

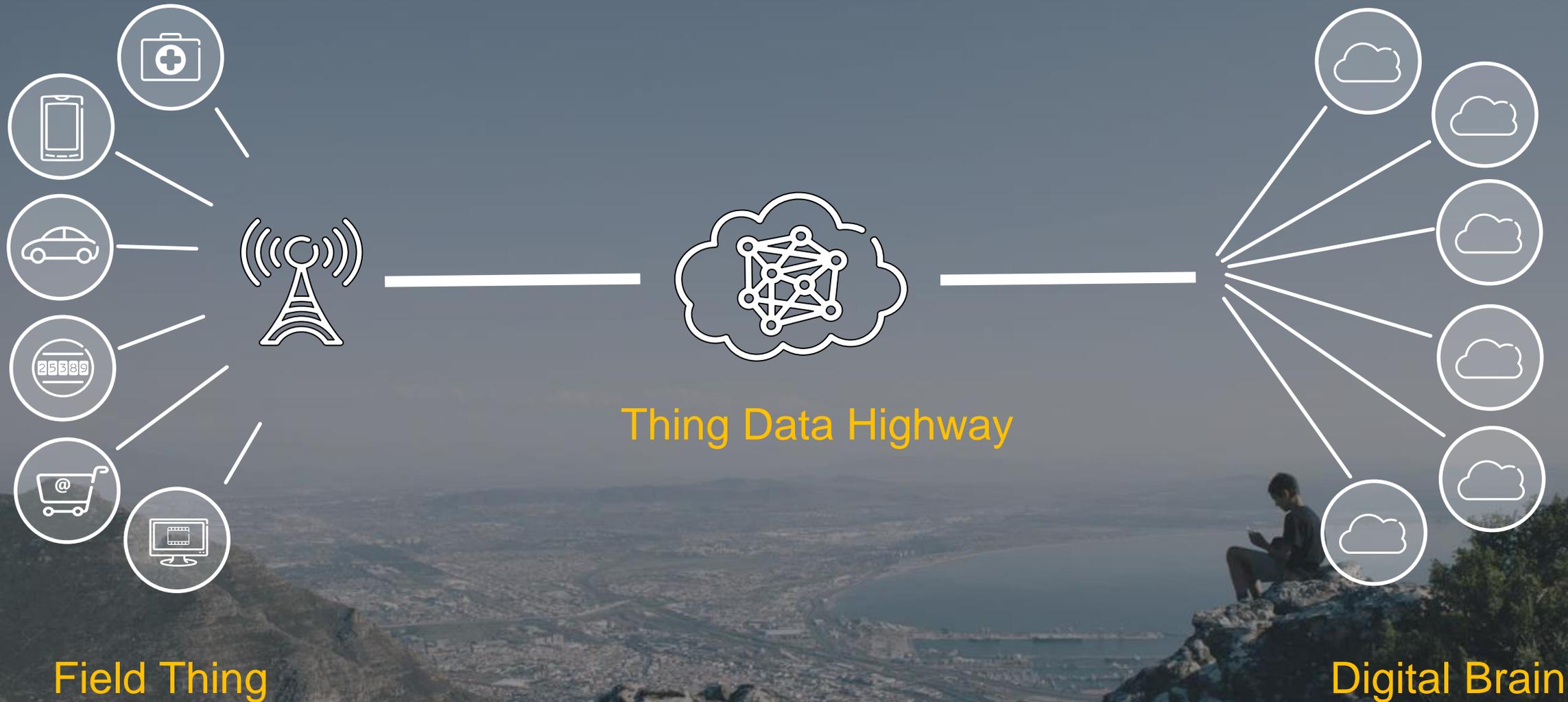
The cellular IoT era

How 5G is fueling IoT adoption across industrial sectors

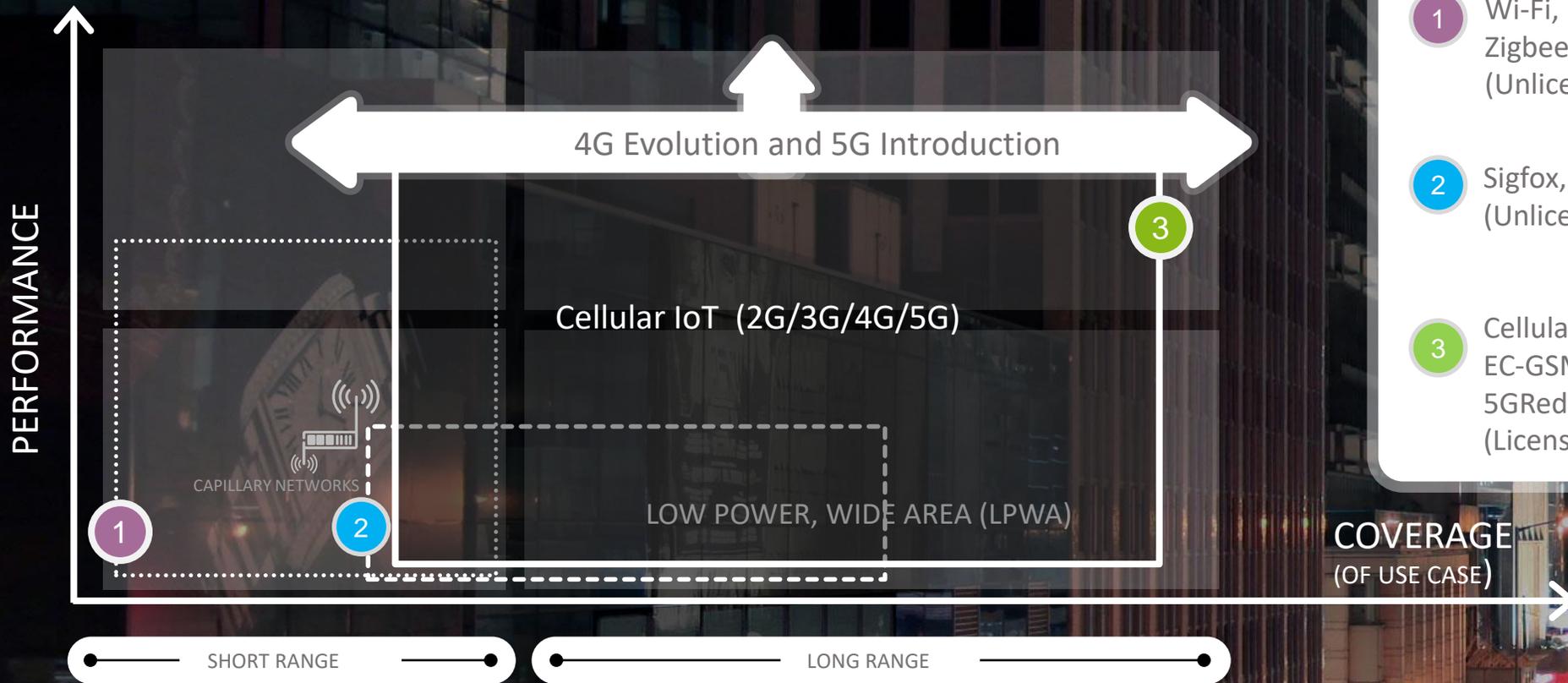


Jan-Peter Meyer-Kahlen
Vice President, Head of ICT Development Center Eurolab Aachen
Ericsson GmbH

Cellular IOT e2e architecture concept



IoT radio technology overview

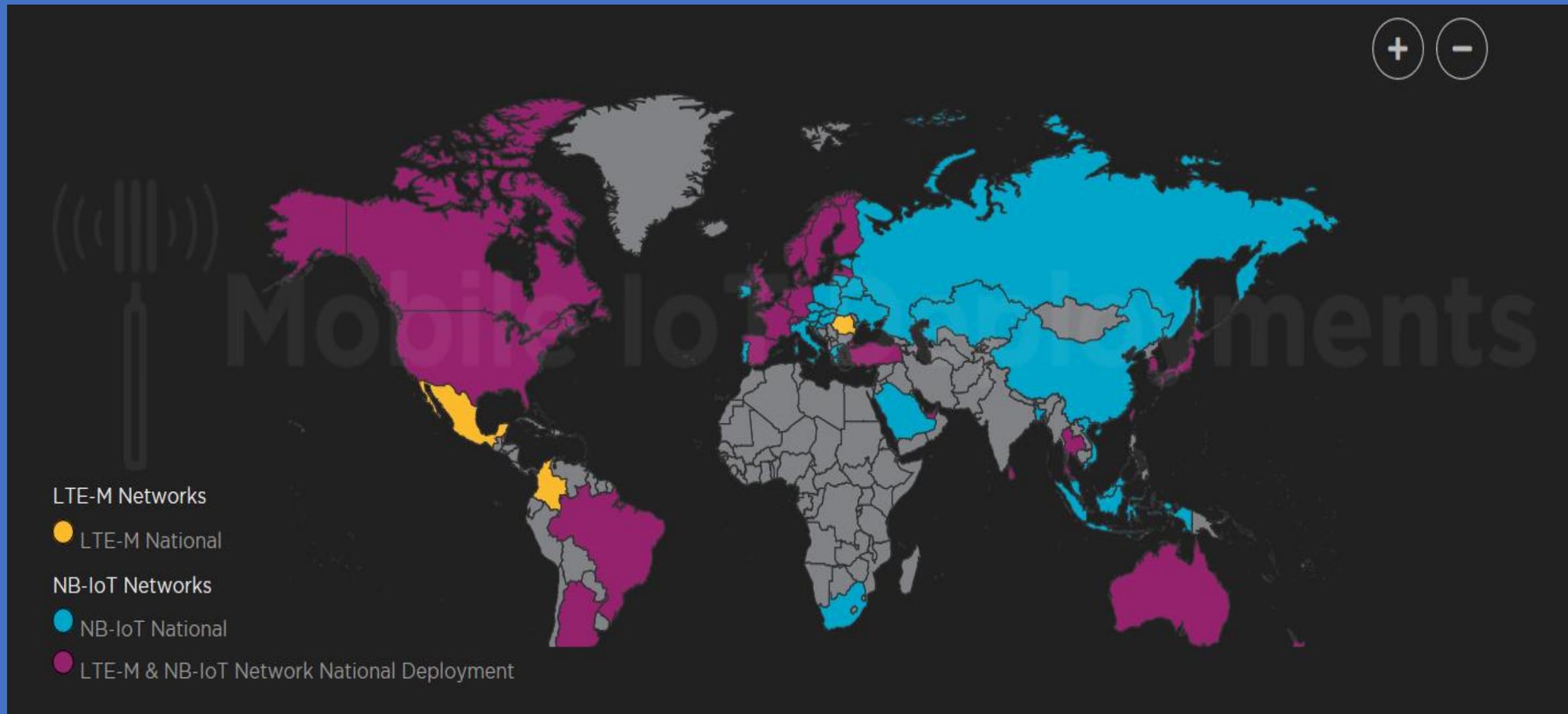


1 Wi-Fi, Bluetooth, Zigbee, etc (Unlicensed spectrum)

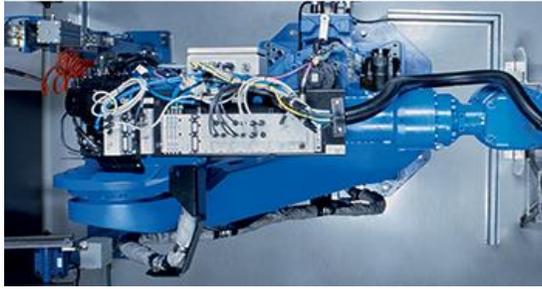
2 Sigfox, LoRaWAN, etc (Unlicensed spectrum)

3 Cellular IoT: EC-GSM, Cat-M, NB-IoT, 5GRedCap, 5G NR URLLC (Licensed spectrum)

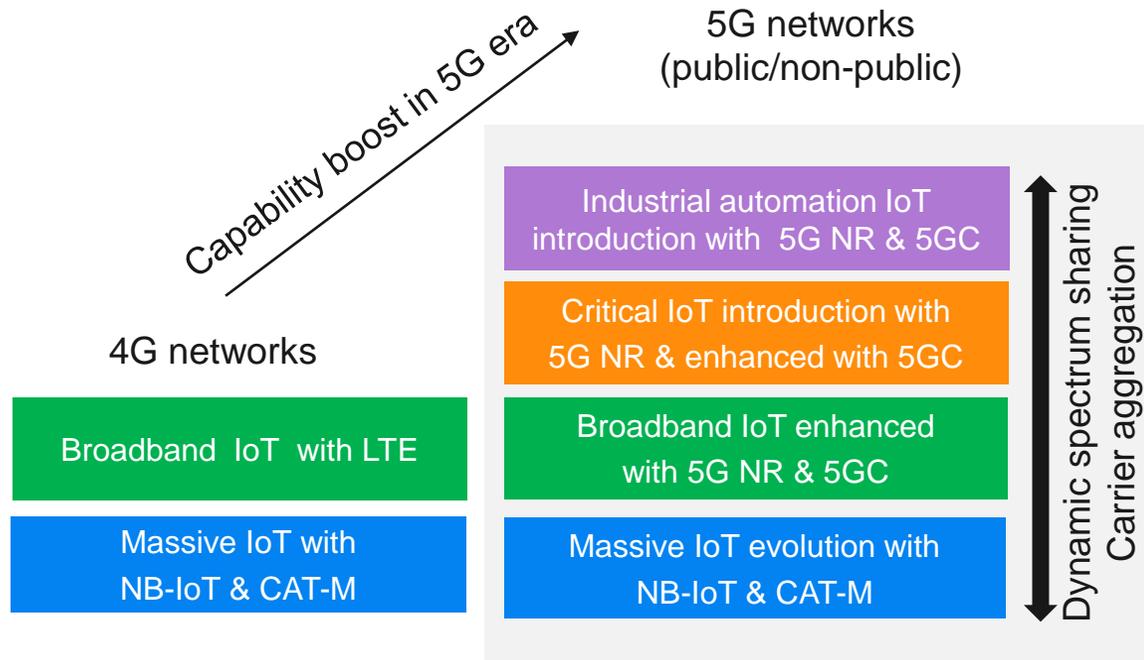
Cellular IoT – Global Network Deployments



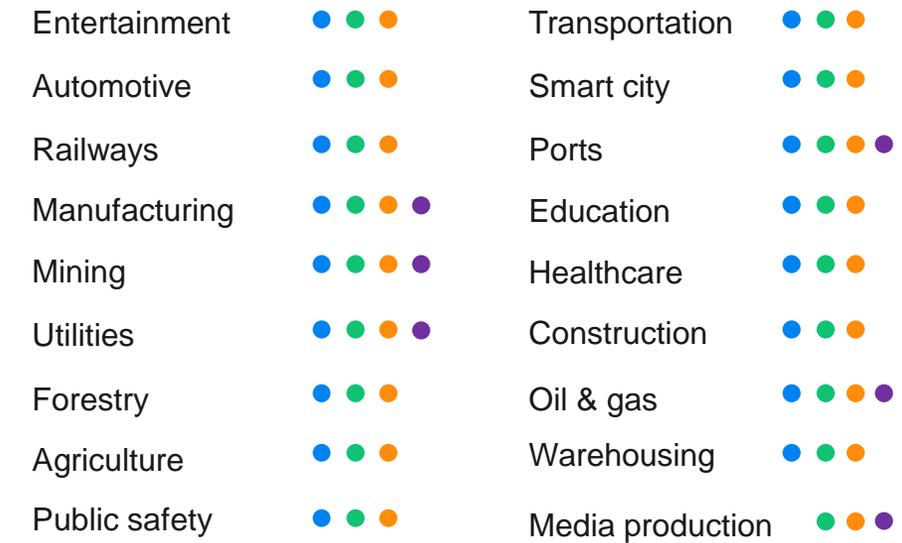
IoT – for almost every industry



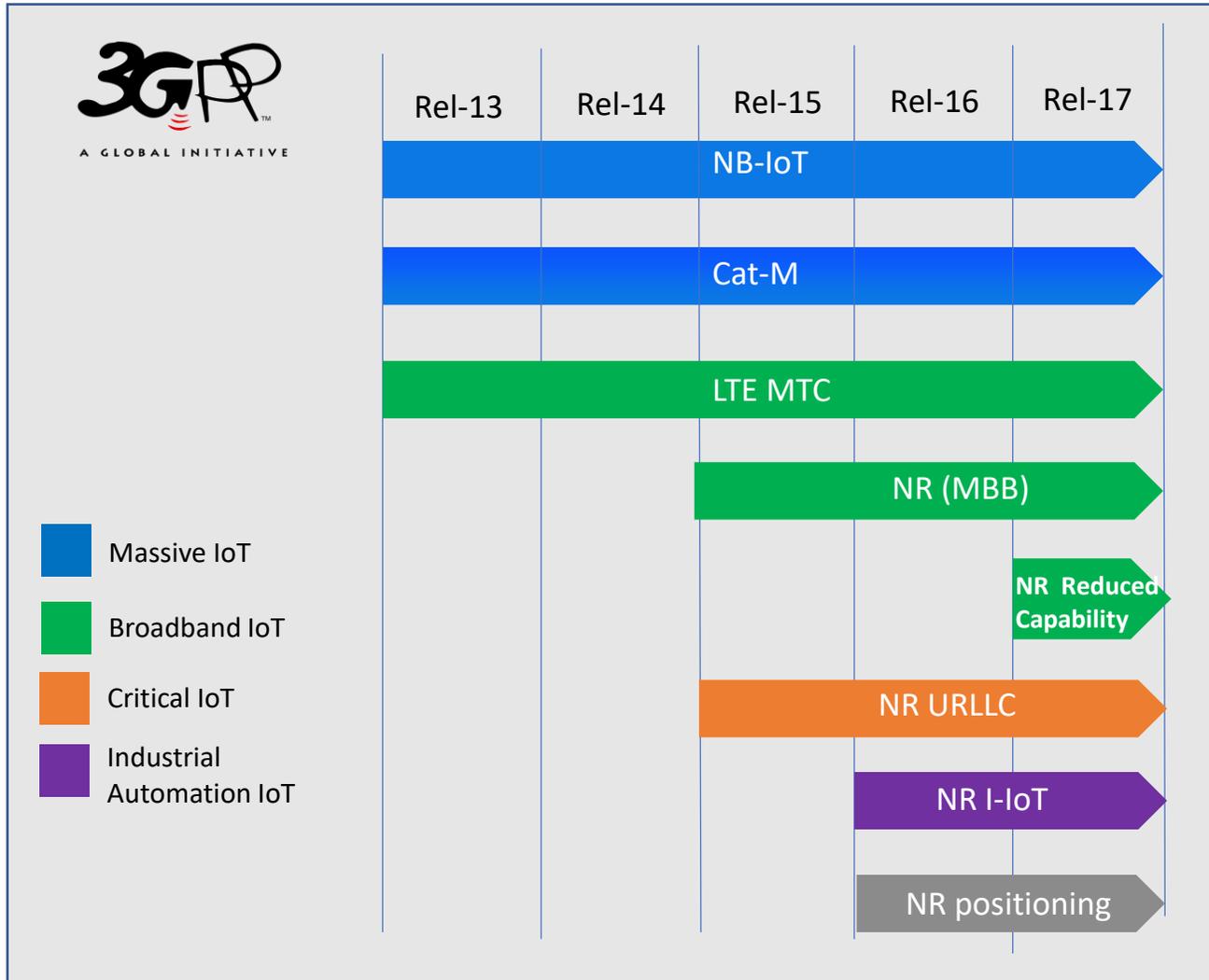
One 5G Network with Four Multi-purpose IoT Segments



Industry Digitalization with Cellular IoT



Global standardization & industry fora



Ericsson is a founding member of
5GAA and 5G ACIA



- Automotive & telecom. industries developing e2e solutions for transport services
- Founded in 2016
- 130 member organization



- A joint initiative of OT and IT industries for connected industries & automation
- Founded in 2018
- 57 member organization

Massive IoT

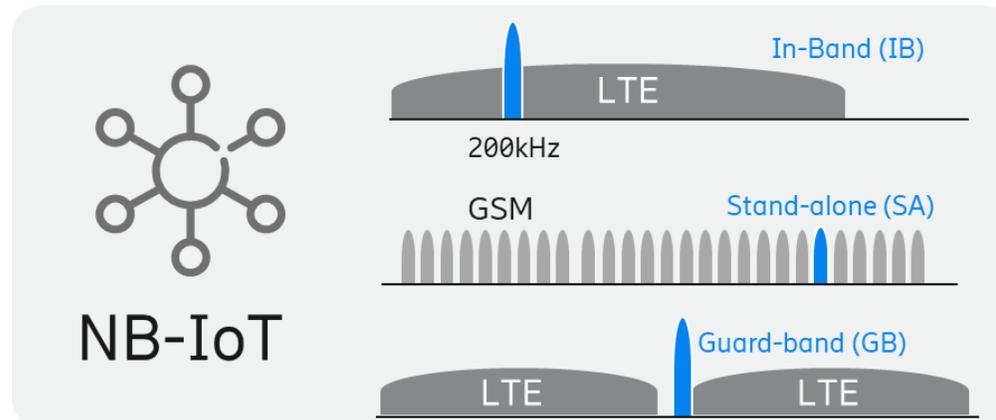
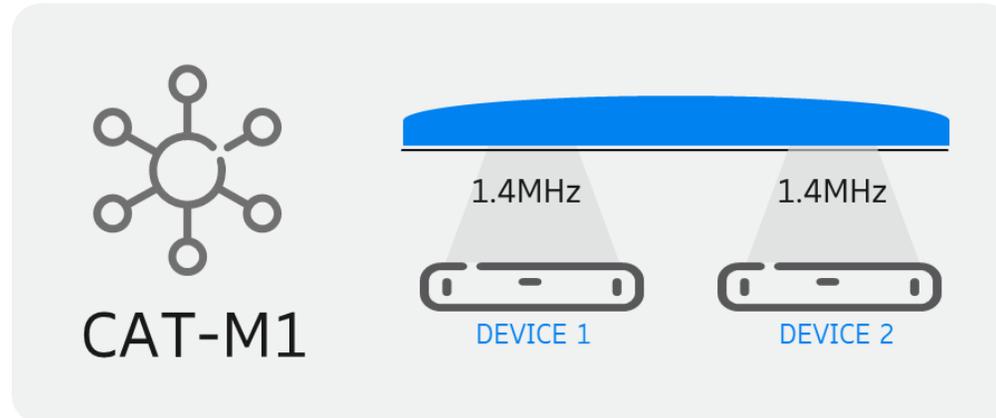


★ Extreme Coverage

★ High Battery Efficiency

★ Low Complexity

- CAT-M1 & NB-IoT (3GPP Rel-13+)
 - 15...20dB additional coverage
 - PSM, eDRX,...
 - 100km...120km cell range
- Wide/local area coverage
- Public/Non-public access
- For low complexity uses cases (sensors, meters, trackers etc.)



Smart Buildings and Cities



Fleet Management



Wearables



Sensors



Broadband IoT

Leveraging MBB capabilities



- LTE
- NR
- Multi-Gigabit
- Low latency
- Uplink capacity
- Coverage extension
- Extended battery life
- Selected vertical specific

- Wide area/local area

- For Automotive, Drones, Railways, Manufacturing, Utilities,...



Cooperative Intelligent Transport System (C-ITS) – V2X In Car MBB Services



Utilities – Smart Grids
Connecting grid elements beyond meters



Train Networks
Public Safety Networks



Drones – UAVs
Delivery, Infrastructure inspection, Agriculture



Advanced wearables
Health monitors, smart watches

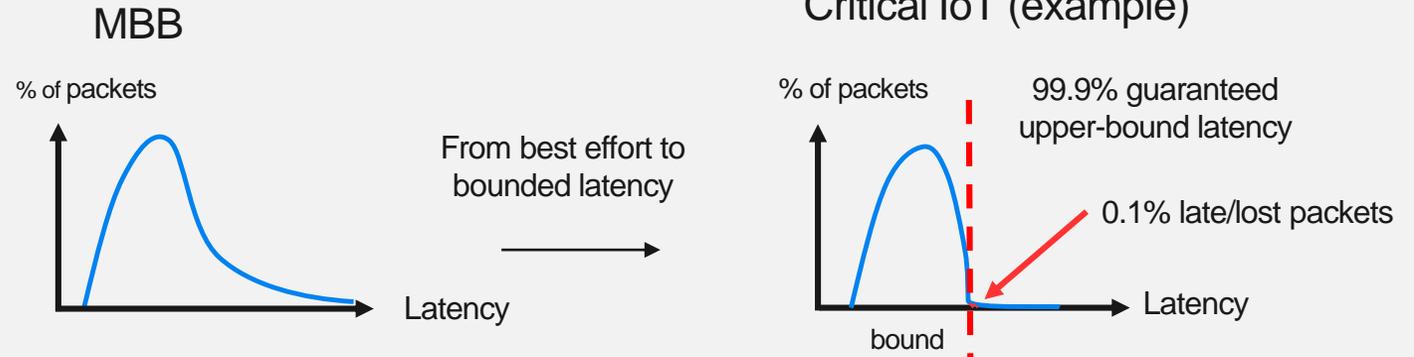


Critical IoT

For Time-Critical Communications

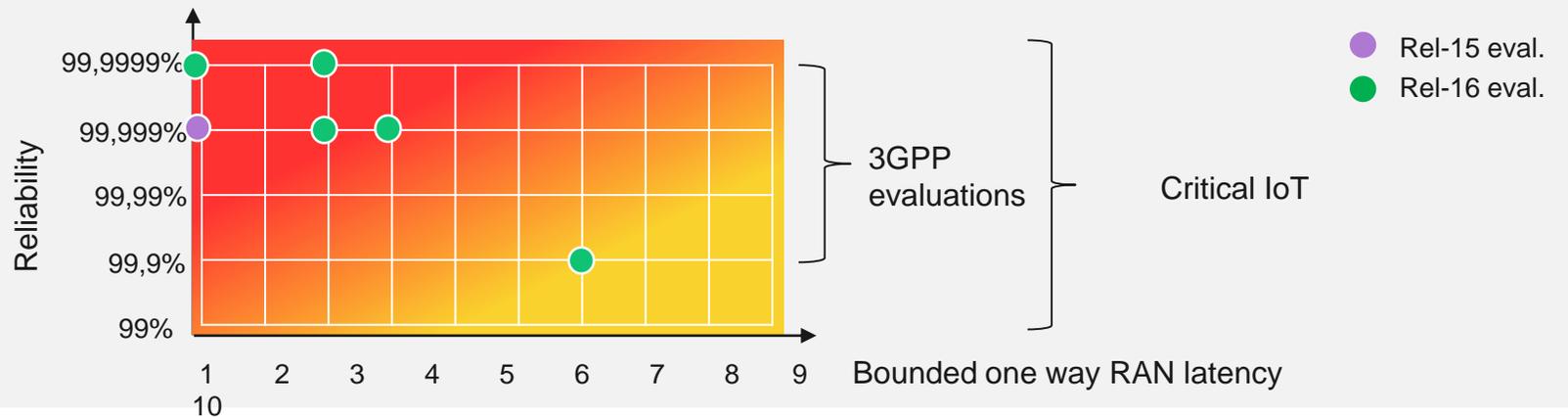


Critical IoT enables data delivery within specified latency bounds with required guarantee levels



Rel-15 | Rel-16 | Rel-17

5G NR URLLC



Industrial Automation IoT

For Integrating 5G with Advance Industrial Automation Networks

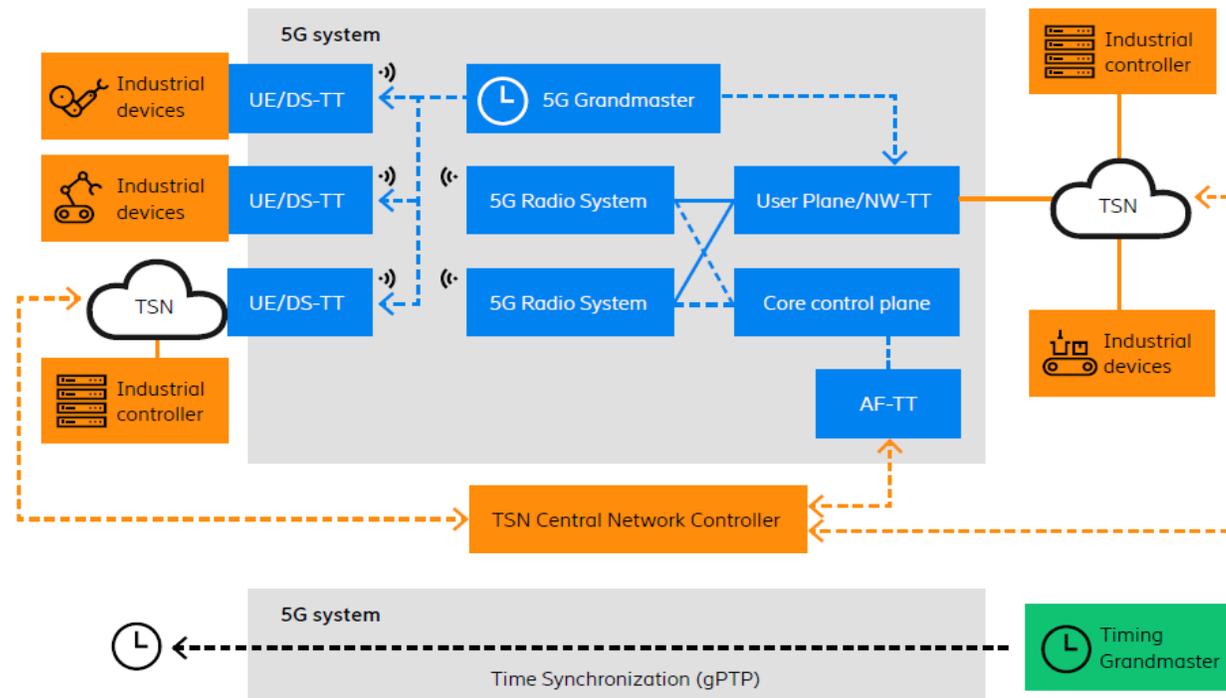


★ Ethernet based industrial protocols

★ 5G-TSN Integration

★ Clock Synchronization Service

- NR I-IoT (3GPP Rel-16+)
- Non-public access
- Standalone 5G
- Use cases
 - Manufacturing
 - Mining
 - Utilities
 - Oil & gas
 - Ports
- 5G-ACIA

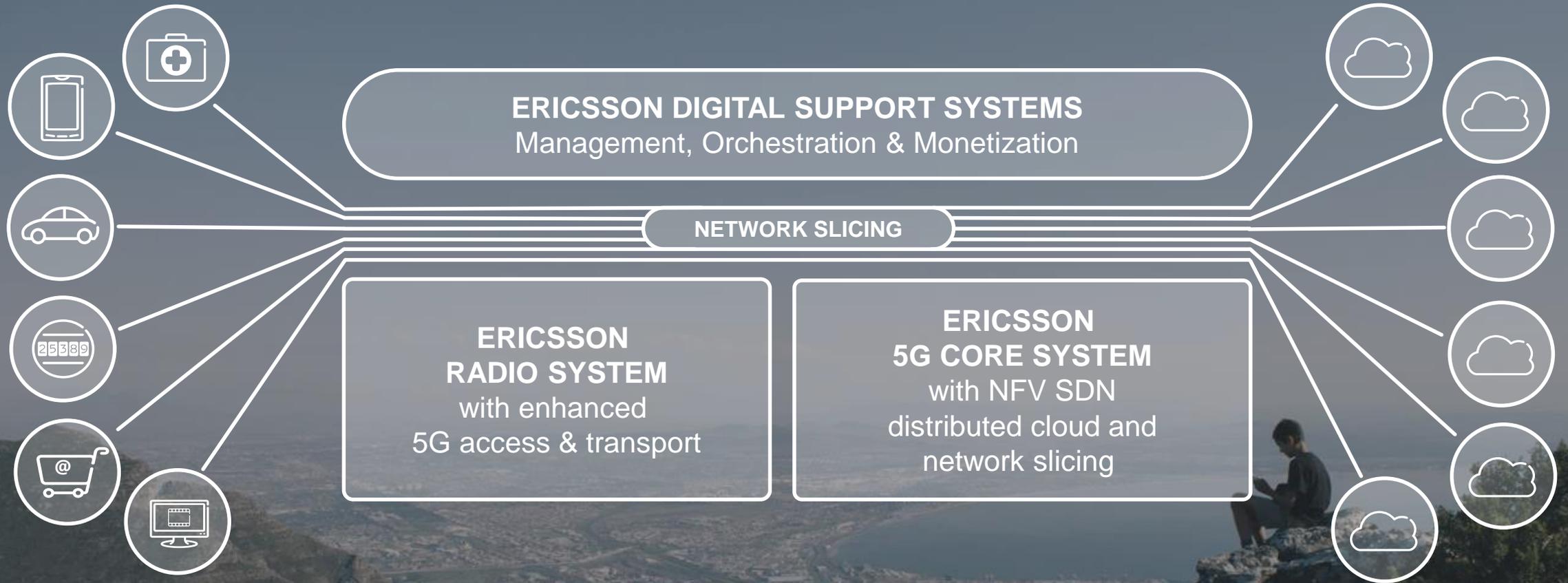


AF-TT: Application Function–TSN Translator
 DS-TT: Device Side–TSN Translator
 NW-TT: Network–TSN Translator

— A physical link
 - - - A logical link

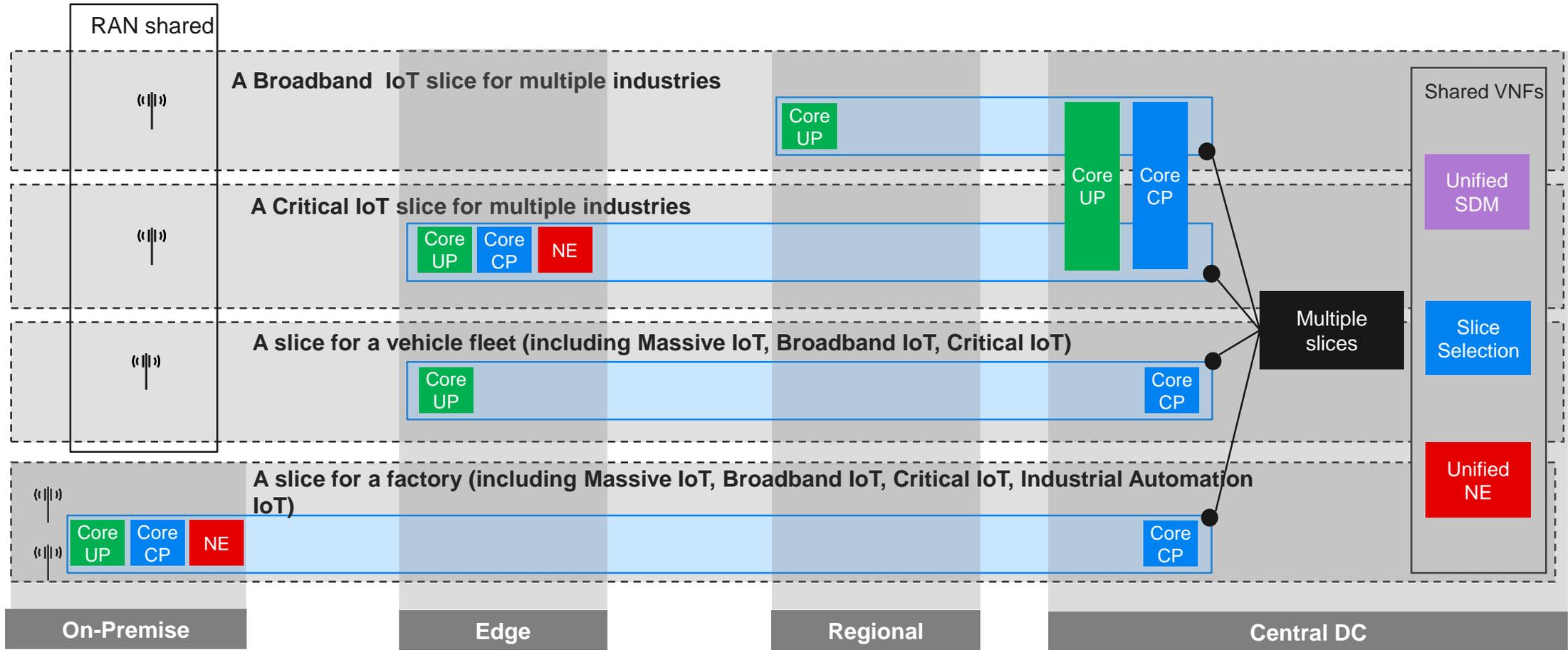


5G Network Slicing



Dynamic network slicing technology

A virtual network for each segment



UP = User Plane
 CP = Control Plane
 VNF = Virtual Network Function

Ericsson Industry 4.0 wireless



Independent software vendors

Applications ecosystem
Application enablement Platforms
Manufacturing Execution Systems (MES)
Enterprise Resource planning System (ERP)



Cellular Network 4G /5G (public, sliced, Private Network, Industry Connect)



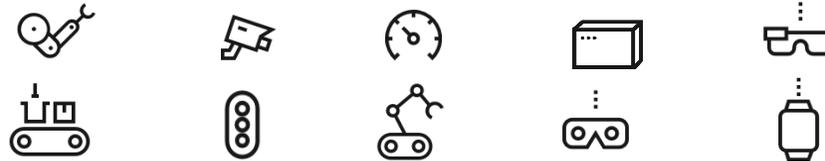
Modules



Cellular Gateways

Current loop
Ethernet
RS232
Analog I/O
Digital I/O

Machinery
Sensors
Actuators
Handhelds
Wearables



Wired via Gateway or Integrated Module, grid power ← → Integrated with Cellular Module or Chipset, battery

Device partners

Gateways
Sensors
Actuators
Handhelds
Wearables



OEMs



System Integrators





First industrial 5G router for private networks

Phoenix Contact, Quectel, Ericsson



Source: phoenixcontact.com

The screenshot shows the Phoenix Contact website's news section. The header includes the company logo, a search bar, and navigation menus for 'About us', 'Our Offerings', 'Careers', 'Press', 'Purchasing', and 'Contact'. The breadcrumb trail reads 'Home > Press > Industrial 5G Router'. The article title is 'Phoenix Contact, Quectel and Ericsson jointly develop the first industrial 5G router for private networks', dated 25.06.2020. The text describes the collaboration between the three companies to create a 5G standalone private network for industrial applications. A small image of the router is visible on the right side of the article.



Connected Pumps



Telenor Connexion, Grundfos

Challenge

Grundfos makes roughly 17 million pumps each year, and connected pump sensors relay data on pump health and performance.

Grundfos wanted to predict when pumps would need repair or replacement to reduce unplanned outages and provide more effective maintenance, which is greatly valued by customers.

“We have been working closely as a team to find a setup for global connectivity and what technology to use in our pumps. I see Ericsson and Grundfos working very closely as strategic partners in our ecosystem of our smart pump to get access to the best connectivity solutions and create future solutions together.”

Fredrik Östbye

Chief Digital Officer at Grundfos

Solution

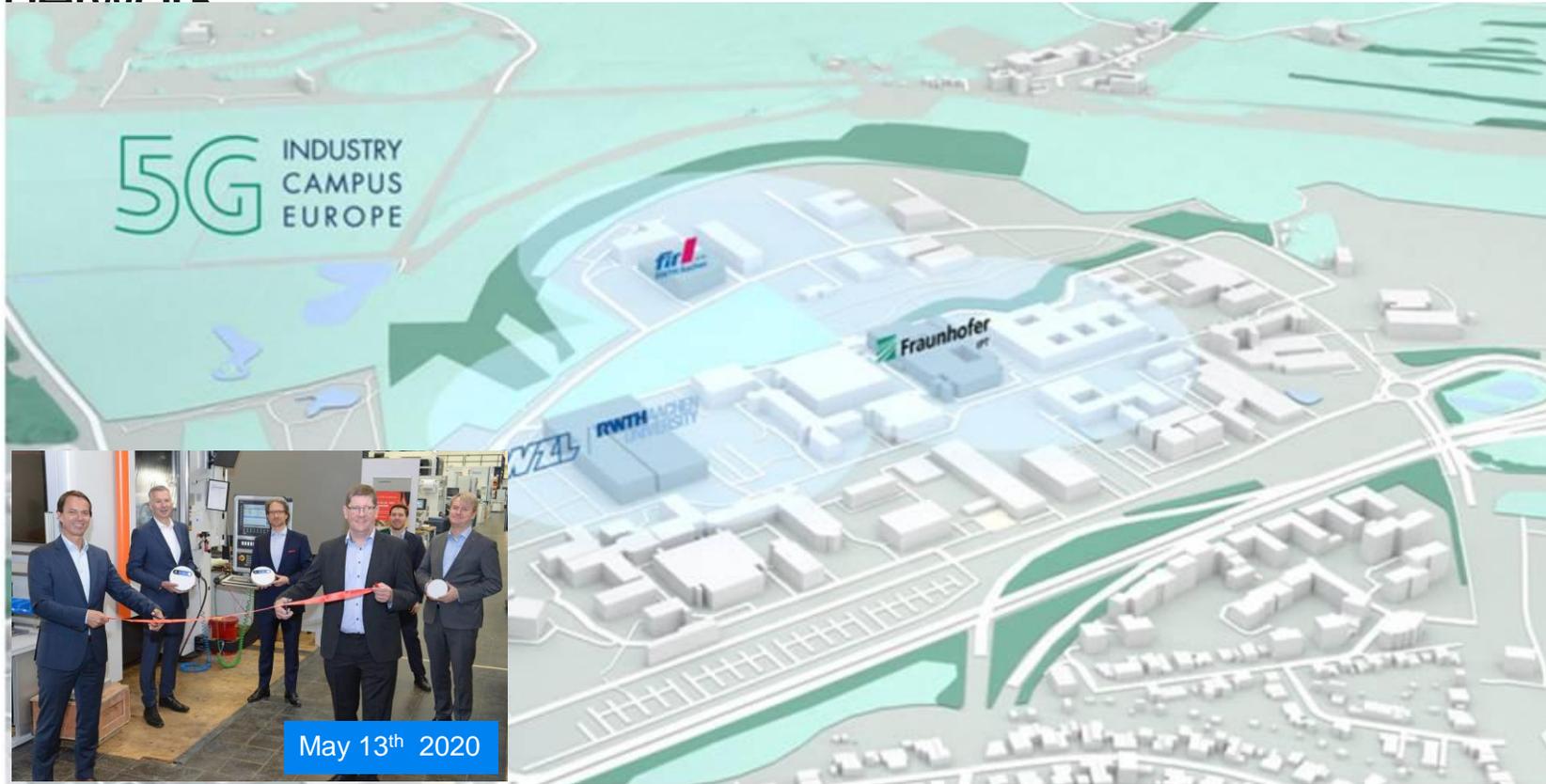
Grundfos selected Ericsson's IoT Accelerator platform to help create an IoT ecosystem that could manage water infrastructures all over the world. The analytics capabilities of Ericsson's platform allowed Grundfos to collect pump data, optimize them and take proactive measures for the most customer satisfaction.

Results

- Health and performance data collection provides predictive analytics for proactive maintenance and downtime reduction.
- Actionable insights from Ericsson's platform allows Grundfos to evolve to sell pumps as a service.
- Global management and control across international markets.

5G-Industry Campus Europe

Fraunhofer IPT and Ericsson run Europe's largest industrial 5G research network



Objective:

Collaborative exploration of application areas of the new mobile radio technology 5G in the production field

5G connectivity:

Ericsson is selected as technology partner and 5G network supplier

5G-Industry Campus Europe is located on the area of the RWTH Aachen Campus Melaten, Germany

5G – AGV Safe Crossing sprint 1

Partners: SICK, KION/Still

The Challenge

AGVs running in shopfloors or warehouses need to comply to safety distances.

Safety regulations demand a secure halt within the visibility range of the on board sensor information.

At crossing and intersections the AGV needs to slow down due to lack of visibility into the crossroad.



The Solution

Sensor information from the infrastructure supports the AGV at the intersection, preventing speed reduction.

The infrastructure monitoring is realised with a laser scanner connected to the AGV with 5G-NR.

The Result

The use case shows 5G transmission of a safety protocol (Ethernet/IP – CIP Safety).

Safety protocols require guaranteed and deterministic communication.

First results in a reference factory show positive results.

Partners

- SICK
- KION/Still

Conclusion



- The connectivity needs of all industries are addressed with four multi-purpose IoT segments:
 1. Cat-M and NB-IoT are formally 5G **Massive IoT** technologies with global coverage and a clear evolution plan in 5G era
 2. **Broadband IoT** has a natural head start with 4G and initial 5G MBB roll-outs. Its long-term success depends on addressing the IoT-specific challenges
 3. Almost every industry has time-critical communication needs. A systematic end-to-end co-development in the ecosystem is essential for realizing **Critical IoT** gradually over time
 4. **Industrial Automation IoT** is an enabler for seamless integration of 5G into the existing and evolving industrial deterministic networks used for real-time automation



www.ericsson.com/internet-of-things