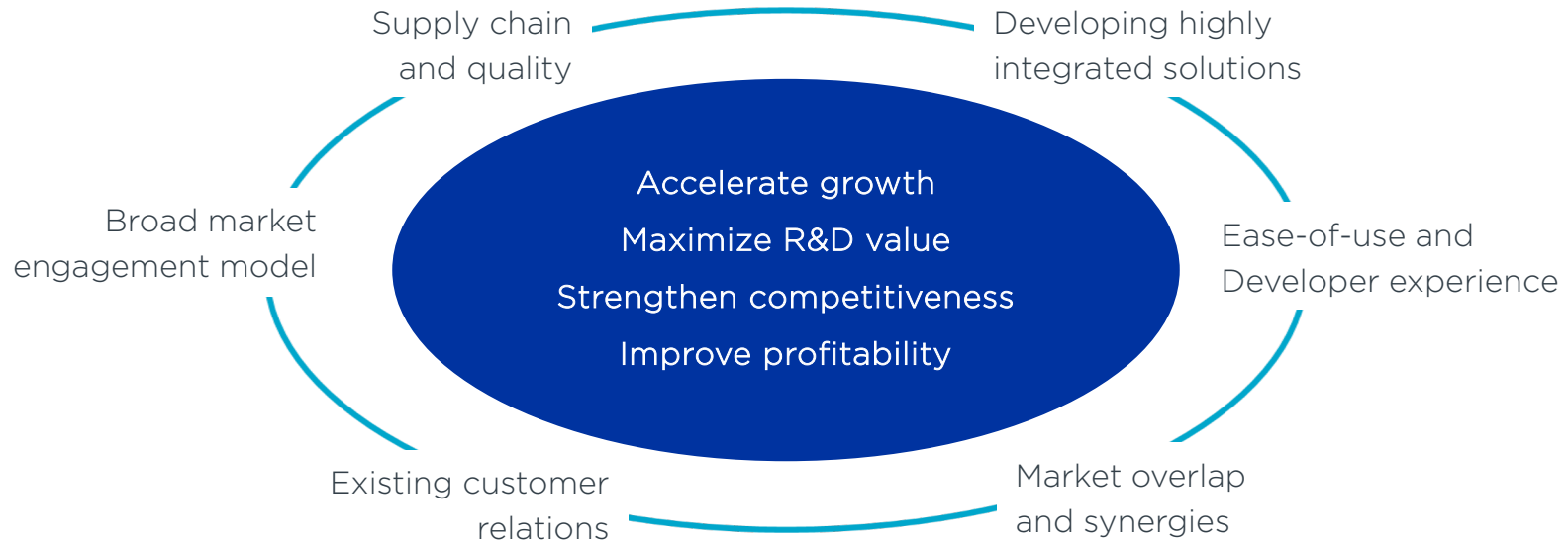# Cellular IoT

CTO, Svein-Egil Nielsen

Cellular IoT adds a new dimension to Nordic
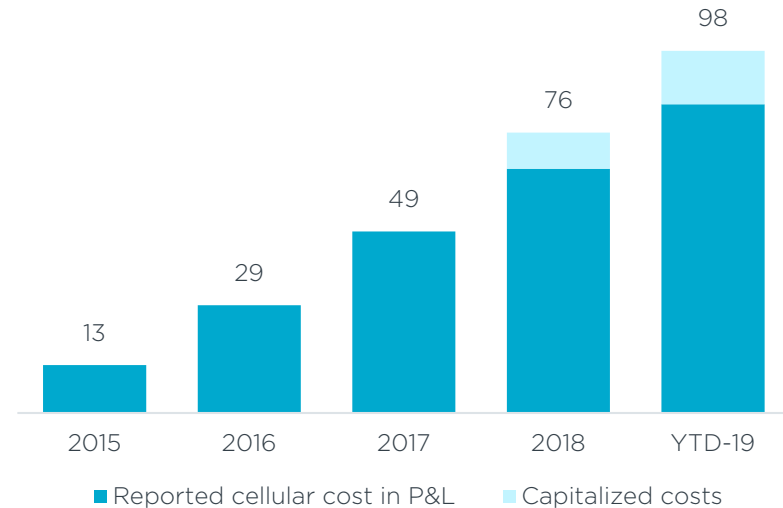
Short-range and cellular IoT highly synergistic businesses

Supply chain and quality

Developing highly integrated solutions

Broad market engagement model

Ease-of-use and Developer experience

Existing customer relations

Market overlap and synergies

Accelerate growth

Maximize R&D value

Strengthen competitiveness
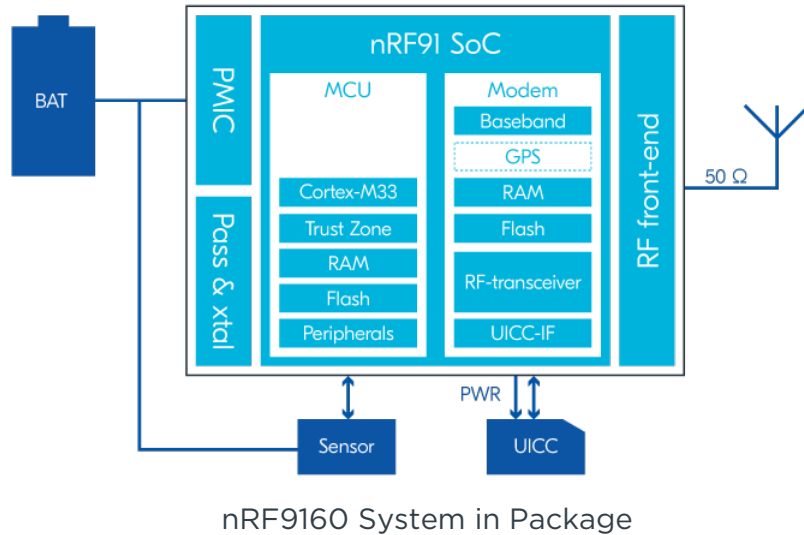
Improve profitability

2

In pole position within low power cellular IoT

- USD 98m invested in cash costs since project start-up, targeting low power cellular IOT(cIoT) market with vast potential

- Built highly skilled organization with cellular backgrounds from multi-billion unit programs at Nokia, Renesas, Broadcom and Ericsson

- Succeeded in developing a market leading, highly optimized, low-power cellular IoT product

Accumulated cellular IoT investments (USD million)

Bar chart data:
- 2015: 13
- 2016: 29
- 2017: 49
- 2018: 76
- YTD-19: 98

Legend: ■ Reported cellular cost in P&L   ■ Capitalized costs

3

nRF9160 is a market leading product

nRF9160 System in Package

Designed for low power
- Best-in-class power consumption, in all modes
- Integrated memories and low-leakage process features
- Common power management and clock system for modem and application

Smallest size
- Integrated and used advanced packaging techniques to reduce solution size

Ease of use
- Enable self-service for thousands of customers

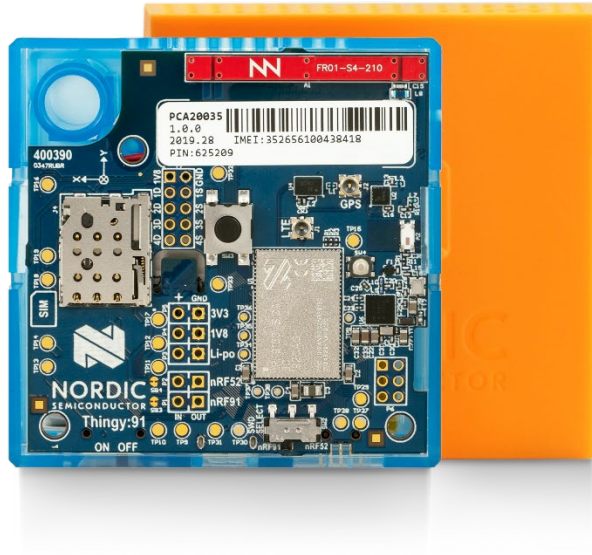## Powerful modem capabilities
- LTE-M, NB-IOT and GPS support

Tight integration
- Efficient, on-chip data and control transfer between application and modem

Multiple Secure Islands
- Modular approach to security

Introduced the Nordic Thingy:91

- The low power cellular IoT market is ripe for expansion - we help develop the market

- The Thingy:91 prototyping tool lowers the barrier for customers to run proof-of-concept trials

- Fully available hardware and software design files offering customers an excellent starting point for their own designs

- In full volume production – 2500 shipped

Favorable competitive comparison

	Power consumption in 81.92s eDRX	Size (mm³)	Low power application MCU and SDK	Embedded software development kit
nRF9160	25uA	160	Yes	Yes
Competitor A	25uA	177	No	No
Competitor B	250uA Preliminary marketing number	1080	No	No
Competitor C	?	1089	No	No

- Leading the field in both low power consumption and small size
- Only vendor with low power embedded MCU and SDK

Simplifying IoT Cloud Connectivity

Secure Connection

- End-to-end security with pre-provisioned credentials
- On-demand provision of new devices to account

Access Data

- Visualize data from development kits
- Access data through APIs using generated token keys

Manage device

- Manage certificates
- Update firmware
- Manage SIMs and data usage

Cellular Core

Network

End-to-end encrypted and authenticated

nRF Connect for Cloud

7

nRF9160 SiP works on 4G and 5G networks

- LTE-M and NB-IOT already available in 4G
- LTE-M and NB-IoT form the 5G massive machine type communication (mMTC) solution
- nRF9160 is ready for mMTC 5G
- Market success for nRF9160 is not dependent on 5G rollout
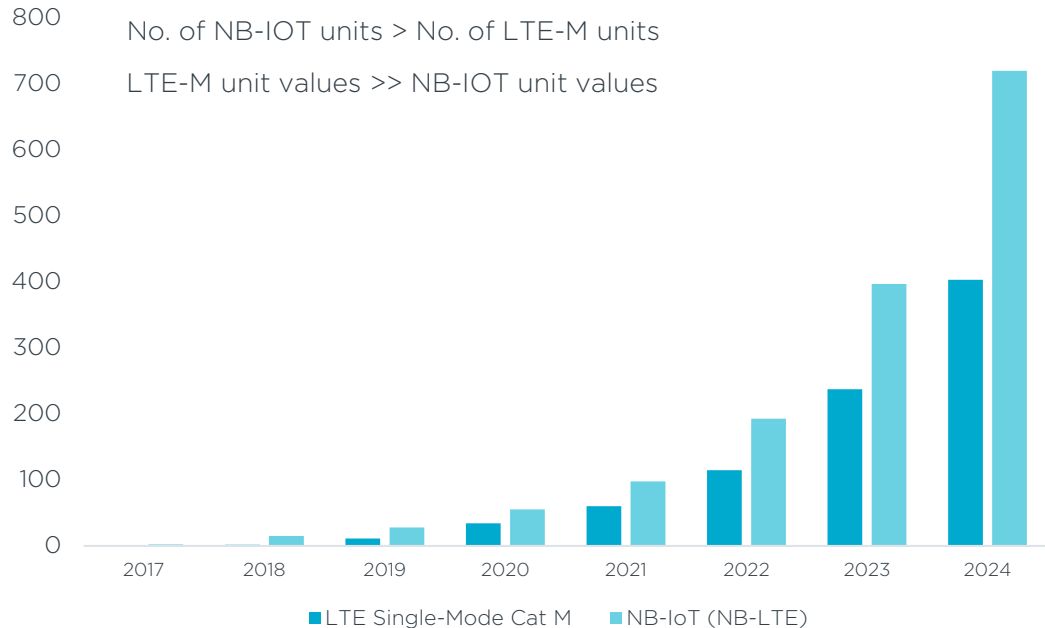
Cellular IoT ready

Confident in long-term cellular IoT outlook

Volumes and revenues pushed out in time

- Carrier and industry ecosystem maturation
- Software development
- Certification processes
- Customer development cycles

ABI: Cellular M2M shipments, million units

No. of NB-IOT units > No. of LTE-M units

LTE-M unit values >> NB-IOT unit values

■ LTE Single-Mode Cat M ■ NB-IoT (NB-LTE)

Source: ABI Research, August 2019

10

Reasons for delay

Ecosystem

Network rollout, LTE-M and NB-IOT
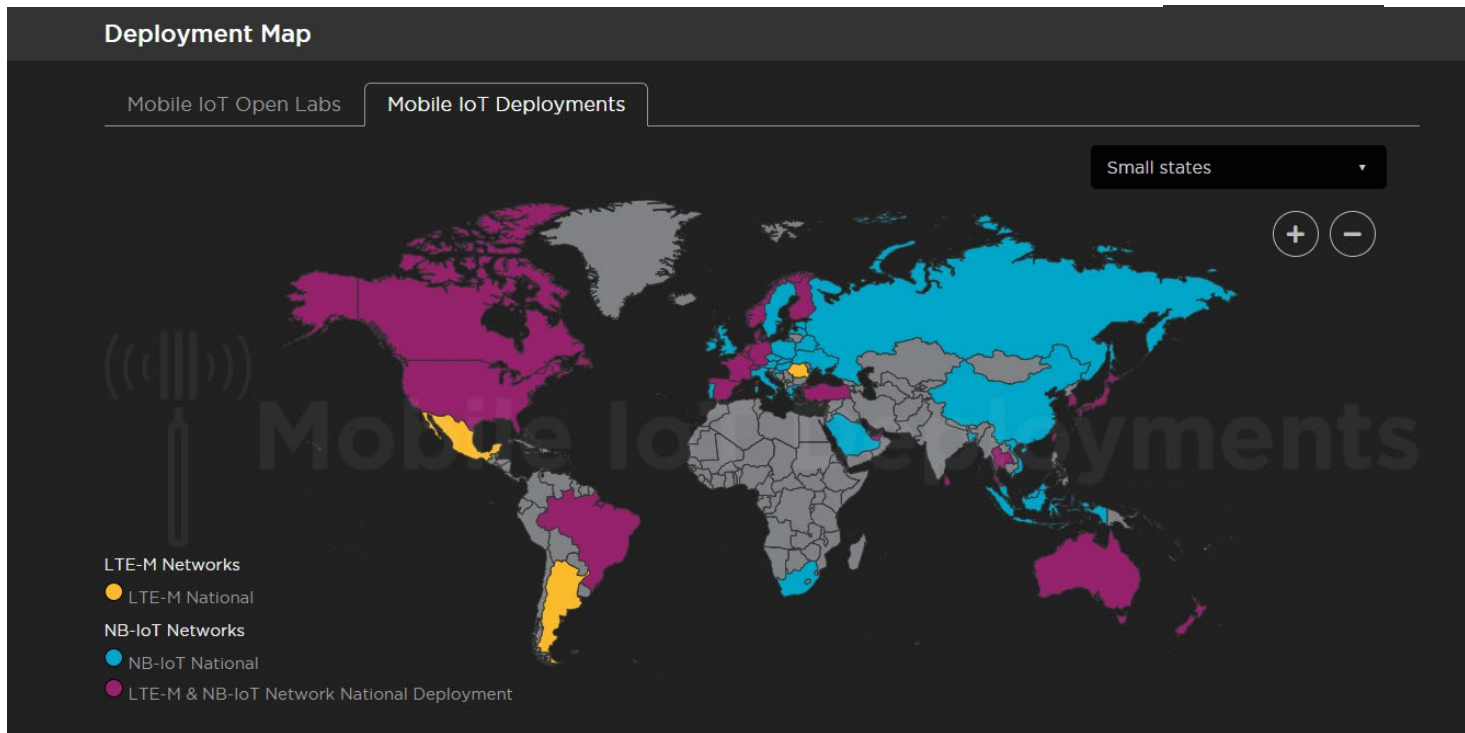
Carrier business model development

Software

Nordic software deliverables

Ease of use not yet at Bluetooth level
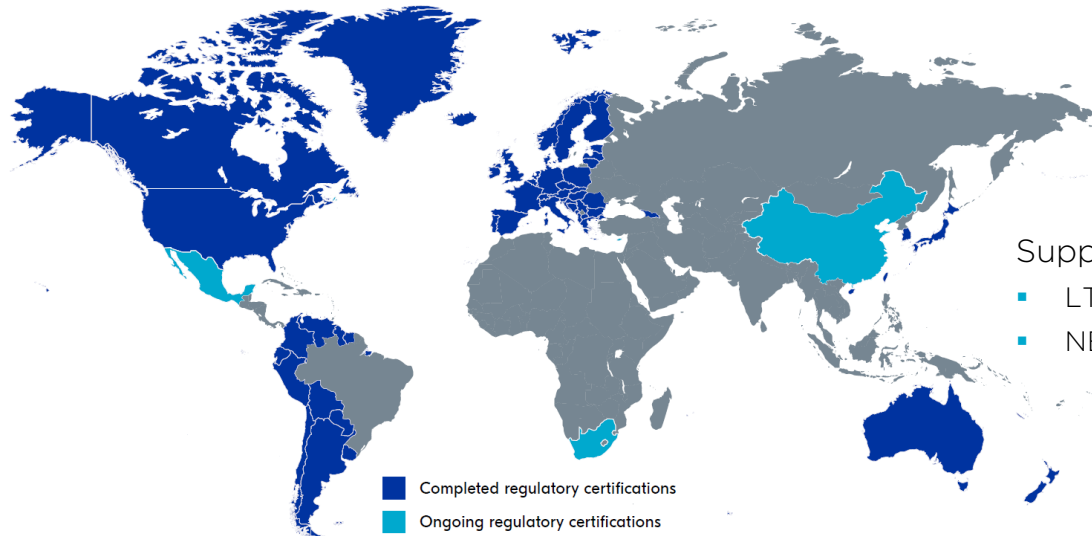
Certification

LTE-M/NB-IOT certification process maturity

Nordic software deliverables

Carriers are embracing cellular IoT

Source: GSMA.com

Leading worldwide coverage with single SKU
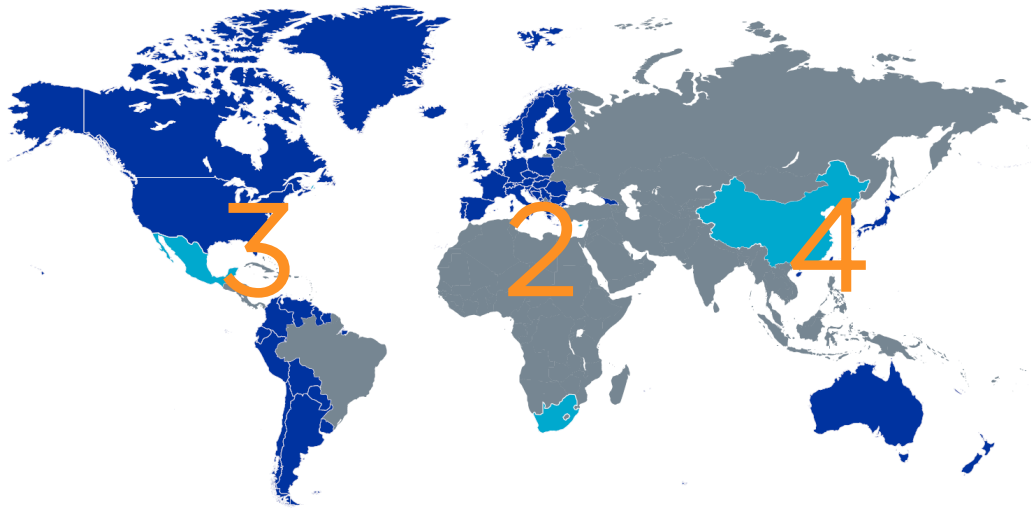
nRF9160 regional tele-regulatory certifications

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

Completed regulatory certifications
Ongoing regulatory certifications

Carrier certifications add local collaboration

Currently in active certification processes with 9 key carriers globally

- Certified by Verizon in August 2019

- Carrier certifications provide opportunities for collaboration with local carriers in major markets

- Most carriers do not have certification programs

Build your devices faster and more economically with

ThingSpace Ready Hardware

Welcome to ThingSpace Ready

We've created a program to help get cellular IoT solutions to market quickly, reliably and cost effectively. We help provide transparent pricing, design house and system integrator support, free certification support (through December 31, 2019), and bill initiated credits to get your device to market. We've selected partners that specialize in developing secure and reliable connectivity solutions, designing LTE chipsets and providing software tech to authenticate and protect devices and data. Contact us using the form below for details.

NORDIC SEMICONDUCTOR

LTE-M Module

Nordic nRF9160

Fully integrated low power SiP featuring a dedicated application processor (Cortex-M33) ideal for creating small and secure battery operated cellular IoT products

Net price after $1.50 bill initiated OEM rebate when device is activated on a qualified line level Verizon price plan.

$10.00
50k + unit volume

10K - 50K	$12.00
Less than 10k	$14.00

Get started

15

Software deliverables coming on-line

First software production releases in early July 2019

- Modem firmware with Triple-Mode functionality, LTE-M, NB-IOT and GPS
- nRF Connect SDK

Some functionality omitted from July releases

Strong development momentum in Q3 and Q4 will enable significantly wider customer base to go to production

New production releases scheduled for Q4 adding significant functionality

Market opportunity

Ongoing project across all these verticals

- Smart Home
- Payment systems
- Industrial monitoring systems
- Agricultural monitoring
- Construction
- Smoke alarms
- Metering
- Vehicle and driver behavior tracking
- Logistics
- Kids and elderly trackers

- Asset Trackers
- Pet and livestock trackers
- Healthcare
- Street lights
- Solar power systems
- Environmental monitoring and disaster prediction
- Product-as-a-service
- Parking systems
- Water/sewage systems monitoring

Highly complementary with short-range

Broad and diversified range of potential applications for both consumer and non-consumer markets

61% of customers who have ordered nRF9160 SiPs have also bought short-range devices from Nordic

Combining short-range and cellular

Mixing short-range and cellular
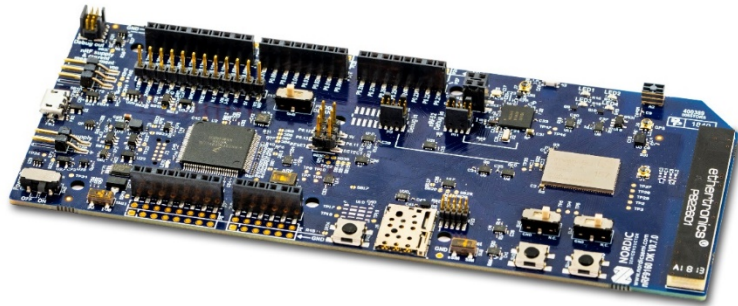
Asset tracking set to be a leading market

Massive potential market

- Tracked objects range from vehicles, packages, machinery and pets/livestock
- With increased digitization, need is growing for accurate information on location and condition of assets

nRF9160 SiP is ideally suited for asset tracking

- Low power consumption
- Small size
- GPS integration
- Sensor application integration
- Global coverage

Gaining traction with the nRF9160

nRF9160 Development Kit

- In mass production with good yield

- Shipped 4,000 nRF9160 development kits

- 220 customers have ordered parts from distribution to build their own board

- 3rd most active product on DevZone

- Prototypes and early products drove $500k in Q3 2019

Nordic is poised for cellular IoT growth

- World leading cellular IoT SiP in mass production

- Carriers are embracing cellular IoT

- Certifications and firmware availability gaining pace

- Considerable customer design activity

- Diverse applications overlapping with short-range customer base

- Early volumes of DKs and products shows great promise