

A person in a red plaid shirt is holding a tablet that displays various IoT data visualizations, including a world map, a bar chart, and a pie chart. The background is a large greenhouse filled with rows of green plants. A robotic arm is visible on the right side of the frame, and a large fan is mounted on the ceiling. The overall scene illustrates the application of IoT in agriculture.

IoT Connectivity Webinar

Nordic Semiconductor and Soracom

Content

- Soracom
 - IoT Connectivity Basics & History
 - Comparison between different technologies
 - 3GPP standards
 - LTE-M1 vs NB-IoT
 - Soracom Air
- Nordic Semiconductor
 - Use Cases Enabled by low power cIoT
 - nRF9160 SiP Intro

Today's hosts

Alexey Gabsatarov



Business Development
Manager
Soracom

Bjørn Kvaale



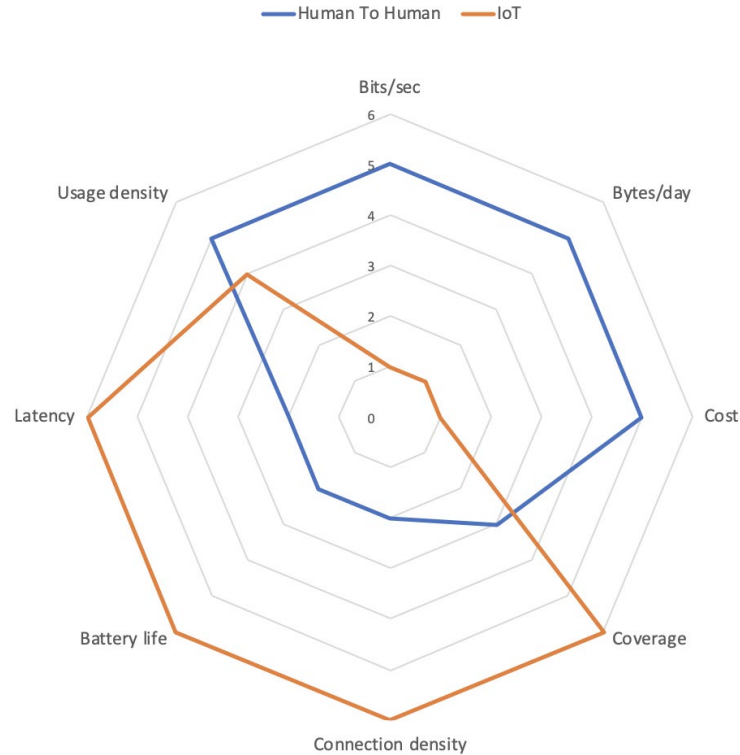
Product Marketing
Engineer
Nordic Semiconductor

IoT Connectivity

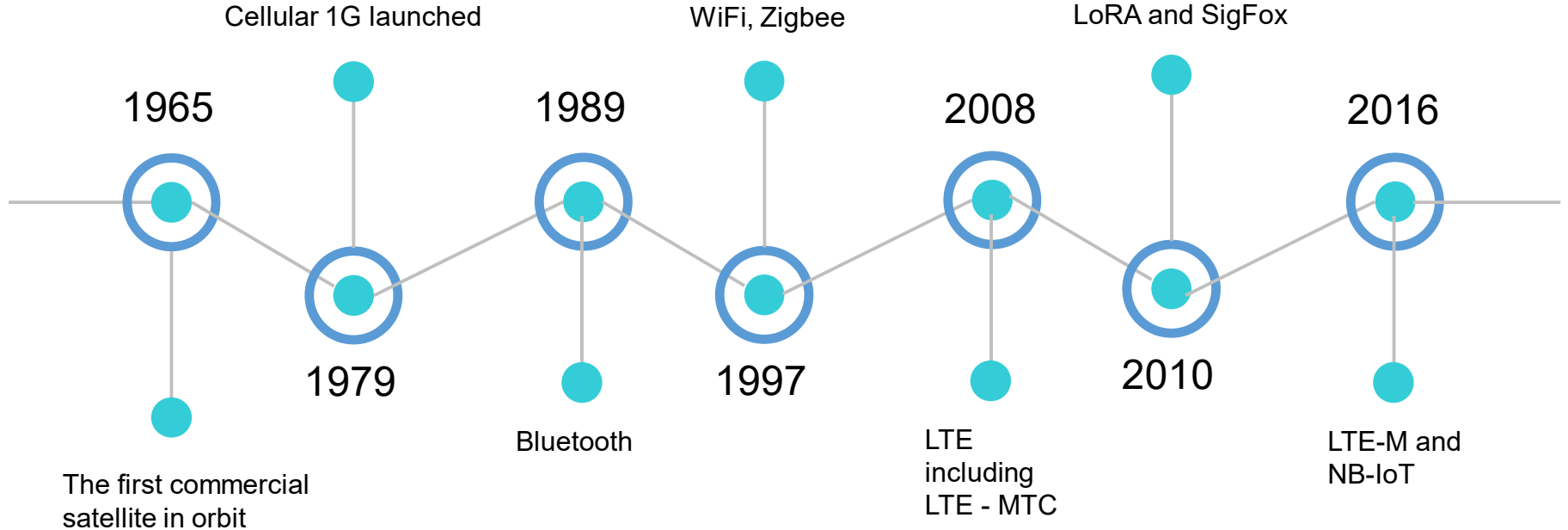
- Wired vs Wireless
- Short vs Long Distance
- Stationary vs Mobile
- Licensed vs Unlicensed

IoT connectivity is always a trade-off between various requirements, such as cost, power, coverage and bandwidth

IoT connectivity characteristics



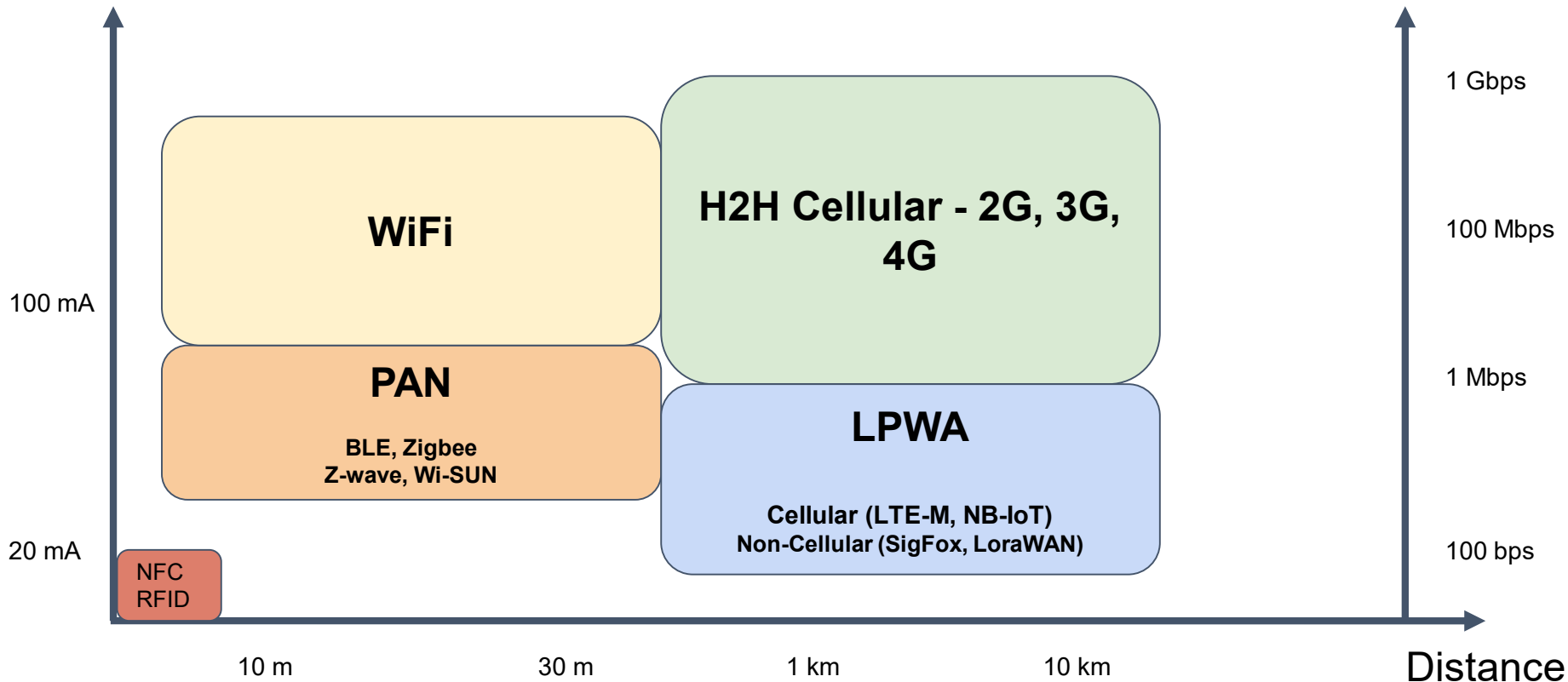
History of IoT Connectivity



Energy
Consumption

Comparison

Bandwidth



3GPP IoT connectivity requirements

Addressing

Infrequent mobile terminated communications

Charging

Monitoring

Security

Groups

Triggering

Battery Life

Low mobility

Number of device

Time controlled communications

Coverage

Small data transmissions

Device cost

LTE-M and NB-IOT features

Feature	LTE-M	NB-IOT
Throughput	300/365 kbps	30/60 kbps
Distance	12 km	15 km
Bandwidth	1.4 MHz	200 KHz
Mobility	Yes	Yes
Roaming	Yes	No
Battery	> 10 years	> 10 years

Cellular IoT use cases

LTE-M use cases

Asset tracking

Wearables

Retail and pos

Home automation

NB-IOT use cases

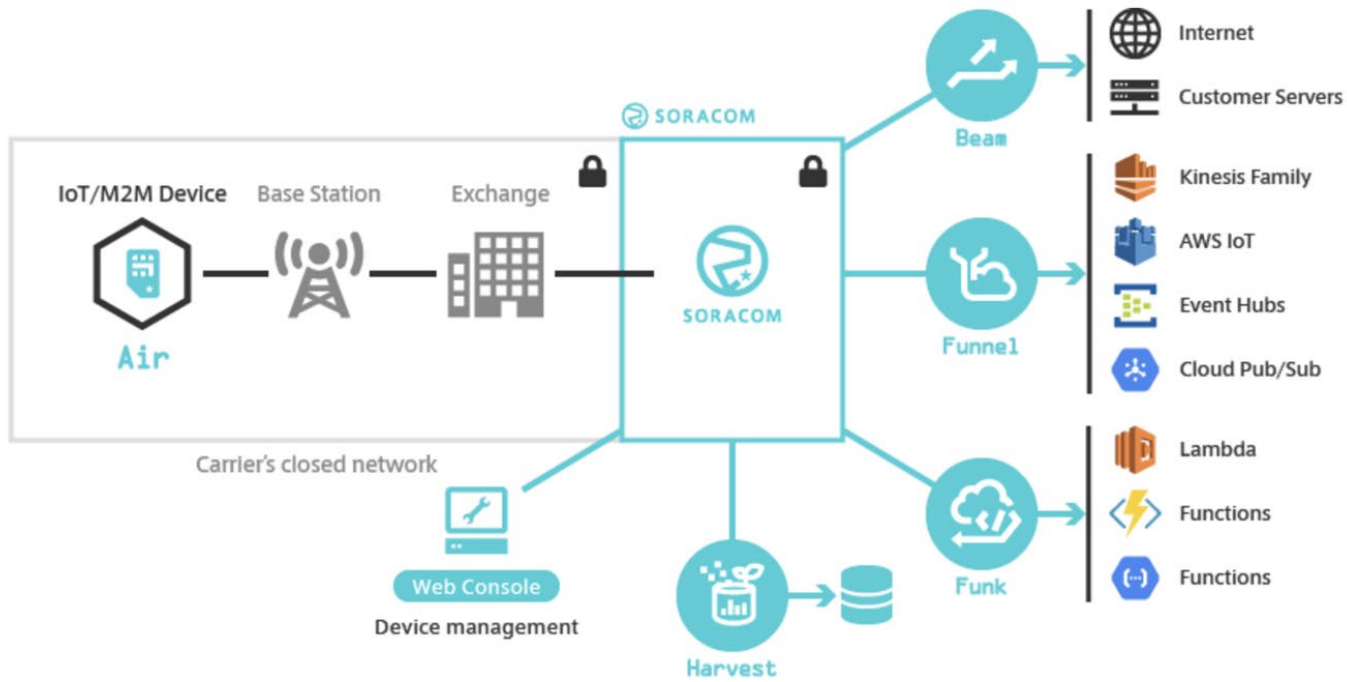
Utility metering

Precision agriculture

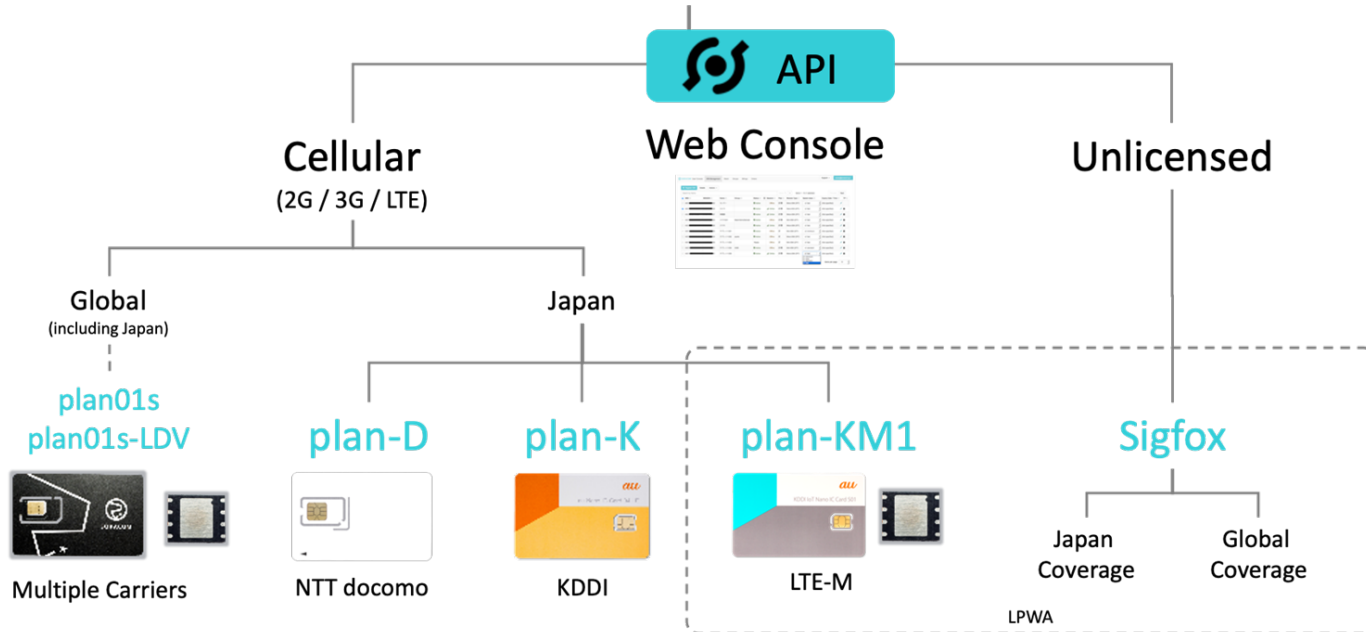
Smart city

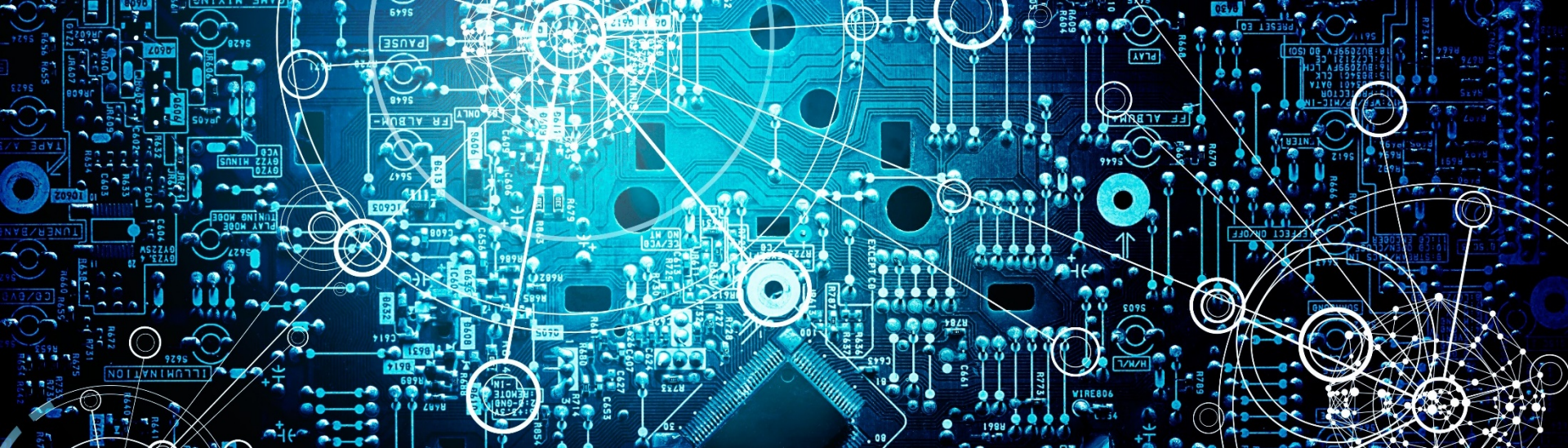
Predictive maintenance

Soracom Air



Soracom Air





Nordic – Cellular IoT

Introduction of Nordic Cellular IoT

July 2020

Lorenzo Amicucci



About Nordic Semiconductor



Key Facts:

Founded in 1982, HQ in Norway

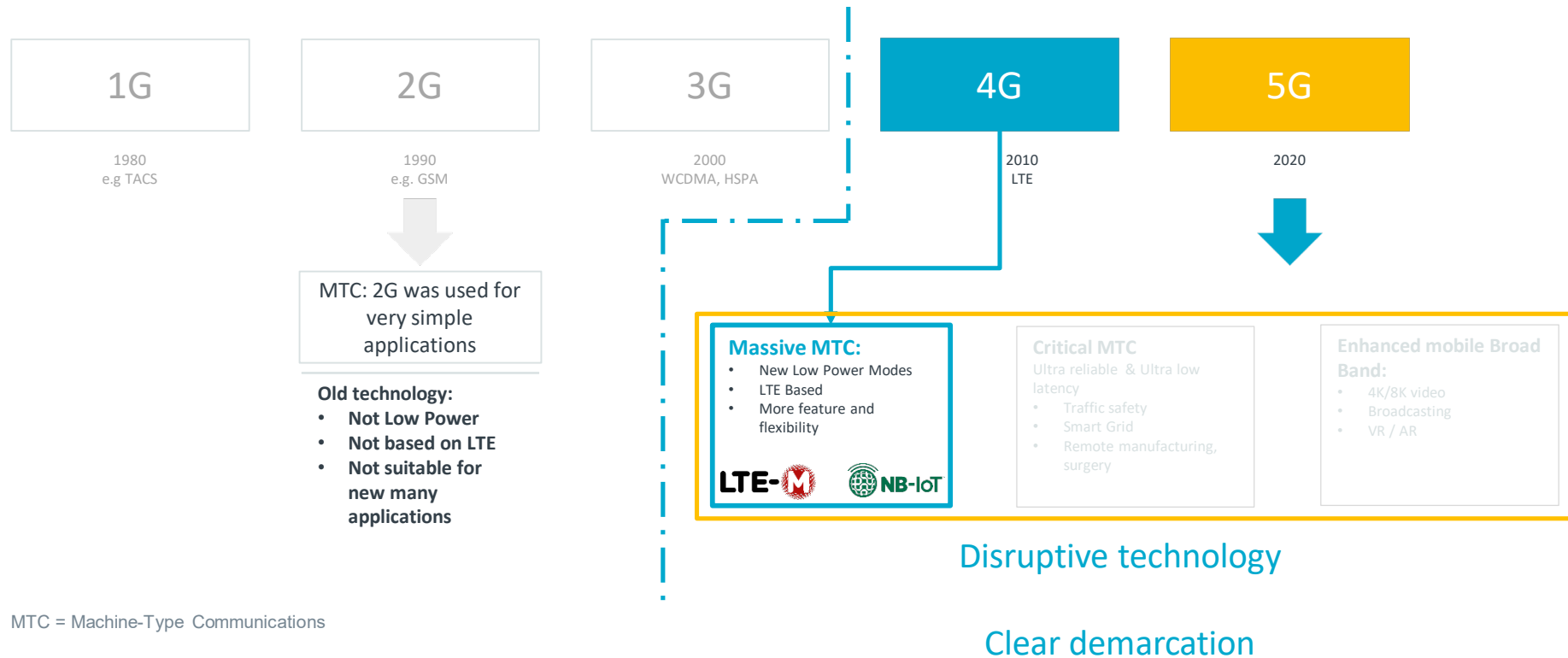
~ 800 employees

R&D in Norway, Finland and Poland

Publicly Listed OBX: NOD

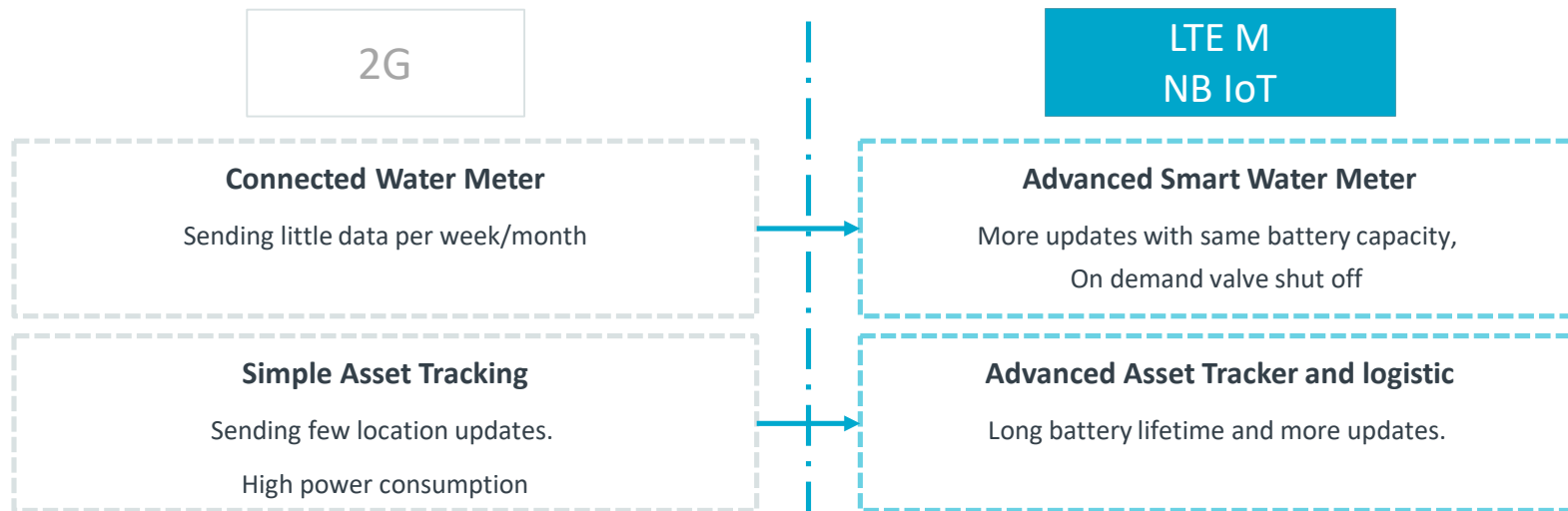
- Fabless Semiconductor Company
- Market Leader in Bluetooth Low Energy
- Short-range Ultra low power wireless SoCs
 - *Bluetooth*[®] Low Energy/ Zigbee / Thread / ANT
- Cellular IoT: LTE M, NB IoT Chipset & SiP
 - *LTE design team in Finland (150+ engineers)*

CloT: Disruptive platform for innovation



MTC = Machine-Type Communications

CloT: rethinking and improving products



Rethink connectivity from scratch
New networks requires new HW & SW platform
and new architectures

Innovate: CloT turns impossible to possible

Telemetry



Farm storage tank level monitor (by CoreKinect)

Predictive maintenance



High-speed driven toolheads get predictive maintenance (by InnBlue and M.T.,)

Healthcare



Remote patient monitoring system for bladder dysfunction (by ClearTrac Technologies)

At Nordic: Excited for Low Power!

Rechargeable



Wearables



Medical



Home security/safety



Retail and POS



Asset tracking

Up to days – months- years

Non - rechargeable



Sensors



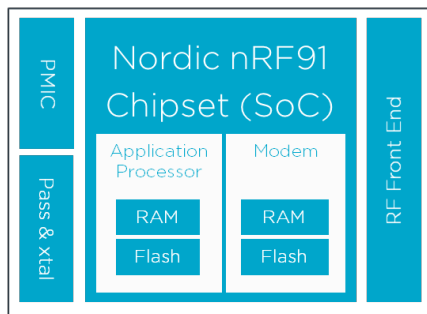
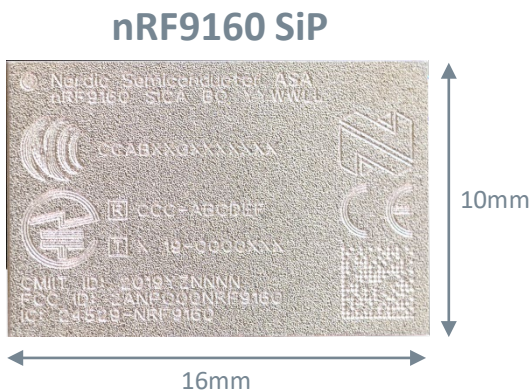
Smart metering

Up to 20 years

Take advantage of PSM, eDRX

Choose a Low Power and Flexible connectivity platform

nRF9160: Low Power SiP enabling innovation



Nordic Dual Core chipset:

- LTE-M/NB-IoT/GPS modem
- ARM Cortex M33 MCU

Ultra Low Power

Multiband for global coverage

Small form factor (includes PMIC, RF FEM, passives and crystals)

Flexible Software Architecture

Certified world-wide band support

Global - 3GPP



Completed

Regulatory standards



CE – FCC - ISED - ACMA RCM – NCC –
IMDA – MIC – MSIP - IFT

Completed

Carrier



Completed

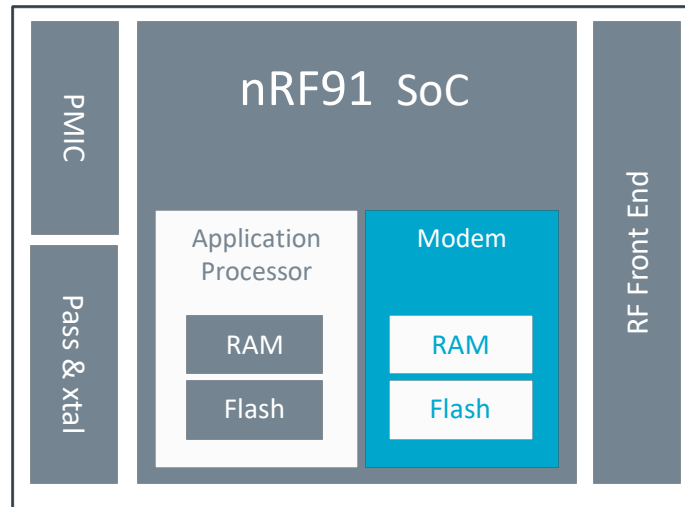
[More Coming](#)

Supported LTE Bands:

- LTE-M: 1,2,3,4,5,8,12,13,14,17,18,19,20,25,26,28,66
- NB-IOT: 1,2,3,4,5,8,12,13,17,19,20,25,26,28,66

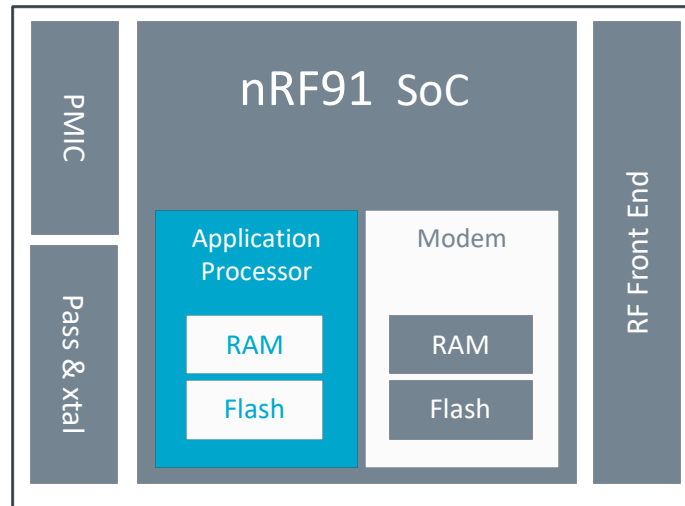
Multimode LTE-M / NB-IoT / GPS modem

- Built from scratch for low power
- Automatic scheduling of GPS acquisition around LTE operations
- eDRX and PSM power saving modes
 - 21 uA @ 81.92 s eDRX
- UICC interface with support for eUICC/eSIM



Dedicated application processor

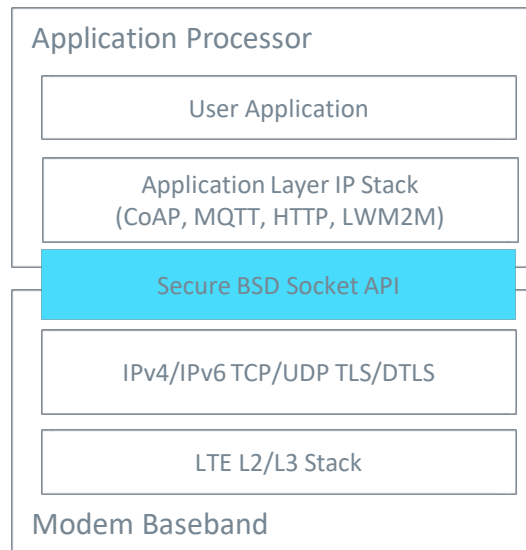
- 64 MHz Arm® Cortex®-M33 CPU
- Arm TrustZone® for trusted execution
- Arm CryptoCell® 310 for application layer security
- 1 MB Flash & 256 KB RAM for application
- 4 x SPIM/SPIS/UART/TWIM/TWIS
- PDM, I2S, PWM, ADC
- 32 GPIOs



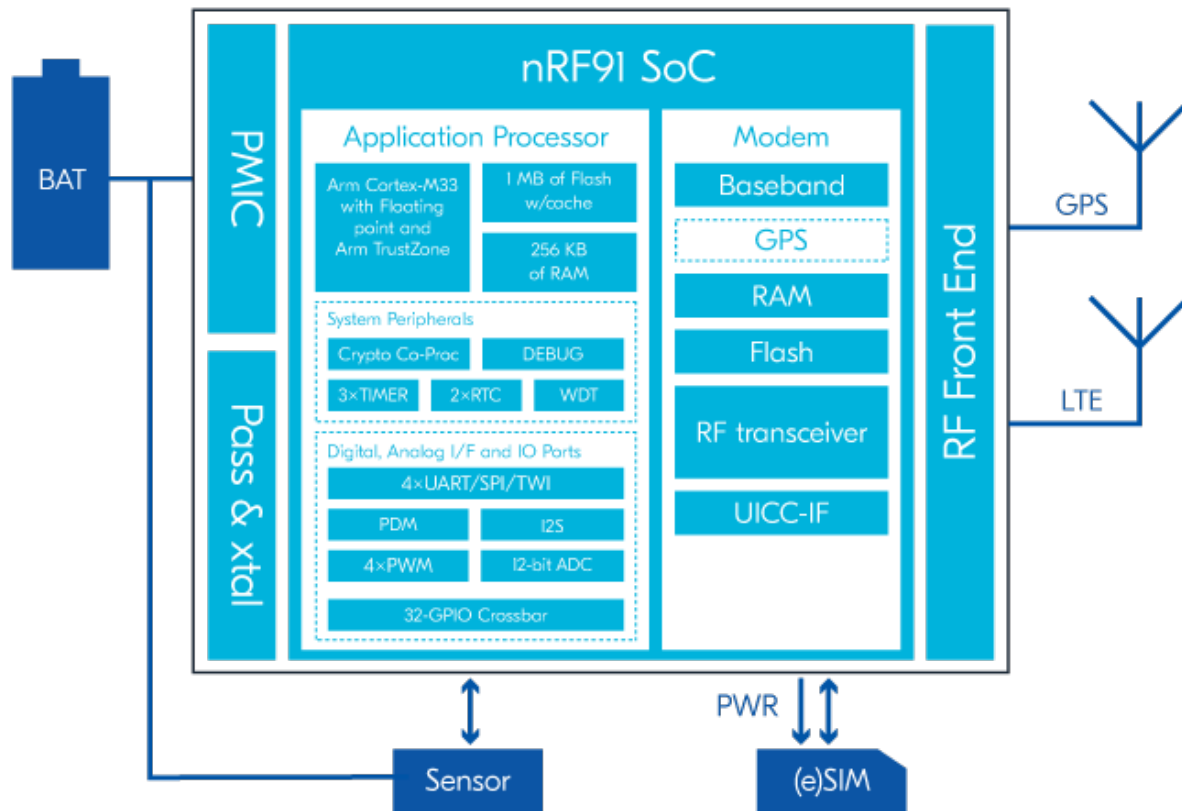
nRF Connect SDK: Flexibility

nRF Connect SDK for the application processor:

- RTOS Based (Zephyr - Open source)
- Extensive protocols supported, including LWM2M / CoAP / MQTT. Flexible to support all Device Management & Cloud platforms.
- SDK and toolchain are FoC (including LWM2M client)
- All in one place: same SDK for nRF91, nRF53 and nRF52 Series. Including: Bluetooth LE, Bluetooth mesh, Thread/Zigbee, Bluetooth 5.1 etc



Enabling New Architectures

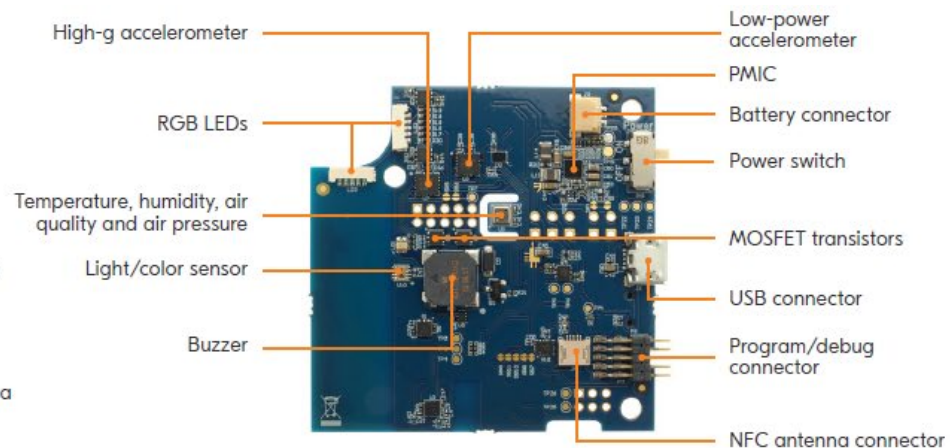
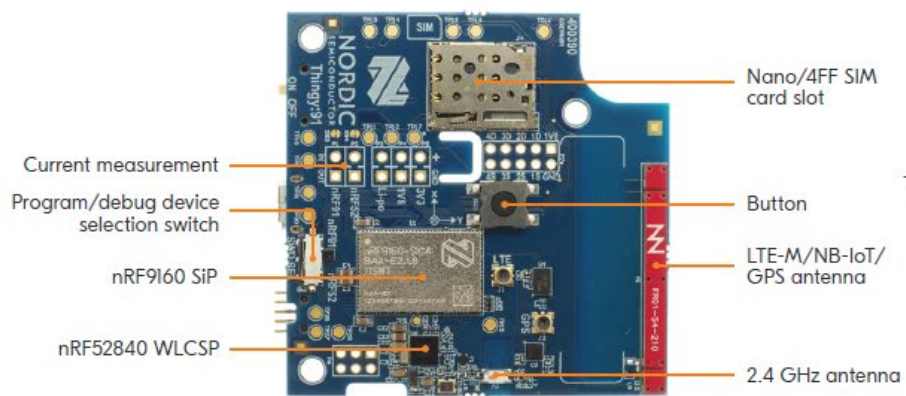


Example: Thingy:91 PoC

- An 'out-of-the-box' rapid prototyping kit for cloT
- Supports LTE-M/NB-IoT and GPS
- Ships with a eSIM
- Supports Bluetooth Low Energy
- Lots of other sensors etc.
- Comes with a sophisticated application ready to go
- Dev tools and SDK



Nordic Thingy:91 hardware



Tools and Development

- Dev Kits, Prototyping Platforms
- Best in Class Support:
 - 30+ dedicated application engineers working on Nordic DevZone (Ticketing portal) + Local FAE
 - In House LTE Chipset Engineers
- Software Tools
- Open Documentation
- [Online Power Profiler](#)



Q&A