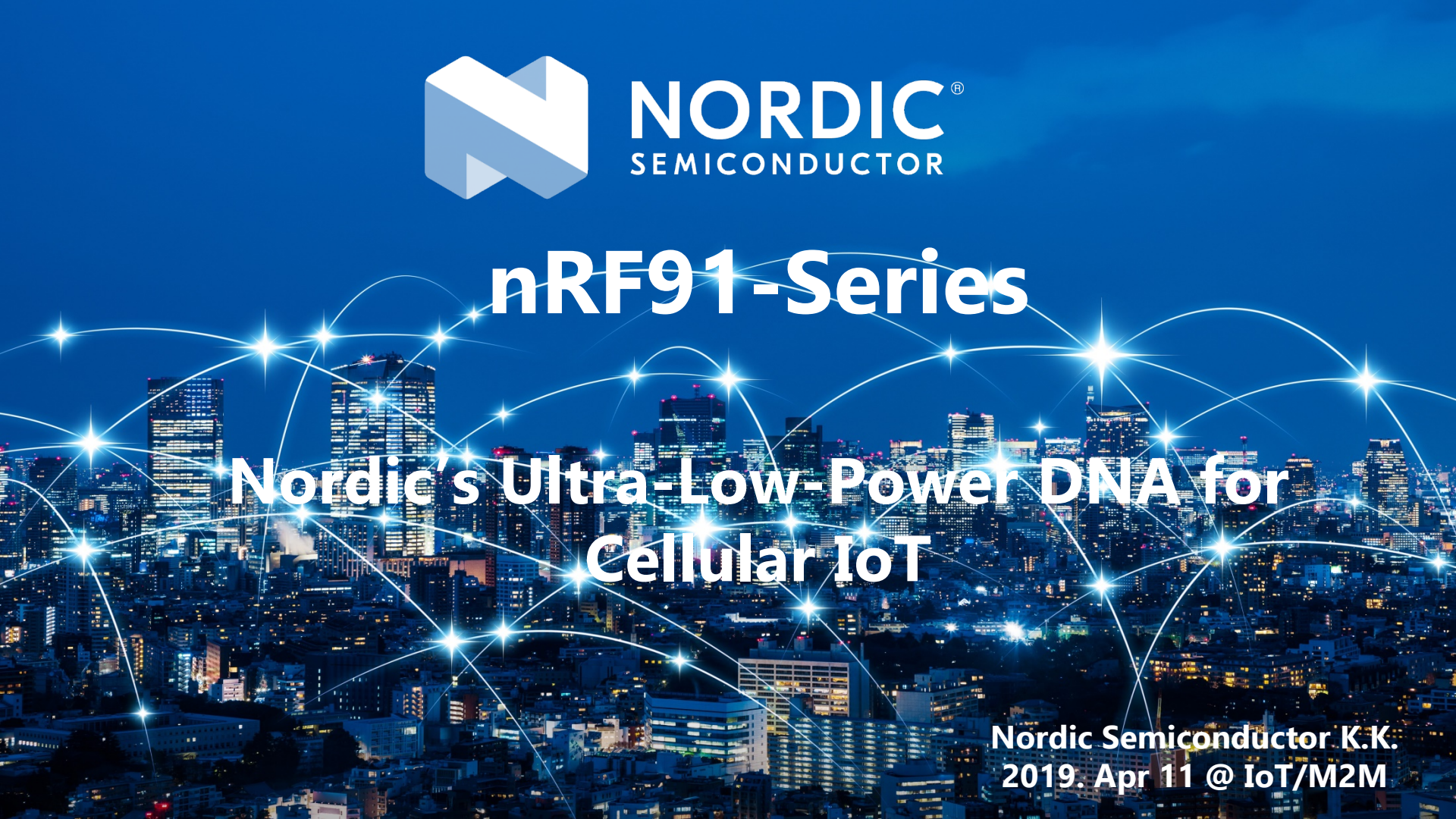

NORDIC®
SEMICONDUCTOR
nRF91-Series
Nordic's Ultra-Low-Power DNA for Cellular IoT
Nordic Semiconductor K.K.
2019. Apr 11 @ IoT/M2M

Nordic has been leading ULP Wireless Market

First wave

Y2002 ~

Second wave

Y2011 ~

Proprietary 2.4GHz RF

Bluetooth® low energy

nRF 51 SERIES

nRF 52 SERIES

Bluetooth® 5.x

Stable market

#1 position

Fast growing market

#1 position

2016~ Nordic has been leading ULP Wireless Market

LTE-M

: wave

)02 ~

"Cellular IoT"

Second wave

Y2011 ~

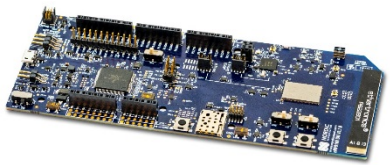
NB-IoT

Cellular IoT made easy

Proprietary 2.4GHz RF

® low energy

nRF 5 SERIES



Complete package

Fully integrated

nRF 9 SERIES

Global operation

Lowest power

Bluetooth 5.x

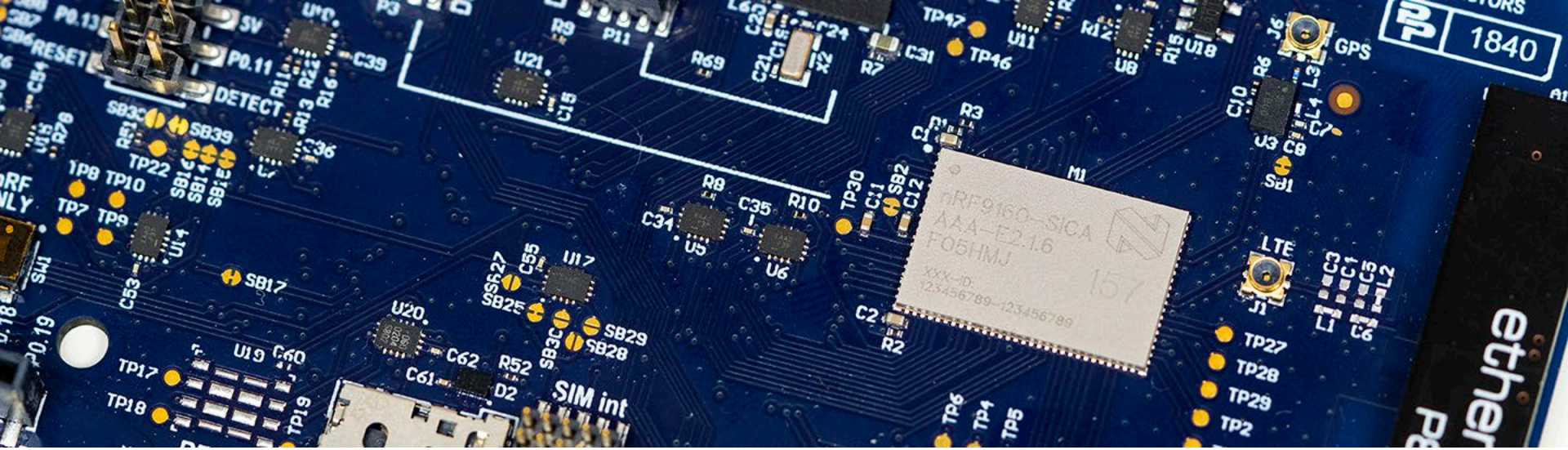
Stable market

#1 position

Cellular IoT for everything else

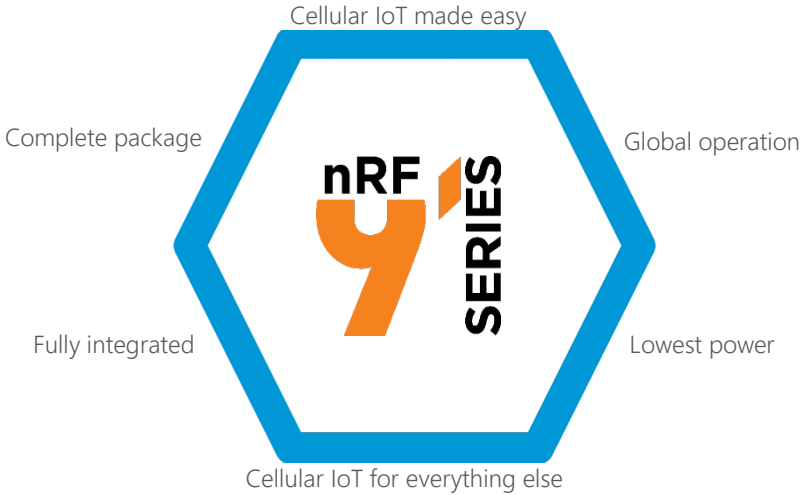
Fast growing market

#1 position



nRF91 Series

Cellular IoT made easy



New low power LTE technologies

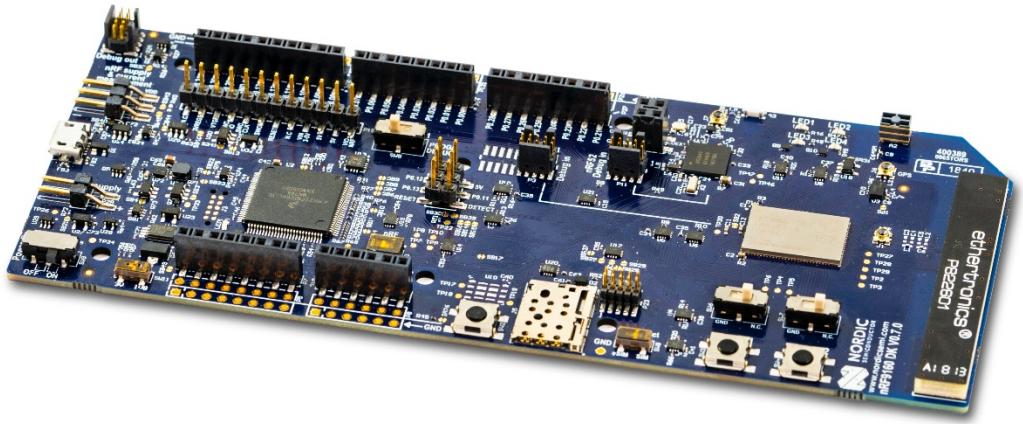
	LTE-M	NB-IoT
Also known as	eMTC, LTE CAT-M1	LTE CAT-NB1
Bandwidth	1.4 MHz	200 kHz
Max throughput (UL/DL)	300/375 kbps	30/60 kbps
Range	<11 km	<15 km
Mobility	Yes	No
Roaming	Yes	Not yet
Battery lifetime	15 years	

Complete low power cellular IoT solution

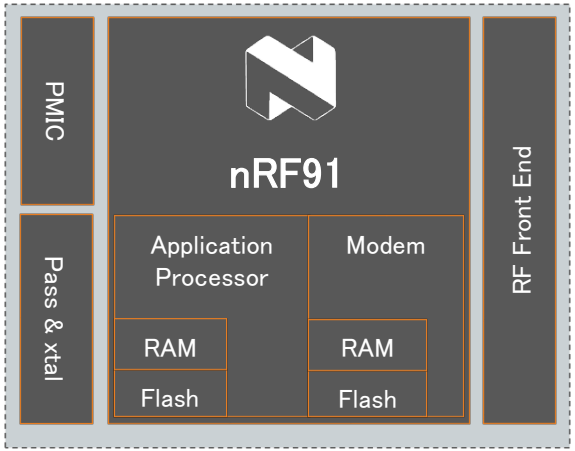
nRF9160 SiP

* Dedicated application processor and memory
* Multimode LTE-M / NB-IoT modem with integrated RFFE
* GPS

nRF9160 DK

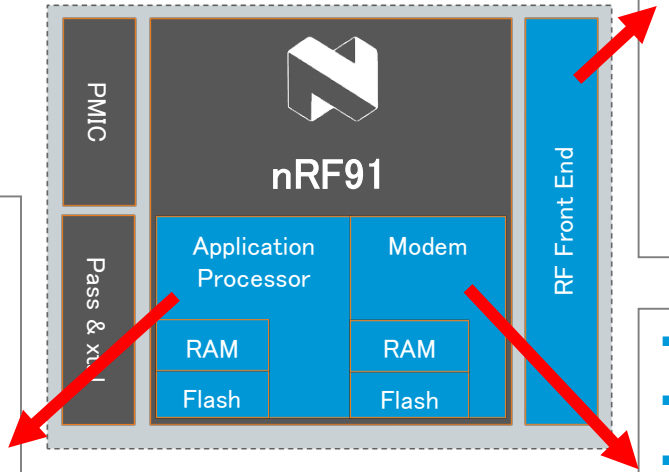


Complete low power cellular IoT solution



Complete low power cellular IoT solution

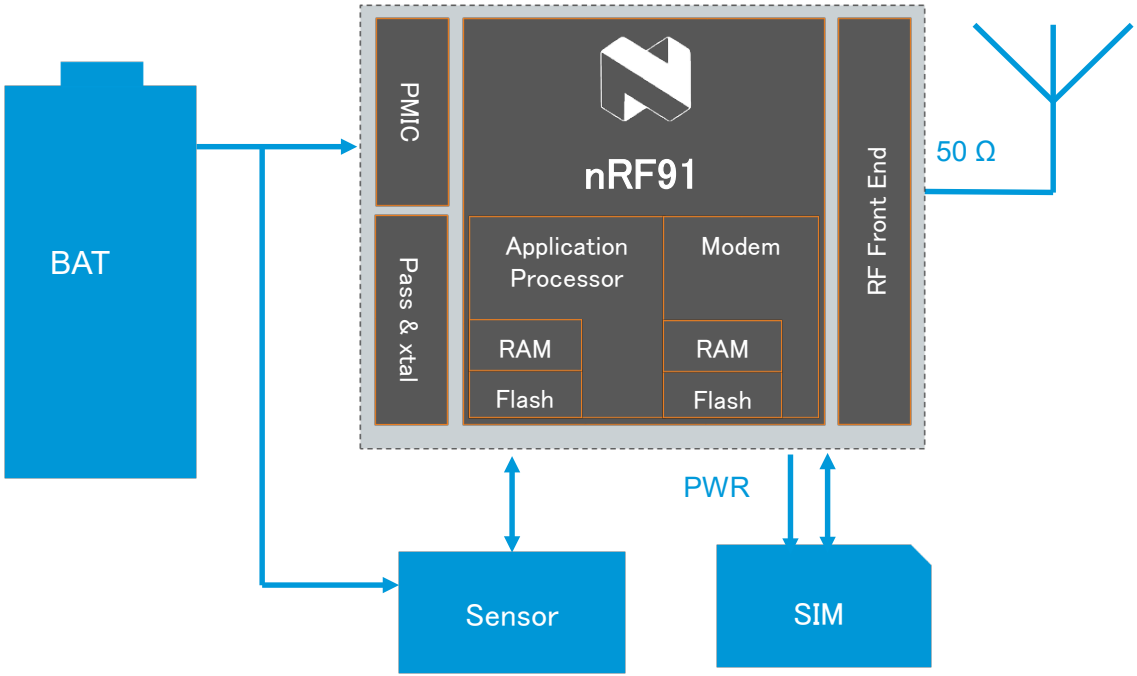
- 64 MHz ARM® Cortex®-M33 CPU
- ARM® Trustzone® for trusted execution
- ARM® Cryptocell 310 for application layer security
- 1 MB Flash & 256 KB RAM
- 4 x SPIM/SPIS/UART/TWIM/TWIS
- PDM, I2S, PWM, ADC
- 32 GPIOs



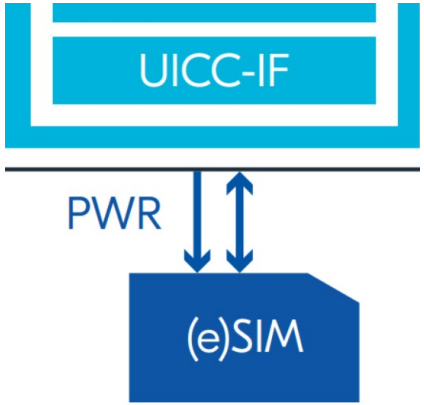
- MHz – 2.2 GHz bands supported
- Up to 23 dBm output power
- -108 dBm LTE-M RX sensitivity
- -125 dBm NB-IoT RX sensitivity
- Single pin 50 Ω antenna interface

- Half Duplex (HD)
- Frequency division duplex (FDD)
- eDRX and PSM power saving modes
- Coverage enhancement modes
- GPS
- IPv4/IPv6, TCP/UDP, TLS/DTLS
- UICC interface

Complete low power cellular IoT solution



UICC interface



- Both plug-in and soldered SIMs and eSIMs are supported
- Power is supplied
- All communication is automatically handled by the modem

GPS

- Optimized for asset tracking
- Satellite trilateration
- Concurrent with LTE-M / NB-IoT
- Combines GPS and cellular positioning data
- LTE antenna or dedicated GPS antenna

Certifications

3GPP

3GPP complicance

MNO

Separate certification for LTE-M and NB-IoT

Regulatory standards

Regional certification

Full overview and roadmap on nordicsemi.com/9160cert

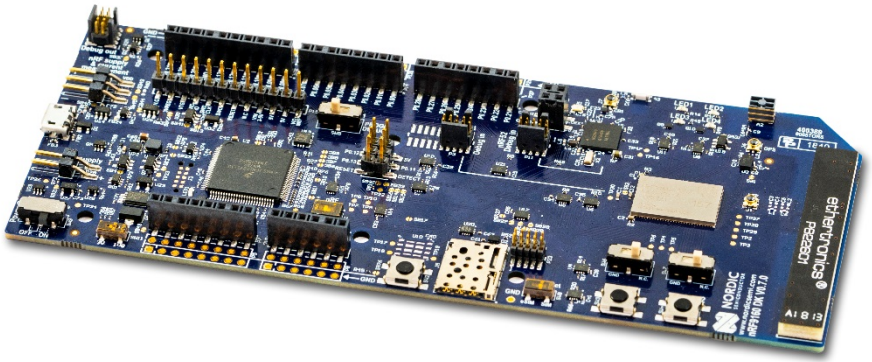
Certifications ～ JAPAN

Now on working・・・ and will come soon !!!

nRF9160 SiP product variants

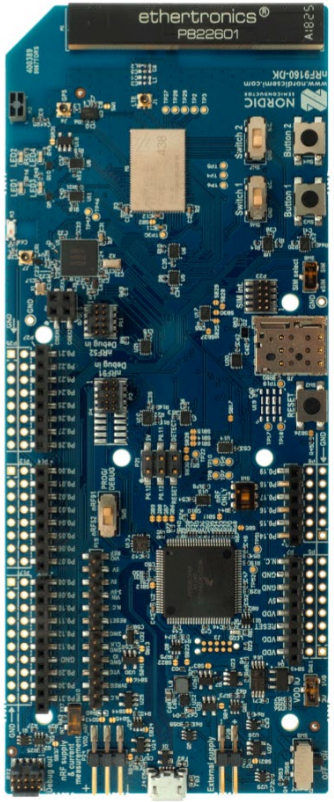
- SIAA LTE-M only
- SIBA NB-IoT only
- SICA LTE-M + NB-IoT + GPS

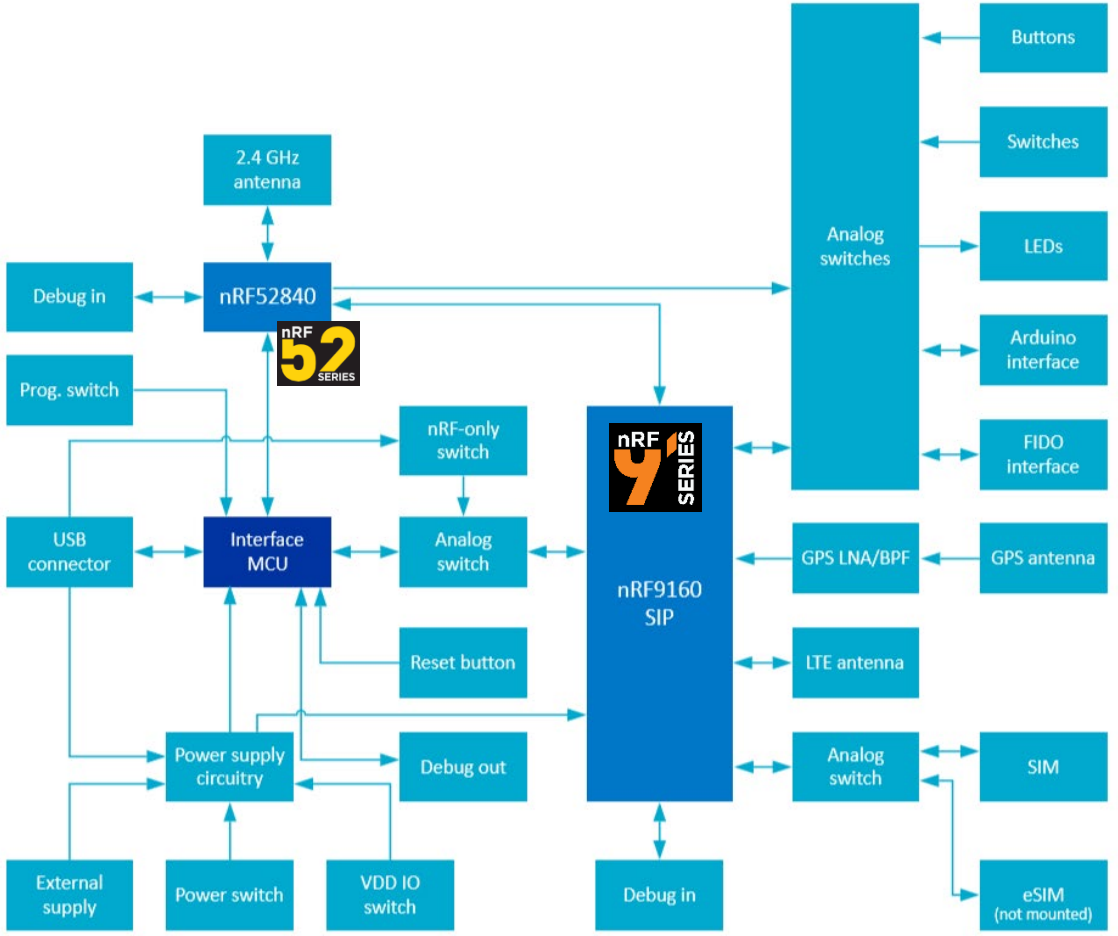
nRF9160 DK



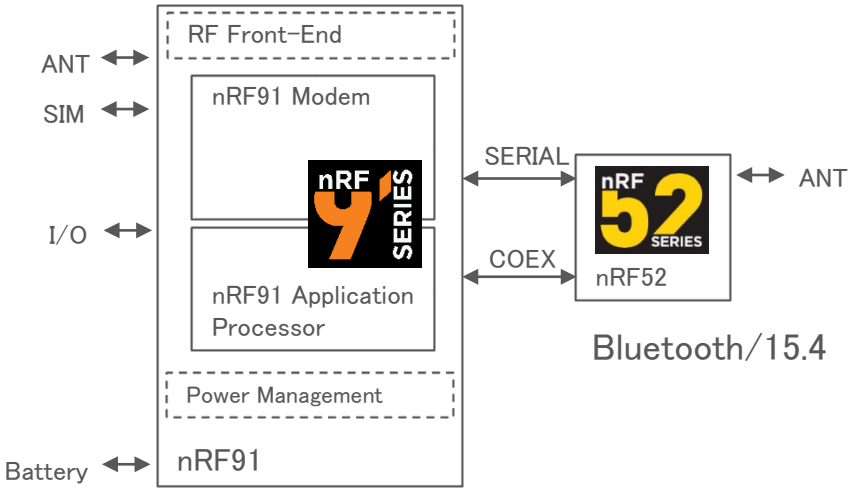
- Single board development kit for the nRF9160 SiP
- nRF52840 board controller
- Dedicated LTE-M/NB-IoT, GPS and 2.4 GHz antennas
- User-programmable LEDs, buttons and switches
- Supports both plug-in and soldered (e)SIMs
- Bundled with a eSIM card from iBasis preloaded with 10 MB

nRF9160 DK





Complete cellular IoT system in package



Cellular Modem with Application Processor

Chipset approach

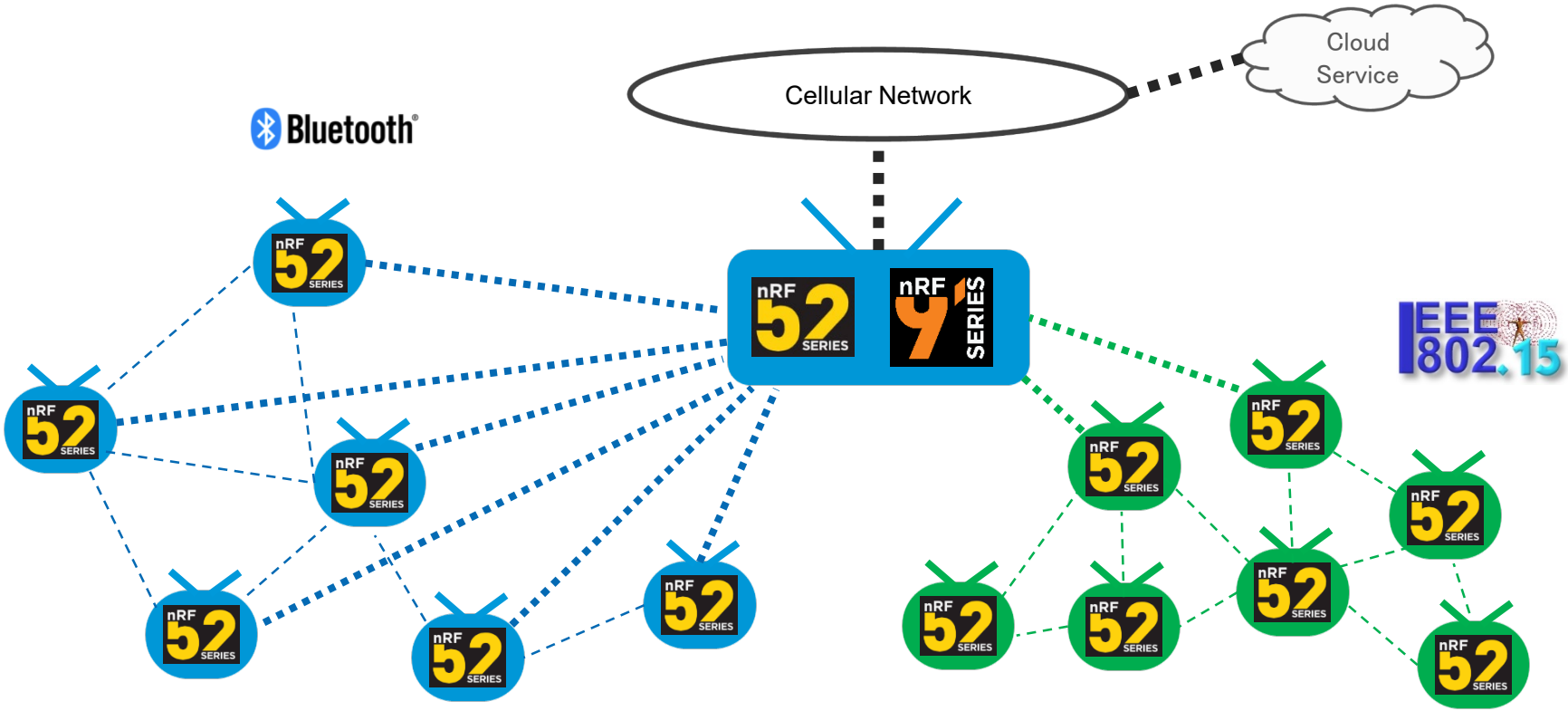
Automatic coexistence interface –mix and match with nRF52

Software drivers and sample application in the SDK

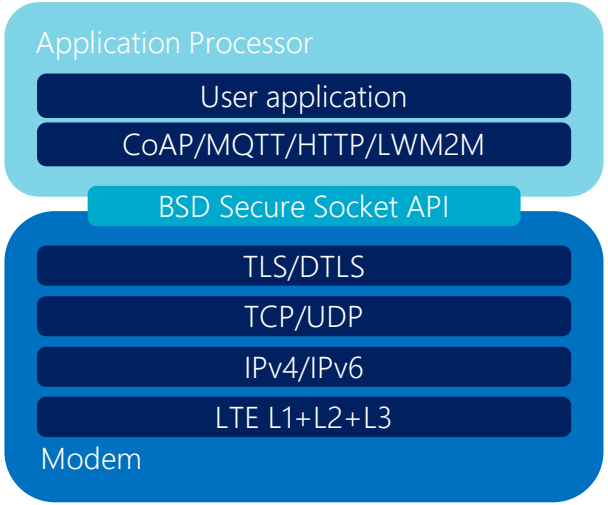
Edge Computing

Processing and memory resources for low-power edge computing – send information, not data

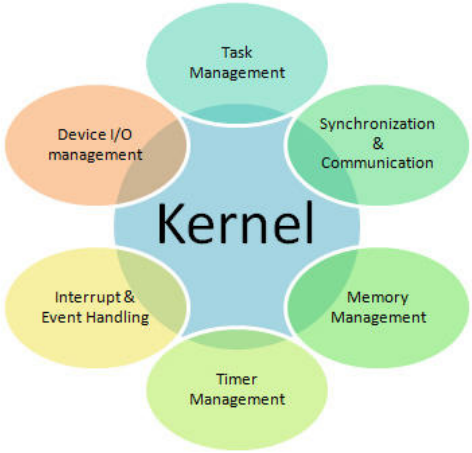
Complete cellular IoT system in package



Software architecture



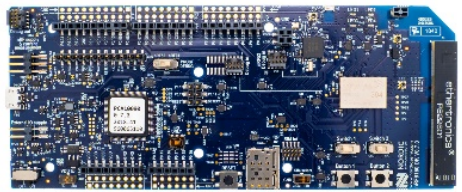
- Complete and easy to use solution
- Connectivity and application software
- Support for OTA Modem and Application updates
- Reference design with multiple sensors
- Support for “thin modem” operation



What does an RTOS do for a product developer?

- Control the complexity of applications
- Standard, tested services and components
- More portability & re-use of applications
- Higher-level programming model
- Faster time to market

Getting started



- nRF9160 comes with iBasis SIM
- First 10MB free for use
- Register SIM at: www.ibasis.com
- Provision at nRF Connect for Cloud
- nRF Connect for Desktop
  - Trace apps to basestation
  - Signal stength
  - AT commands

iBasis Global Access for Things

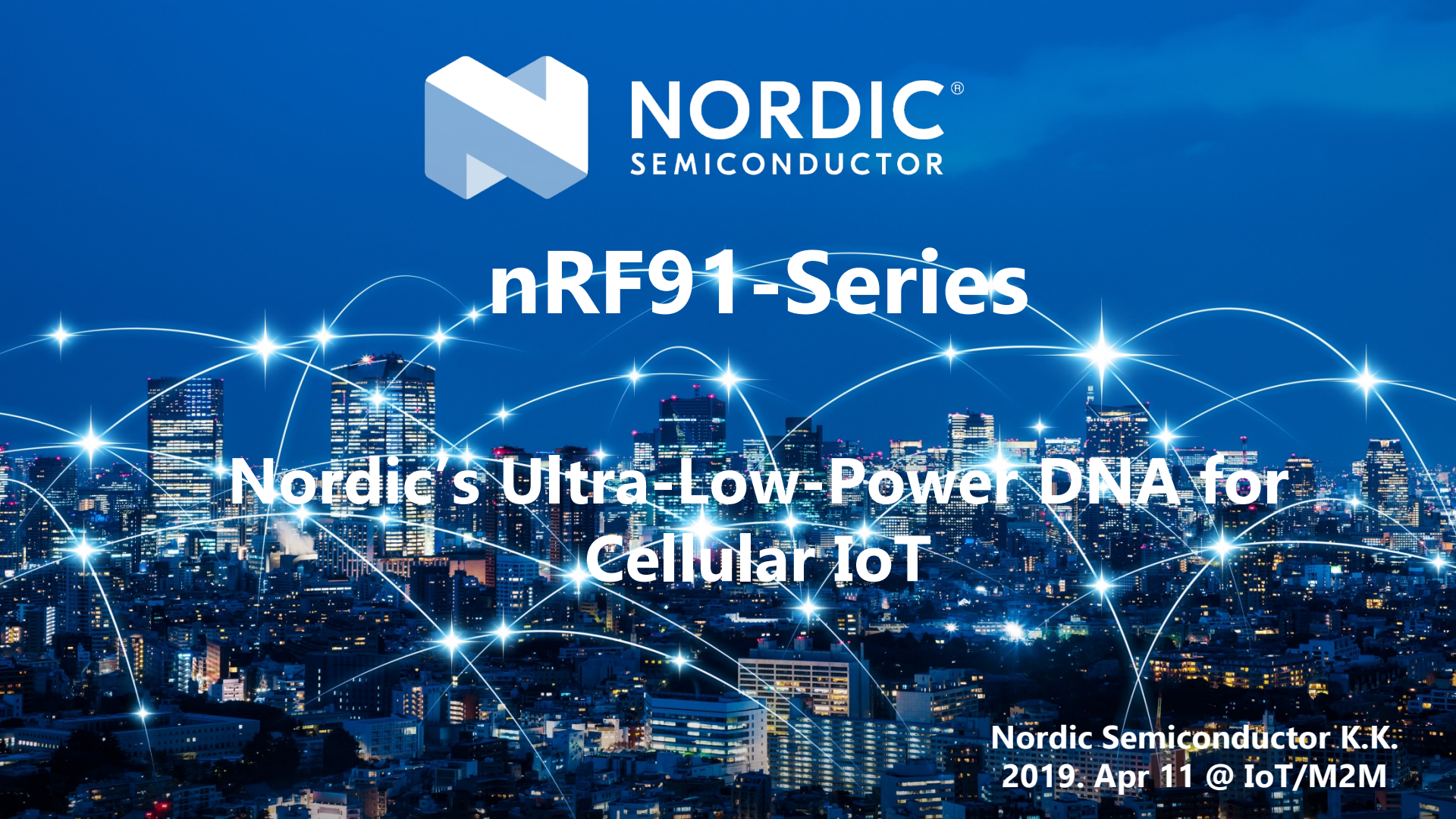
nR9160 ~ PSA Certified

PSA Certified™ SECURITY ASSURANCE CERTIFICATE

Certificate Number:	0604565273048-10003
Date of Issue:	13/02/2019
Test Lab:	Riscure
Certificate Holder:	Nordic Semiconductor
Certified Product:	nRF9160
Product Description:	nRF9160 is a low power System-in-Package supporting LTE-M, NB-IoT and GPS. It offers game-changing energy-efficiency, performance and security for genuinely secure IoT applications
Software Version:	nRF Connect SDK v0.3.0 and later
Hardware Version:	nRF9160 build code AA and later
Standard:	PSA Certified – Chip vendor
Security Level:	Security Level 1 Beta 002

The Arm PSA is an architecture-agnostic framework for securing the next one trillion connected devices, from endpoint to cloud

For more information see www.psacertified.org/products/nrf9160-sip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