- Includes open-source code from external projects
- Nordic contributes to, and synchronizes with external projects
- Nordic runs integration test on all source code and manages configuration
- Customers clone a tag using git and west



nRF Connect SDK

Toolchain

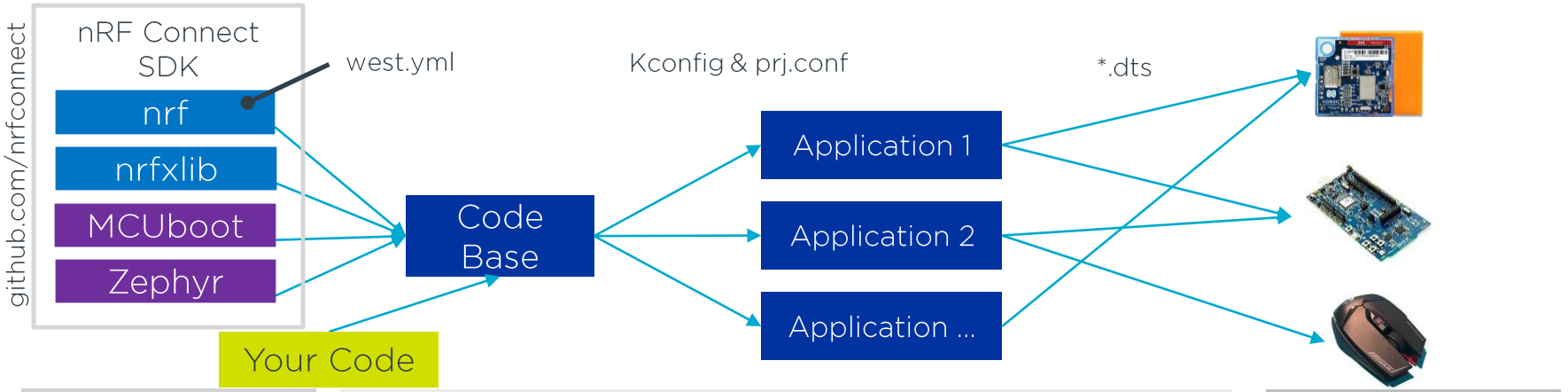
Manage Source Code and Configurations

West
Multi-repository management tool

Kconfig
Source module / feature configuration for compile

Device Tree
Target Board / Device description

Clone / update → Configure features → Configure target

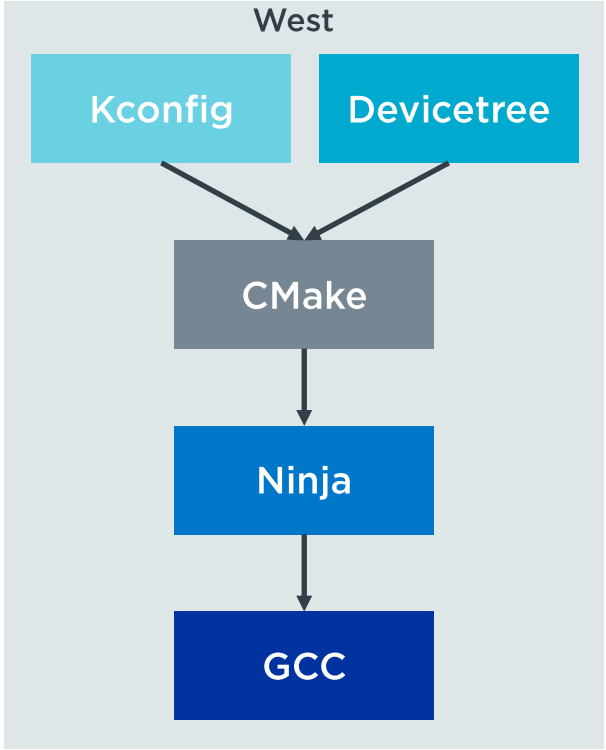


nRF Connect SDK

Toolchain

- Kconfig
  - Describes SW and system features, generates C definitions to configure the system and include libraries without changing the source code (e.g. BLE, sensors, RTOS services (logging, shell))
  - Kconfig and prj.conf files are merged into one .config file for CMake *(see build/<proj.name>/zephyr/.config)*

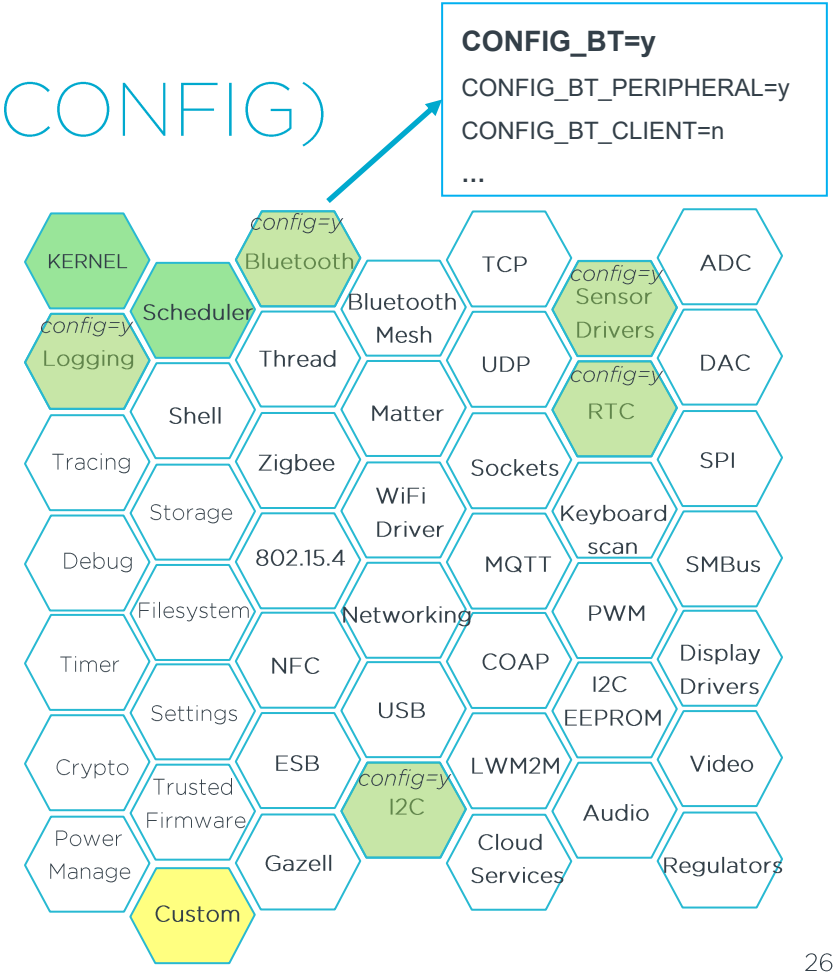
- DeviceTree (dts,dtsi)
  - Describes HW, pin layout
  - Allows for flexible HW modification via an overlay file
  - → Build for different PCB designs and SoCs without changing source code
  - Zephyr Documentation: Device Tree Guide



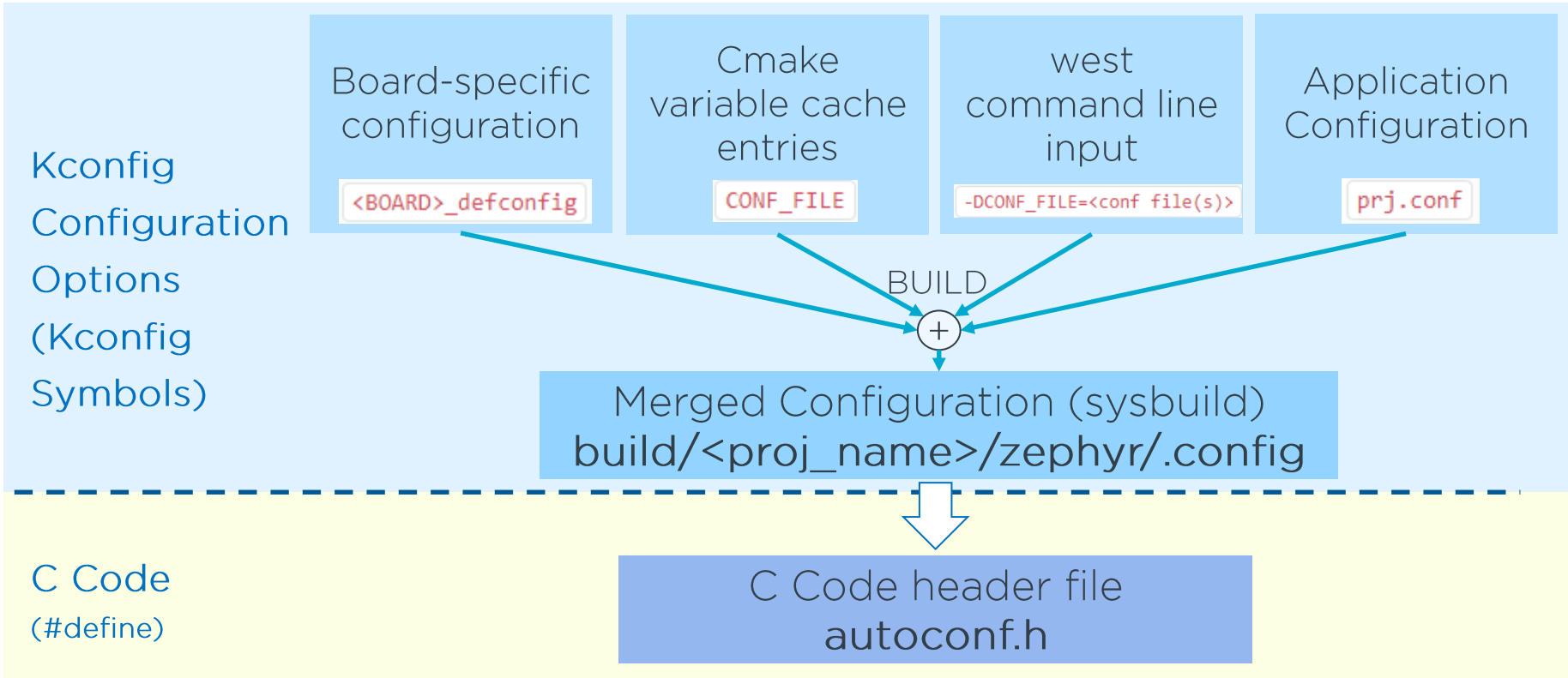
Configuration System (KCONFIG)

- Zephyr Kernel and Sub-System can be configure at build time
  - Add software modules to your project
  - If a software module was added, further CONFIG symbols appear and allow you to configure the module
- Custom Kconfig is possible

- Goal: Configure software features without changing source code



Configuration for an Application



nRF Connect SDK

Toolchain cont.

CMake

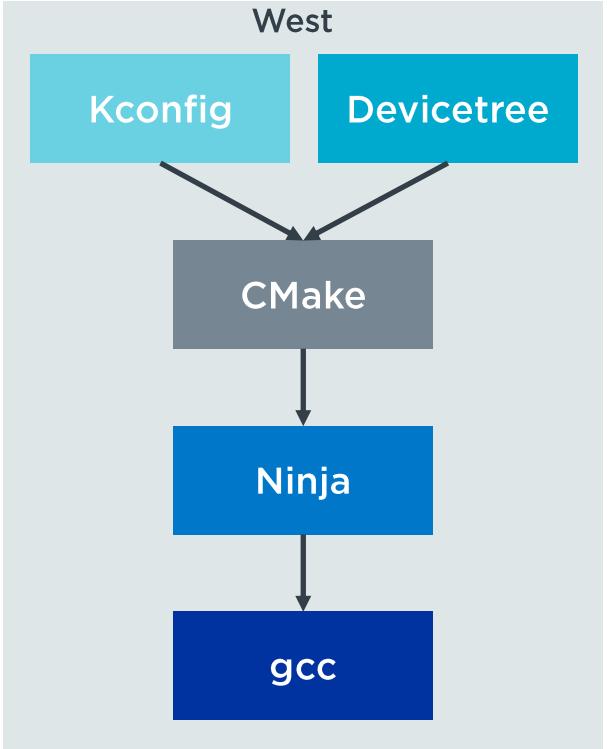
- Uses the information from Kconfig and the devicetree to generate build files.

Ninja

- Similar to make
- Faster than make when performing incremental builds
- Requires CMake in order to generate build files

gcc

- The gcc compiler is used to creates the executables (hex/elf files)



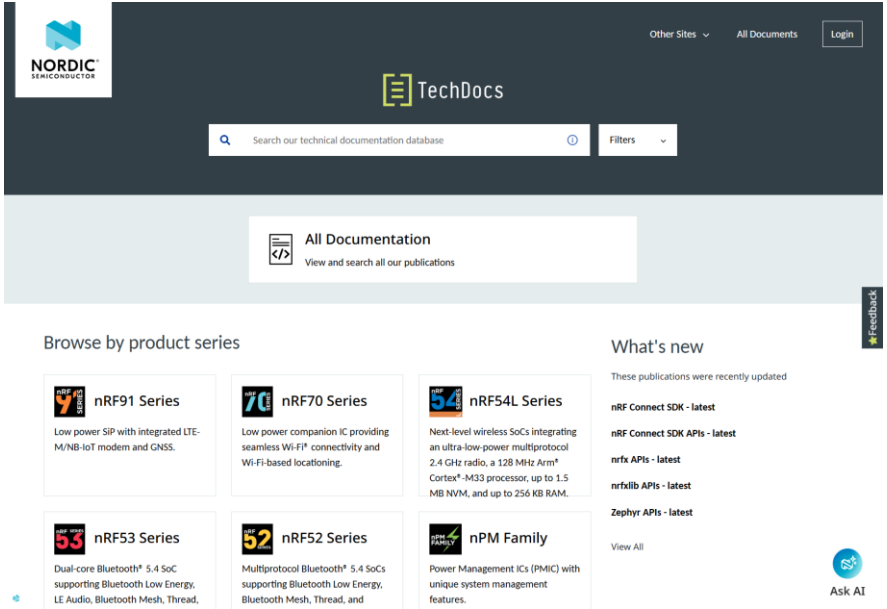
Documentations & Help

Guidance

Where do I find documentation?

- Nordic created a new, unified website for its documentation called TechDocs:
  - www.docs.nordicsemi.com

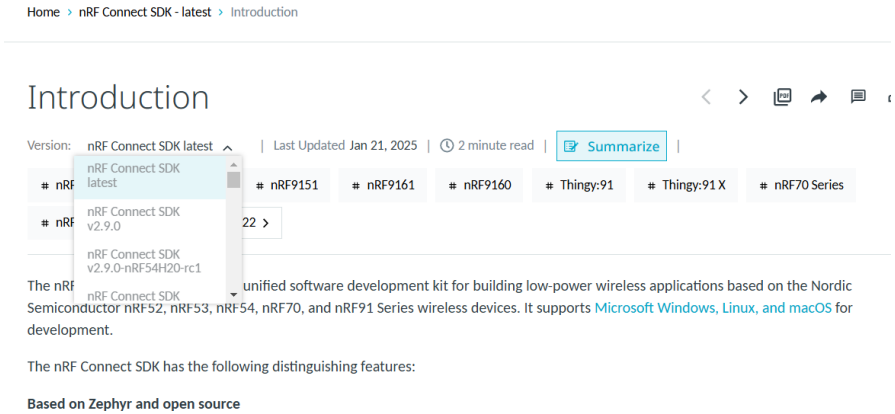
- HW: Tiles represent the product series on the main page
- SW: Navigation found on the right-hand side
  - Links to various repositories that are part of the nRF Connect SDK
  - (Entry Page: “nRF Connect SDK – latest”)



nRF Connect SDK Documentation

- nRF Connect SDK: Documentation link
- Ensure to view the documentation corresponding to your NCS version in use
  - Click on the version field / drop down menu
  - “Latest” refers to the current development branch
  - Other versions listed as per SDK releases

- Note that not all sub pages list all SDK release versions, as the respective sub page might not exist in that SDK release



Have you seen this button?

It‘s found on following web pages:

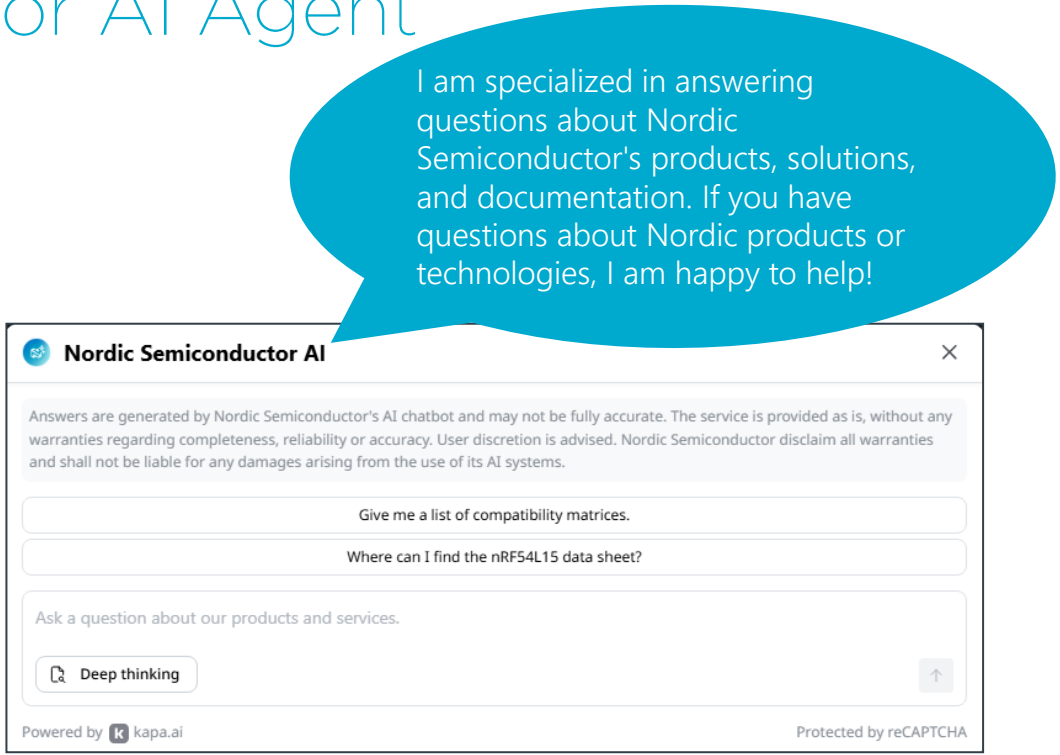
- Nordic Semiconductor‘s TechDocs
- Nordic Semiconductor‘s DevZone

Nordic Semiconductor AI Agent

- Answering questions about Nordic Semiconductor's products, solutions, and documentation.

- AI Agent uses Nordic Semiconductor resources to look for an answer:
  - Official Nordic Semiconductor documentation
  - Nordic Semiconductor Blog posts
  - Nordic Semiconductor Forum Discussions
  - Nordic Semiconductor Support Resources

- Different Languages are supported



Recommendation: Nordic DevAcademy !

- Interactive Learning Platform around Nordic's Software Solution and Products
- Start with nRF Connect SDK Fundamentals
- Enhance Knowledge with BLE Fundamentals
- Advanced topics in nRF Connect SDK Intermediate

Nordic Support

Webinars

Regular webinars about our products and technologies

www.nordicsemi.com/Events/Webinars

Tech Support & Forum

Dedicated Application Engineering Support from Norway and open community forum: DevZone Portal

https://devzone.nordicsemi.com