



| **A¹ Digital**

Five essential building blocks for cellular
IoT development with A1 Digital

Today's hosts

Dominik Windhab



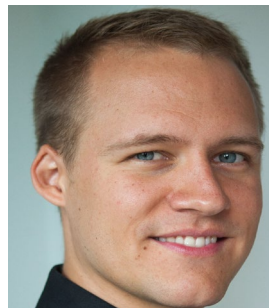
Solution Architect

Florian Krcma



Consultant Digital
Business Solutions

Bjørn Kvaale

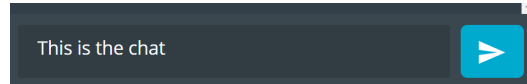
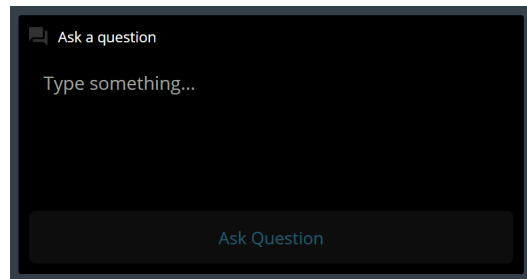


Product Marketing
Engineer



Practicalities

- Duration: 45 mins + 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 questions towards the end
- The chat is not anonymous, and should **not** be used for questions
- If you have more questions:
 - Go to DevZone for Nordic related questions
 - info@a1.digital for A1 Digital questions
- A recording of the webinar will be available together with the presentation at webinars.nordicsemi.com



Nordic Semiconductor



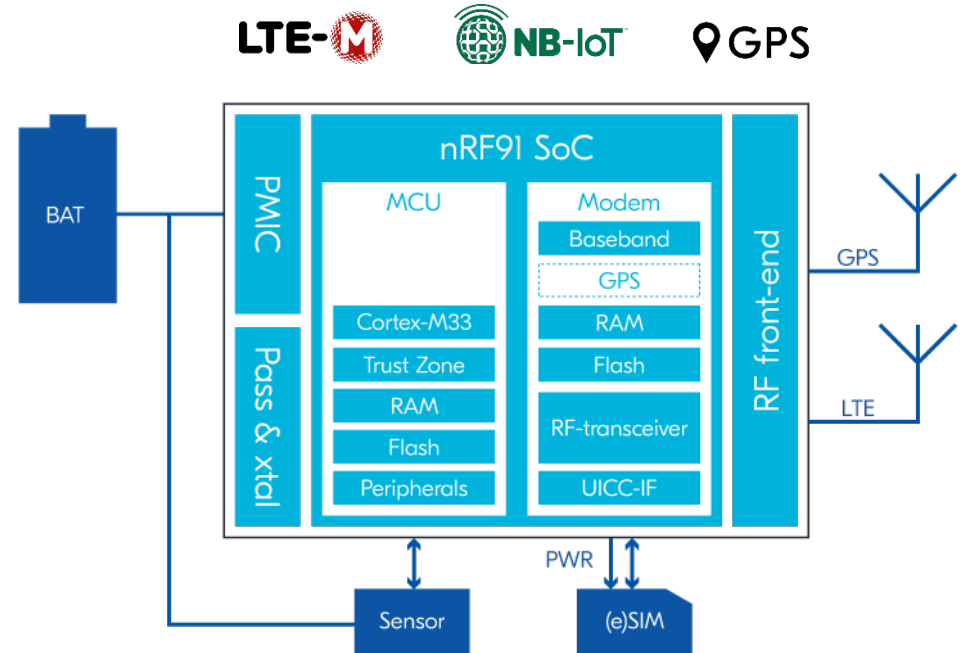
Key Facts:

- Founded in 1983, HQ in Norway
- ~1000 employees
- R&D in Norway, Finland and Poland
- Publicly Listed OXB: NOD
- Market Cap 3800 MUSD (Q1 2021)
- Key partners: TSMC, QORVO, AMKOR, ASE

- Fabless Semiconductor Company
- Market Leader in Bluetooth Low Energy
 - >40% market share
 - > 350M ICs shipped per year
 - 1000s of customers in volume production
 - 95,000 development kits shipped in 2020
- Short-range Ultra low power wireless SoCs
 - *Bluetooth®* Low Energy/ Zigbee / Thread / ANT
- Cellular IoT: LTE M, NB IoT Chipset & SiP
 - *LTE design team in Finland (150+ engineers)*

nRF9160 – Voids Cellular Modules

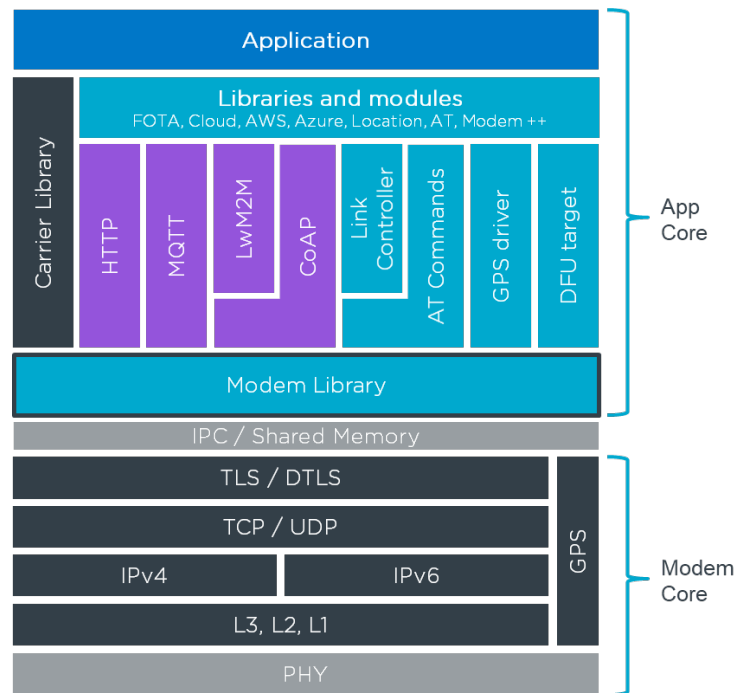
- Based on Nordic Dual Core SoC:
 - Arm® Cortex® M33 MCU for the application
 - Multiband LTE-M/NB-IoT modem with GPS
- **Small** form factor - includes PMIC, RF FEM, passives and crystals
- **Ultra Low Power** – Avg. 18µA @ 81.92s eDRX
 - Power saving mode (PSM) floor current: 2.7 µA
- Multiband support for global coverage
- Pre-certified System-in-Package (SiP)



The nRF9160 Software Product

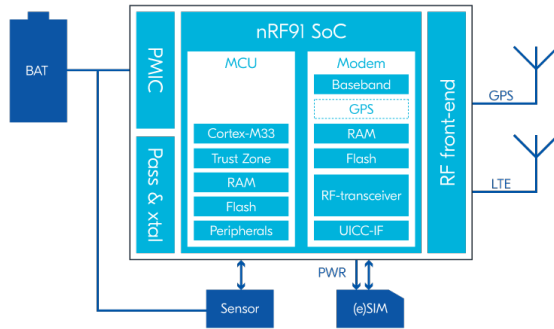
nRF Connect SDK

- Open source Application domain
- Fully customizable nRF Connect SDK provided by Nordic
- All major protocols supported
- LWM2M / CoAP / MQTT / HTTP(S) are running on application processor: customers can customize these protocols
- Ideal to support all Device Management platforms
- Complete application examples in the SDK



nRF9160 – Unique Winning Features

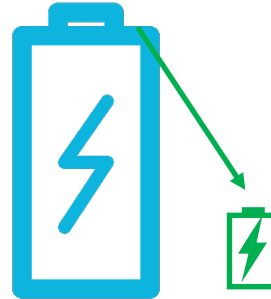
Integration



Unique, open application MCU

Simple end HW integration, but keeping
key flexibilities

Lowest Power



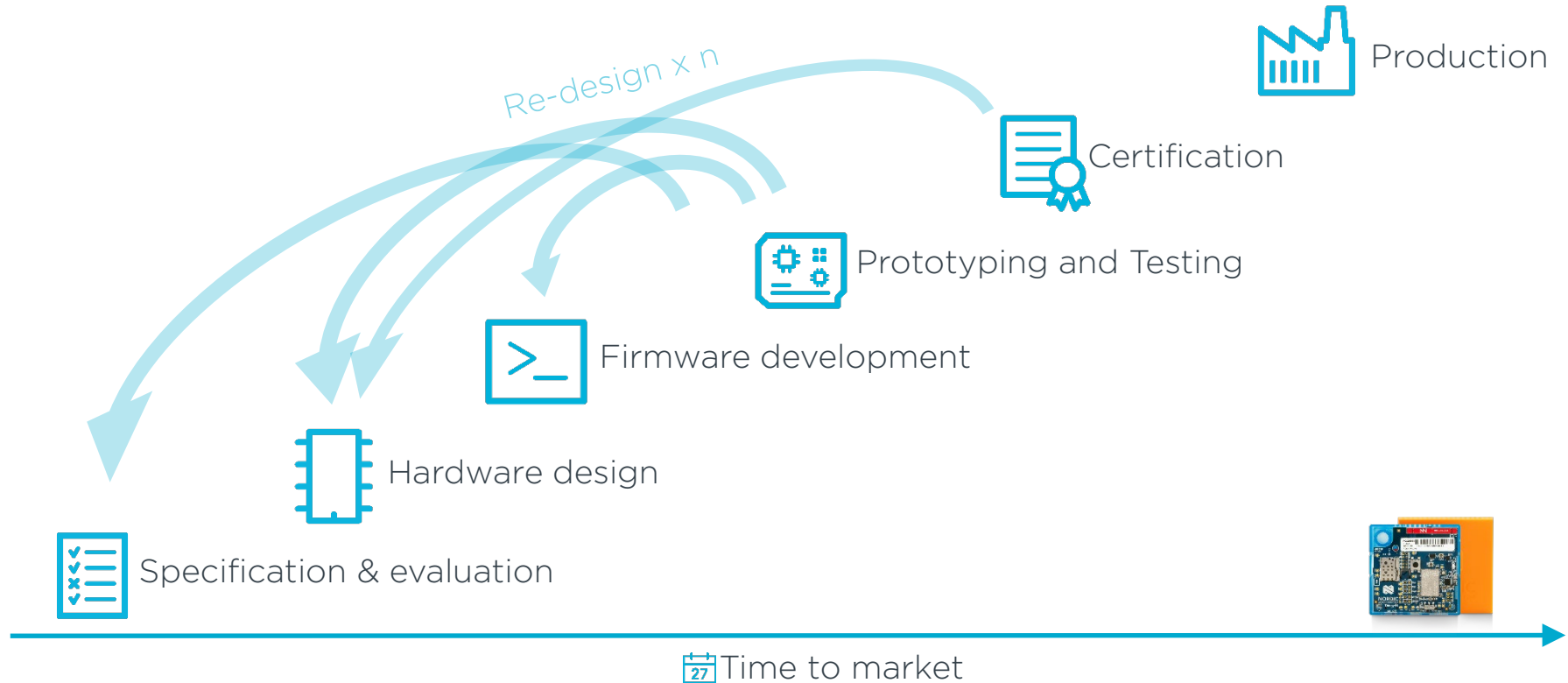
Uniquely optimized in all corners
10x the **battery lifetime** vs a major
supplier, and **10x lower** 1h PSM avg.
vs a "low power 1uA PSM" modem

Ease of Use



Unique, open and free tools for
power profiling, SDK, modem
trace decoding and more
100s of customers drive maturity

Customer Journey for Cellular development



Investing to Dismantle the Cellular Complexity



Specification & evaluation

- Available for all (no NDAs)
- Open documentation
- Development kits
- Open-source code
- Online Power Profiler



Hardware design

- Open reference designs
- Guideline documents
- Nordic offer free schematic & layout review
- nRF9160 SiP is flexible



Firmware development

- Free, open nRF Connect SDK
- nRF Connect for VS Code
- Complementary desktop apps
- Documentation & guides
- Edge Impulse partnership



Prototyping

- Thingy:91 prototyping platform
- Memfault partnership
- Power Profiler Kit 2
- Cellular monitor



Certification

- Globally certified SiP
- Guidelines
- Pre-certified third-party modules
- Certification partners



Production

- nRF Cloud services
- Location services
- Firmware over the air
- Device management

Links to relevant topics

- [Cellular Certification](#)
- [Power Profiler Kit II](#)
- [Online Power Profiler, PPK2 documentation](#)
- [Online Power Profiler](#)
- [Solution Partners](#)
- [LwM2M sample](#)

A1 Digital

A¹ Digital makes digitalization happen



**Founded
in 2017**

Portfolio:
IoT & Machine Learning,
Security & NaaS,
Cloud (Exoscale)

**1500+
Customers**

**Ca. 200
Employees**

**Offices in
Munich, Vienna
& Lausanne**

**6 data centers
in 4 European
countries**

Building a Smart Device | Safe Case



ARKURI
ARKURI

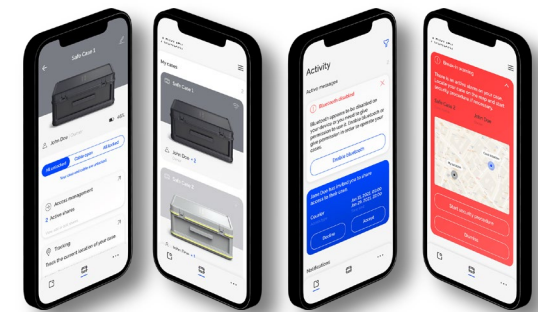
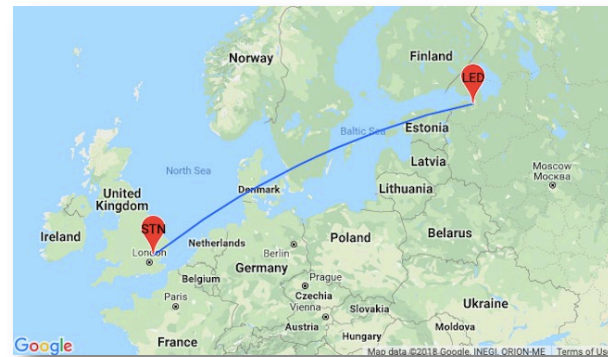


How ARKURI becomes a Smart Device

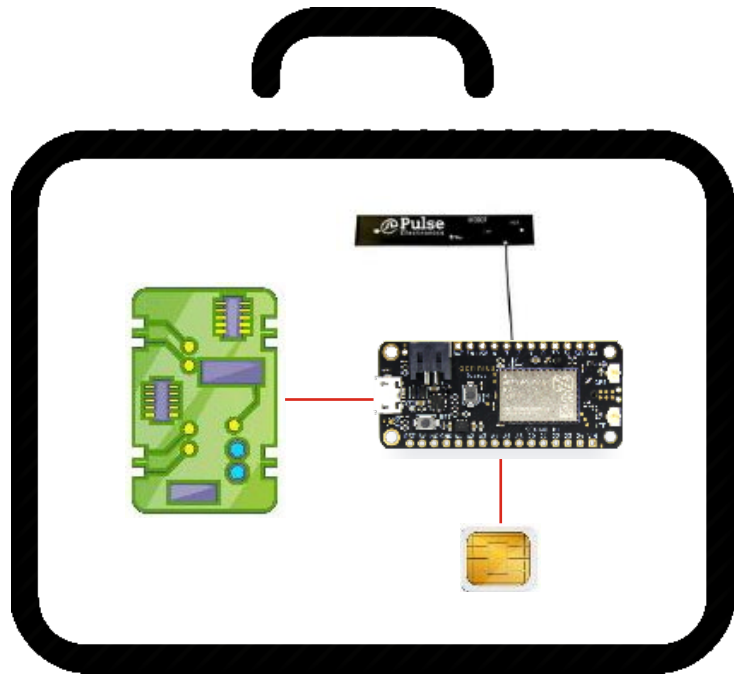


Journey

- Locking up valuables
- Situation-dependent alerting during transport and storage
- Live Tracking
- Secured removal of valuables



ARKURI Components



Hardware: nRF9160 based IoT Enabler Kit

Antenna: Flexible PCB antennas for GSM and GPS

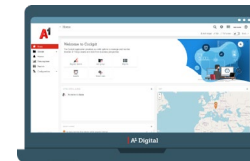
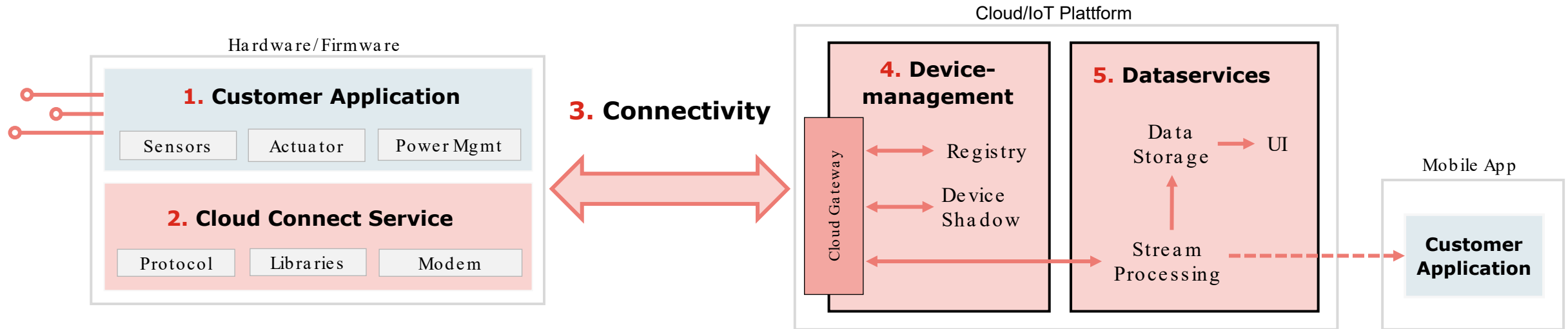
GSM Technology: LTE CatM1, LTE NB-IoT

SIM: A1 Digital SIM with international roaming options included

Cloud platform: A1 Digital IoT platform



The five building blocks of smart devices



A1 Digital
IoT Cloud Platform

LWM2M for IoT device management



Bootstrapping

- Key management
- Service Provisioning

Reporting

- Notify changes of sensor values
- Read device config and status

Remote Management

- Change settings
- Trigger actuators

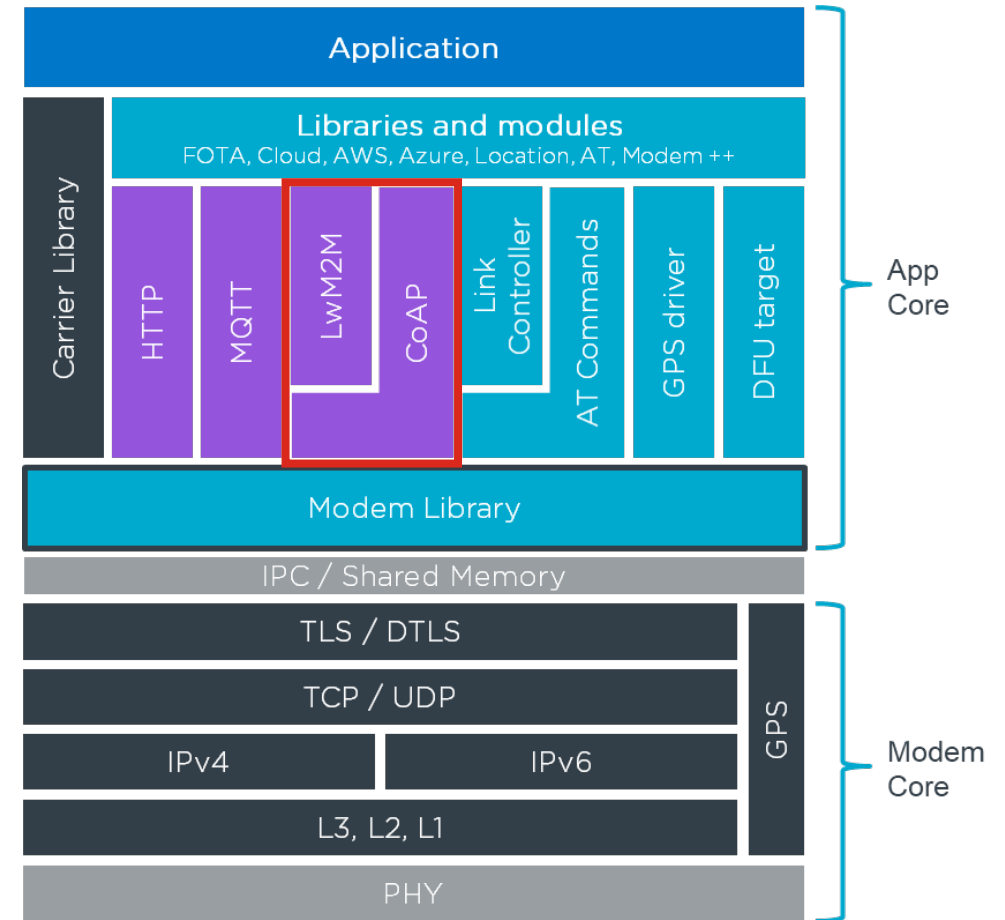
Firmware Update

- Bugfixing/New Features
- Application and Modem FW

The nRF9160 Connect SDK



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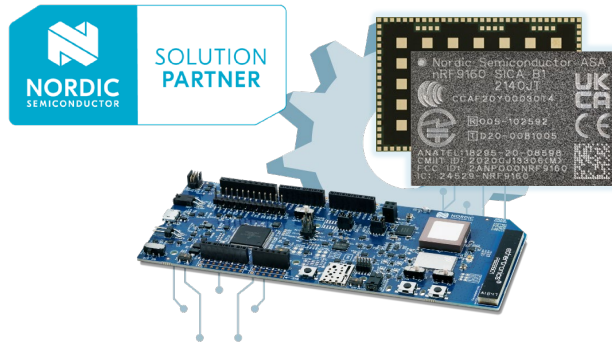
IoT Center: All building blocks for your IoT-project



- Information about the A1 Digital IoT ecosystem
- Knowledge Base
- IoT Enabler Kit

www.a1.digital/demo-center/iot-center

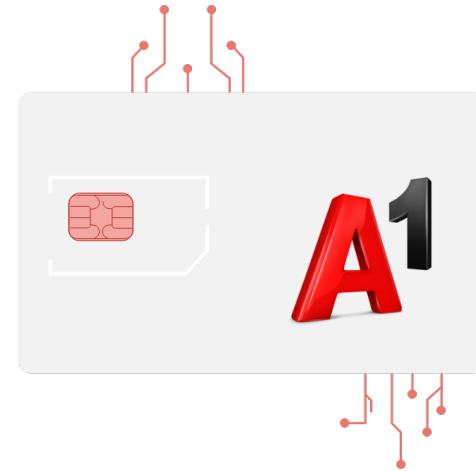
IoT Enabler Kit



HARDWARE

nRF9160 DK

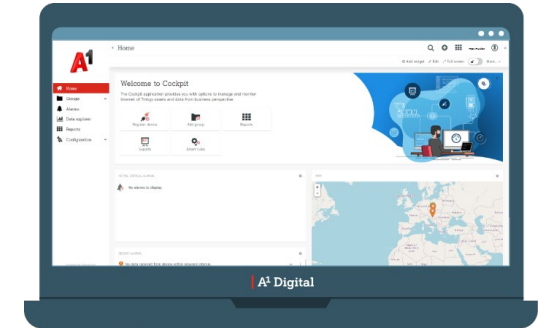
- LTE-M/NB-IoT, GPS, and 2.4 GHz antennas
- Nano/4FF SIM card slot and MFF2 SIM Footprint
- 1 MB Flash & 256 KB RAM
- More information about the development board is available [here](#).



CONNECTIVITY

A1 Digital SIM

- 50MB
- valid for 3 months
- Supported countries with NB-IoT network such as Austria, Germany, Netherland, Slovenia, Spain, Switzerland. More countries are coming soon.




SOFTWARE

A1 Digital IoT Platform

- Modern cloud-based IoT Platform
- Manage your devices
- Analyze all your data
- valid for 3 months

LWM2M Device Management





Home

Devices

Registration

All devices

Map

Simulators

Service monitoring

Overviews

Groups

Device types

Management

All devices Showing 4 of 4

Administrator

Clear filters

Configure columns Create smart group Reload

STATUS	NAME	MODEL	SERIAL NUMBER	GROUP	REGISTRATION DATE	SYSTEM ID	IMEI	ALARMS
	a1d-352656107151360				16 Nov 2021, 08:11:00	61107		1
	Lwm2M A1 Digital International G...	nrf9160dk_nrf9160	351358811466595		1 Dec 2021, 09:26:33	124376		1
	Lwm2M A1 Digital International G...	actinius_icarus	352656106304598		1 Dec 2021, 15:03:43	124708		
	Lwm2M A1 Digital International G...	nrf9160dk_nrf9160	351358811388021		6 Dec 2021, 09:03:32	141781		1

LWM2M Device Management



The screenshot displays the LWM2M Device Management web application. The top navigation bar shows the 'All devices' tab with a search icon, a grid icon, and the user 'Administrator'. Below the navigation bar, the main content area is divided into three sections:

- Left Sidebar:** Contains a list of navigation items including Home, Devices, Registration, Map, Simulators, Service monitoring, Overviews, Groups, Device types, and Management. The 'All devices' item is currently selected and highlighted in red.
- Central Panel:** Displays a list of device-related items for the selected device. The items are: A1 Digital Device Extension /31400/0, Connectivity Monitoring /4/0, Device /3/0 (highlighted with a red border), Firmware Update /5/0, LWM2M Cellular Connectivity /10/0, Location /6/0, Lwm2m Server /1/0, System Mode Configuration /31200/0, Temperature /3303/0, and Tracking Configuration /31100/0.
- Right Panel:** Shows the details for the selected device 'Device /3/0'. It includes fields for Current Time (1638786582000), Device Type (OMA-LWM2M Client), Factory Reset (Execute, Execute with Parameters), Firmware Version (mfw_nrf9160_1.3.0), and Hardware Version (nRF9160_SICA).

LWM2M Device Management



The image displays three overlapping screenshots of the LWM2M Device Management web application interface. The top screenshot shows the 'All devices' page, which includes a search bar, a list of devices, and a sidebar with navigation options like Home, Device, Registration, Map, Simulators, Service monitoring, Overviews, Groups, Device types, SmartREST templates, Device protocols, LWM2M post-operation, and Management. The middle screenshot shows the 'LwM2M A1 Digital International GmbH a1d-351358811466595' page, which displays the device's information, including its ID, date created, and last update. The bottom screenshot shows the '6 Location' page, which displays the device's location information, including its latitude and longitude, and a table of functionalities.

Top Screenshot: All devices

- Header: All devices Showing 4 of 4
- Actions: Clear filters, Configure columns, Create smart group, Reload
- Administrator: Administrator

Middle Screenshot: LwM2M A1 Digital International GmbH a1d-351358811466595

- Header: LwM2M A1 Digital International GmbH a1d-351358811466595
- Actions: Audit configuration, More...
- Administrator: Administrator

Bottom Screenshot: 6 Location

- Header: 6 Location
- Device protocol type: LWM2M
- ID: 6
- Date created: 4 Nov 2021, 09:05:41
- Last update: 17 Jan 2022, 06:54:26
- Description: This LwM2M Object provides a range of location telemetry related information which can be queried by the LwM2M Server.
- Resources: 0 Latitude
- Functionality: --
- Range: --
- Mandatory: Yes
- Operations: R
- Type: FLOAT
- Units: lat
- Instance type: Single
- FUNCTIONALITIES
- ☐ Send measurement
- ☐ Create alarm
- ☐ Send event
- ☐ Custom action
- ☐ Auto observe
- At least one functionality must be set to enable auto observe.
- Buttons: Cancel, Save

IoT Center Tutorials Page



Start on A1 Digital IoT Platform

How to request demo access to A1 Digital IoT Platform



Connecting nRF9160 DK to A1 Digital IoT Platform

How to on-board nRF9160 DK to A1 Digital IoT Platform



Managing Connectivity with A1 Digital IoT Platform

How to manage your A1 Digital SIM card using the A1 Digital IoT Platform



Using A1 Digital IoT Platform with nRF9160 DK

How to use the A1 Digital IoT Platform with nRF9160 DK



Build customized LWM2M client

How to build customized LWM2M client

<https://iotcenter.a1.digital/tutorials>

| A1 Digital

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www.nordicsemi.com/webinars

Q&A