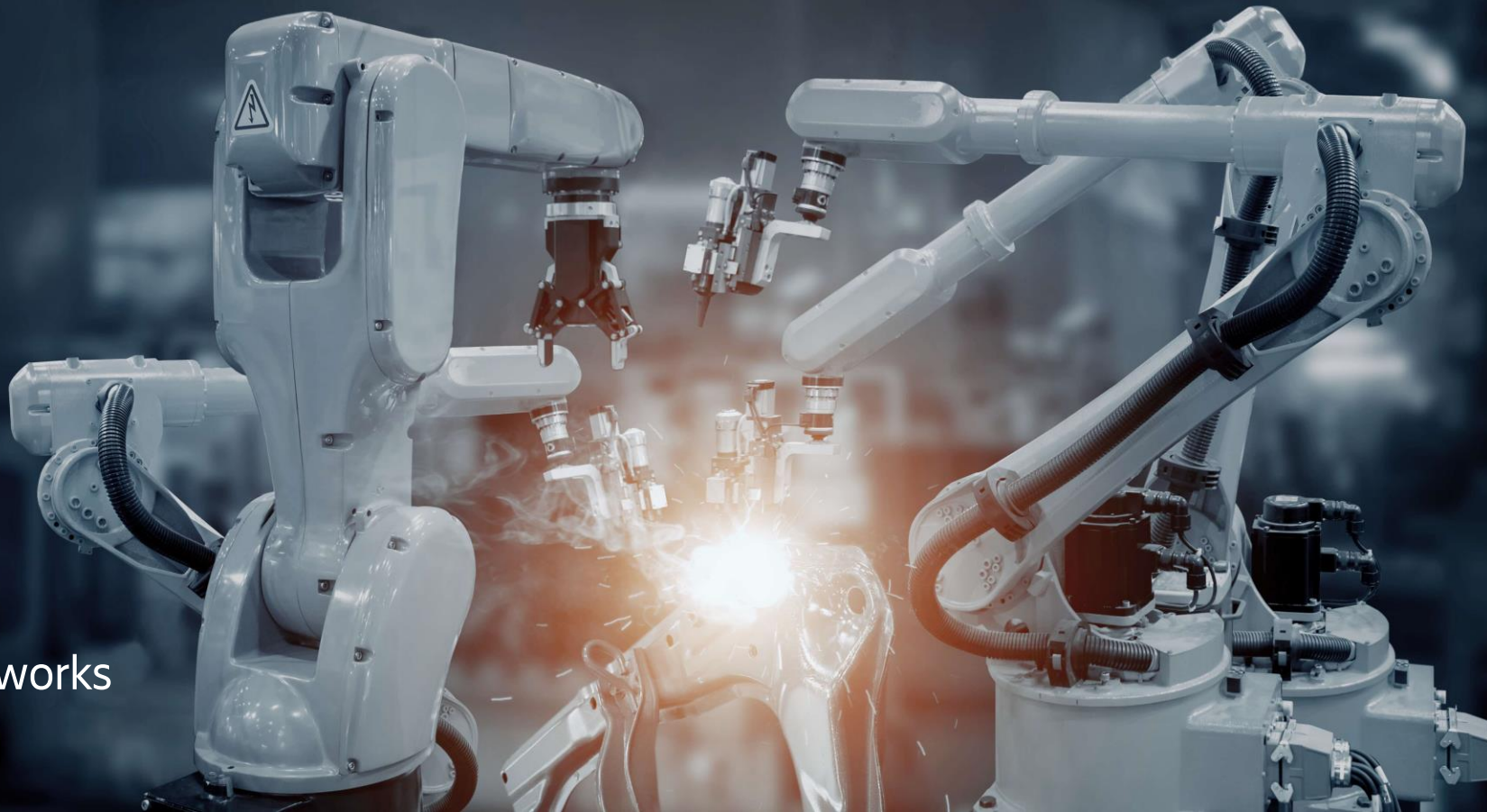# 5G for industries

Johan Torsner
Manager Radio Network Solutions
Ericsson Research, Research Area Networks

The first 2 years of 5G in numbers

Global Figures **Ericsson Figures** **Ericsson live networks**

176 Global Live 5G networks (GSA Aug 2021)

938 5G devices commercially available (GSA Aug 2021)

25% Of Population by the end of 2021 (Ericsson April 2021)

27 GB Monthly mobile data traffic per sub: South Korea (Jun 2021)

54 % Of traffic on 5G network South Korea (Jun 2021)

51

9

12

5

12

7

97 Ericsson live 5G networks
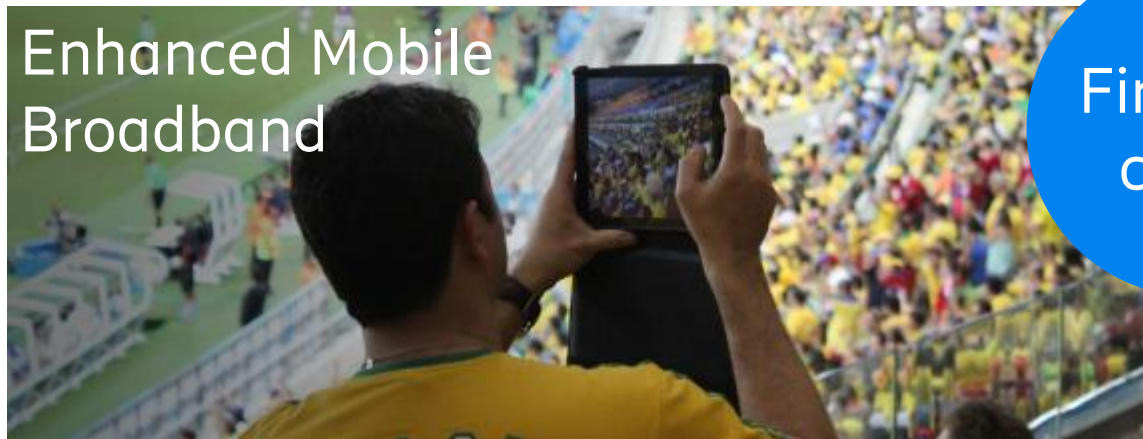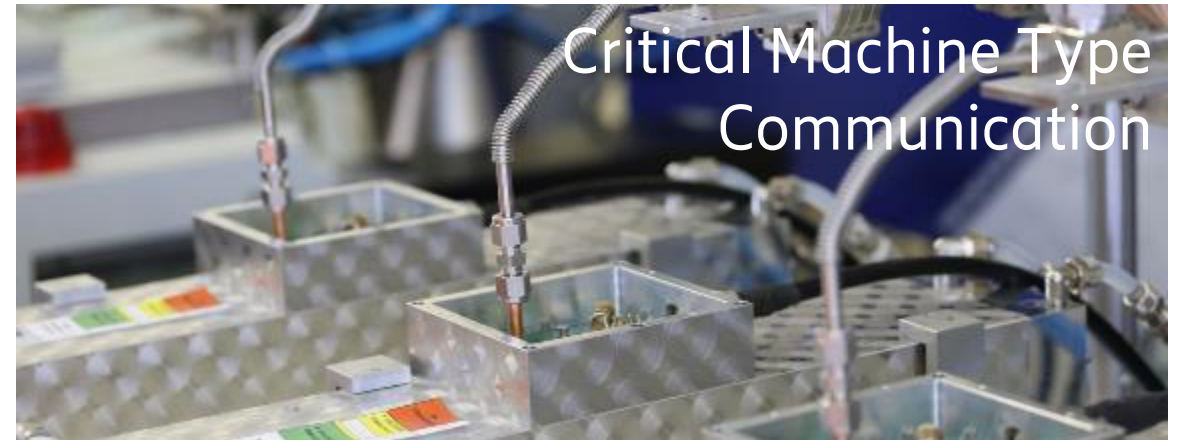
46 5G countries

149 Commercial 5G agreements

9 Standalone live networks

>120K ESS Cells live & counting

5G starting with enhanced MBB and then enabling new evolved IOT use cases

Massive Machine Type Communication

Critical Machine Type Communication

Enhanced Mobile Broadband

First use cases

Fixed Wireless Access

Proofing 5G technology & learning new use cases and requirements

Photo by Boliden

Photo by AstaZero

Photo by SKF

Photo by Scania

5G
For industries
Established 2015

Ericsson Research Initiative:
Pave the way for 5G in industries

Drive 5G requirements, insights and readiness

Covers several industry segments:

Transport, energy, manufacturing, mining, agriculture, …

5G is ready to serve industries

5G standard address industrial requirements

3GPP

Rel-15 includes key URLLC features. Rel-16 enhances IIoT and URLLC. Rel-17 and Rel-18 expand industries

Strong industry fora established

>75

5G-ACIA with >75 members from connected industries and telecom drives requirements and solutions for 5G enabled industries

Key requirements validated

>50

5G requirements validated in >50 industry PoCs with leading industrial partners
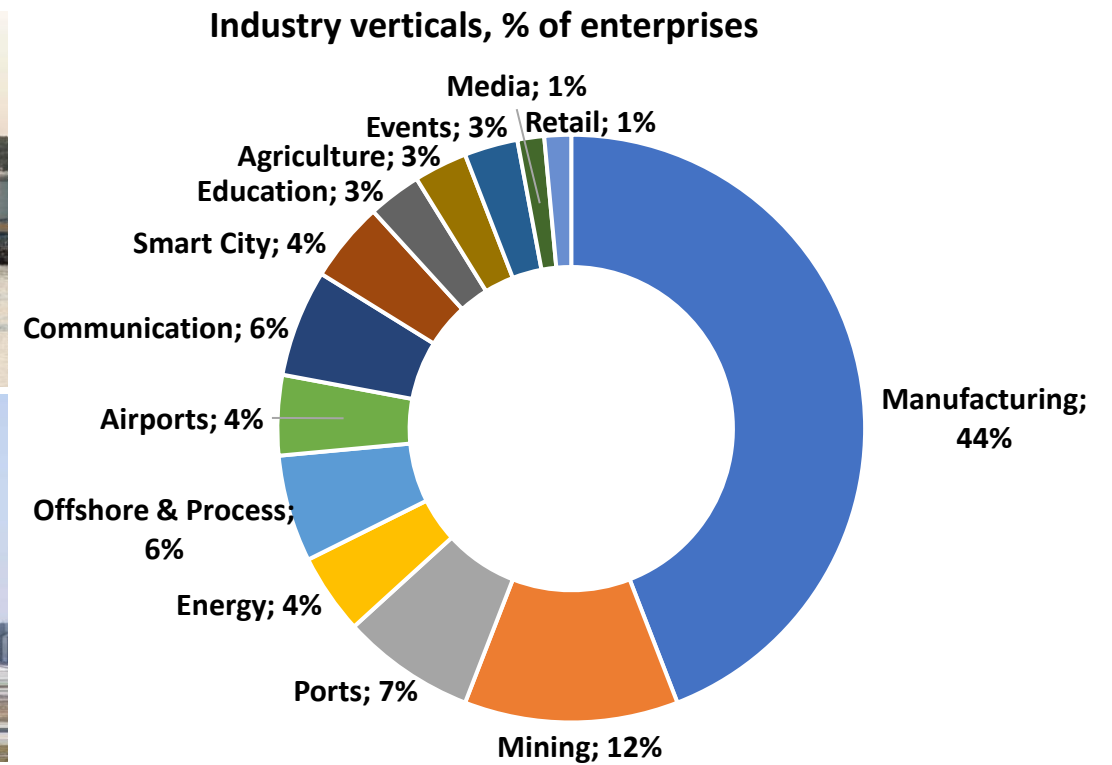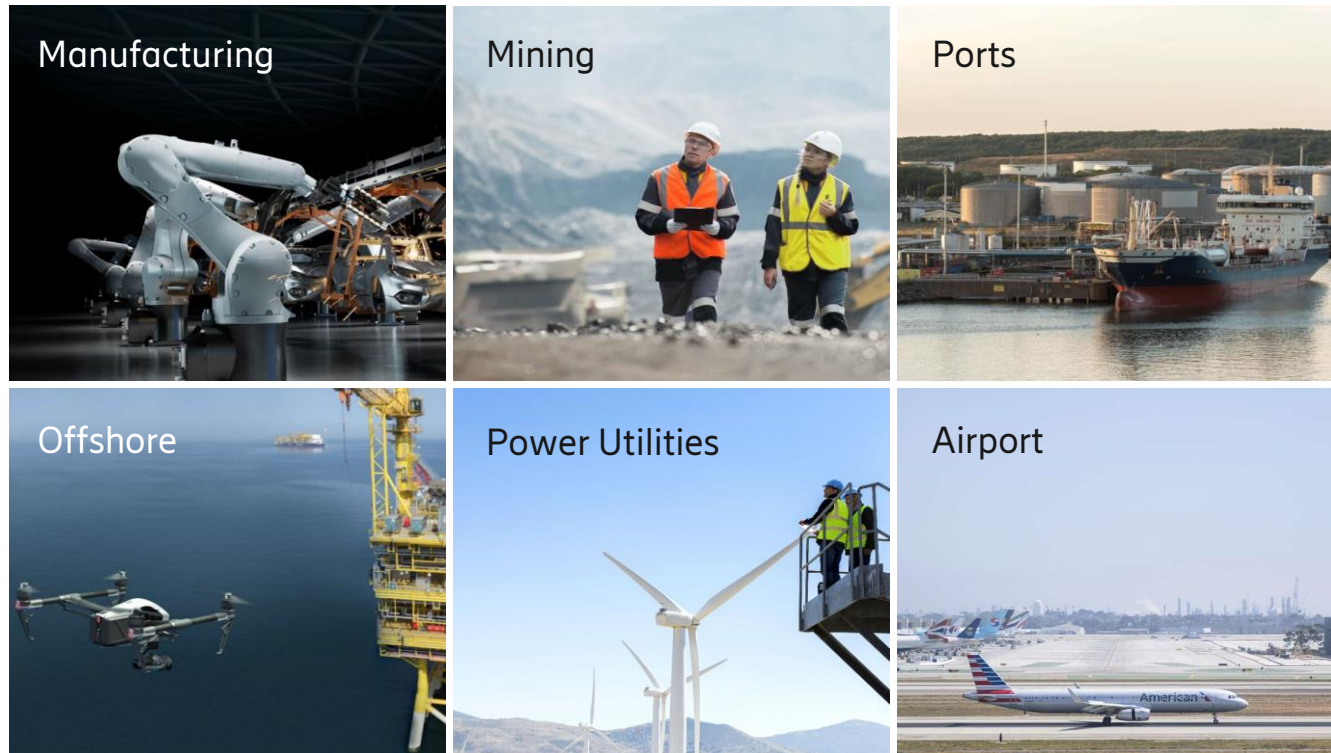
Industrial devices emerging

10+

More than ten 5G modules and devices for industrial use being released during 2021

Industry take-up is broad

Industry take-up is broad, led by Manufacturing with a 5G focus.
Other critical infrastructure industries typically lead with LTE and a focus on connected workers or automation

Manufacturing

Mining

Ports

Offshore

Power Utilities

Airport

Industry verticals, % of enterprises

Media; 1%
Events; 3%
Retail; 1%
Agriculture; 3%
Education; 3%
Smart City; 4%
Communication; 6%
Airports; 4%
Offshore & Process; 6%
Energy; 4%
Ports; 7%
Mining; 12%
Manufacturing; 44%

5G Private Network empower Ericsson Nanjing factory

Won the 2020 ICT China Innovation Award and the 2020 Blooming Cup National Award

Automated manufacturing

More efficient production

Increased quality

5G Drone inventory counting – No.1

5G Cloud AGV

5G surveillance camera

5G AR training

5G industrial computer

5G AR remote assist

Mining use cases

- Exploration and stock inspection
- Fuel sensors and machinery diagnostics
- Precision drilling, blasting and crushing
- Voice communication
- Hazardous zones / breach alert
- Secure operation center and storage
- Real-time location of assets and equipment
- Voice comms and emergency broadcast
- Pyro incident prevention
- Environmental monitoring
- Quantity, location and load monitoring
- Remote control of autonomous vehicles
- Proximity detection and collision avoidance
- Health monitoring and precision tracking

Mining Video

Industry needs

- High reliability and availability
- Low latency
- Easy integration with IT/OT systems
- Easy installation, management, operation and maintenance
- Additional use cases like positioning, edge cloud
- Coverage at multiple sites
- Local survivability
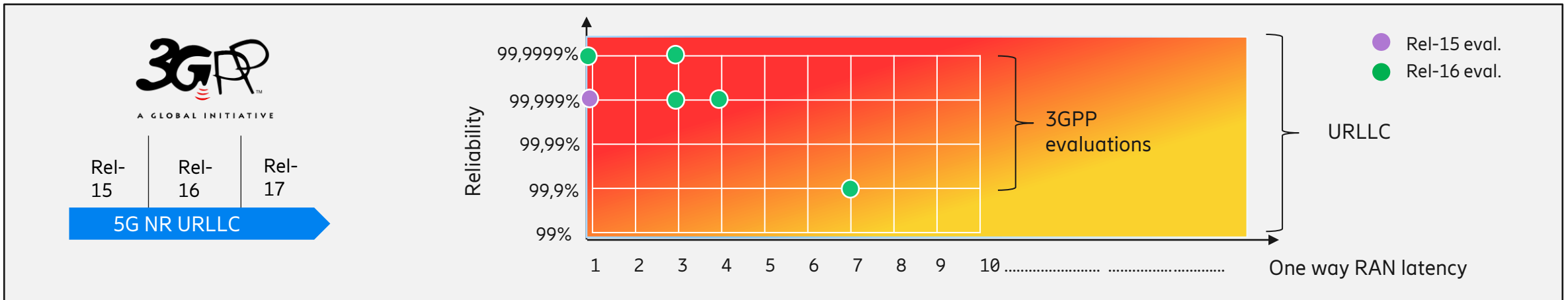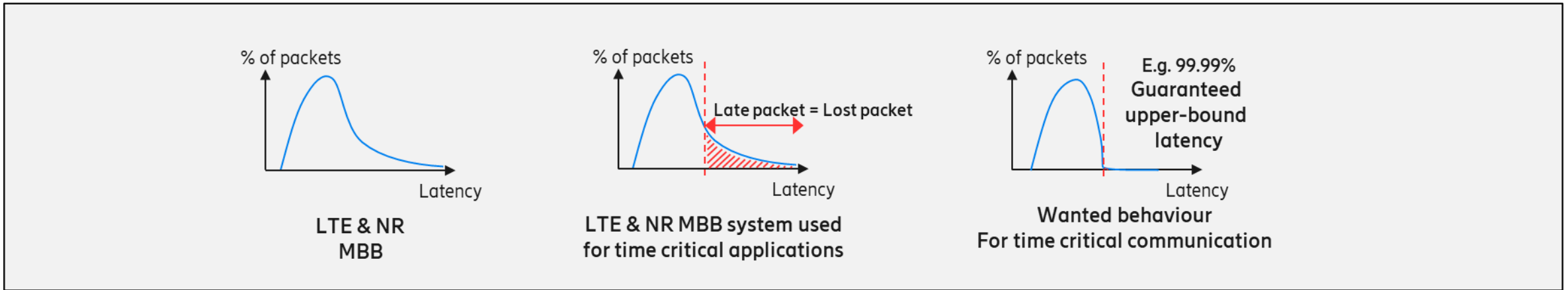- High security and privacy
- Data stays local

Manufacturing

Mining

Ports

Offshore

Power utilities

Airport
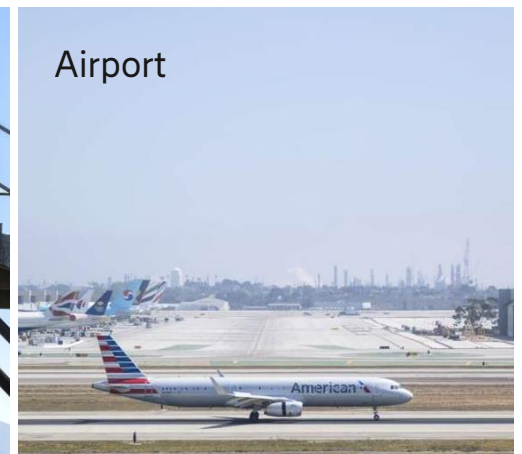
Time-Critical Communication

Data delivery within specific latency bounds with required guarantee levels*

% of packets

Latency

LTE & NR MBB

% of packets

Late packet = Lost packet

Latency

LTE & NR MBB system used for time critical applications

% of packets

E.g. 99.99% Guaranteed upper-bound latency

Latency

Wanted behaviour For time critical communication

3GPP
A GLOBAL INITIATIVE

Rel-15 | Rel-16 | Rel-17

5G NR URLLC

Reliability

99,9999%
99,999%
99,99%
99,9%
99%

1 2 3 4 5 6 7 8 9 10 ....

One way RAN latency

3GPP evaluations

URLLC

● Rel-15 eval.
● Rel-16 eval.

NR was standardized for MBB & URLLC from day one. Some URLLC features were specified in a URLLC work item but URLLC is not limited to the URLLC WI-specified features.

*Reliability: The probability of delivering a message within a specified time duration. [3GPP]

3GPP 5G standard addresses industrial needs

Rel-15

Key URLLC (Ultra Reliable Low Latency) features
- First 5G release
- Key features for low latency and high reliability

Rel-16

Industrial IoT
- Support for IEEE time sensitive networking (TSN)
- Non-public network enhancements, positioning, time-sync

Rel-17

Efficiency and scale
- Enhanced efficiency and capacity for URLLC
- Improvements for positioning and time sync

Rel-18

Expand use cases (Ericsson view)
- Addressing AR/VR, remote control, media production
- Ultra reliability for high bitrate applications

Deployment and Spectrum

Three main deployment options for local network coverage

A. Using public network

Network slicing

Macro RAN coverage or on-prem RAN

B. Hybrid network (integrated with MNO network)
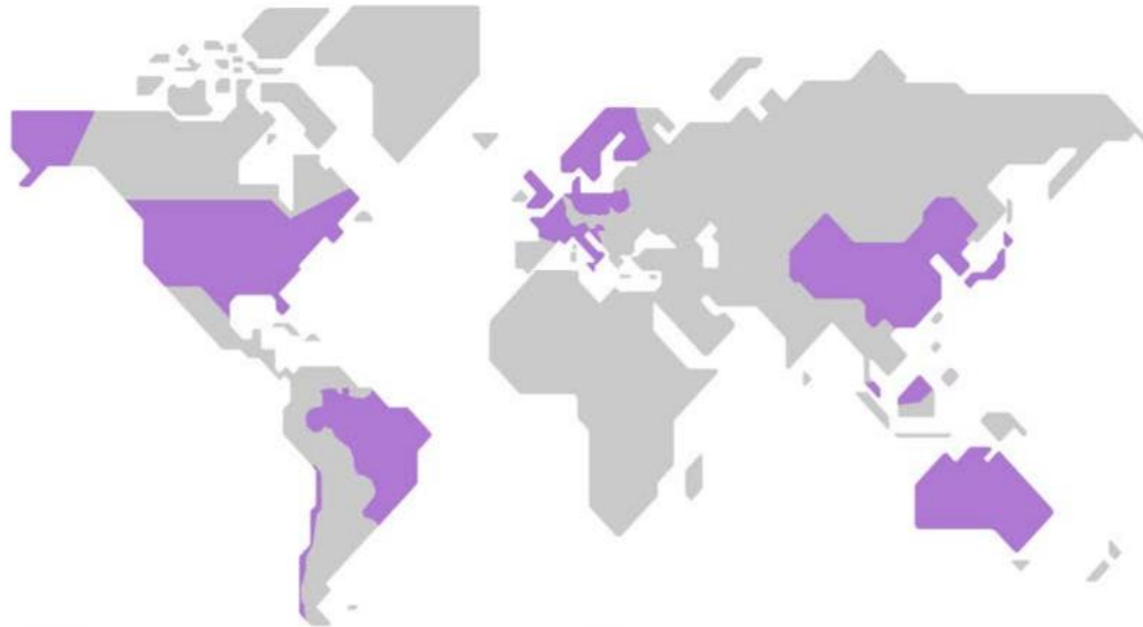
Local breakout

On-premise user plane and RAN
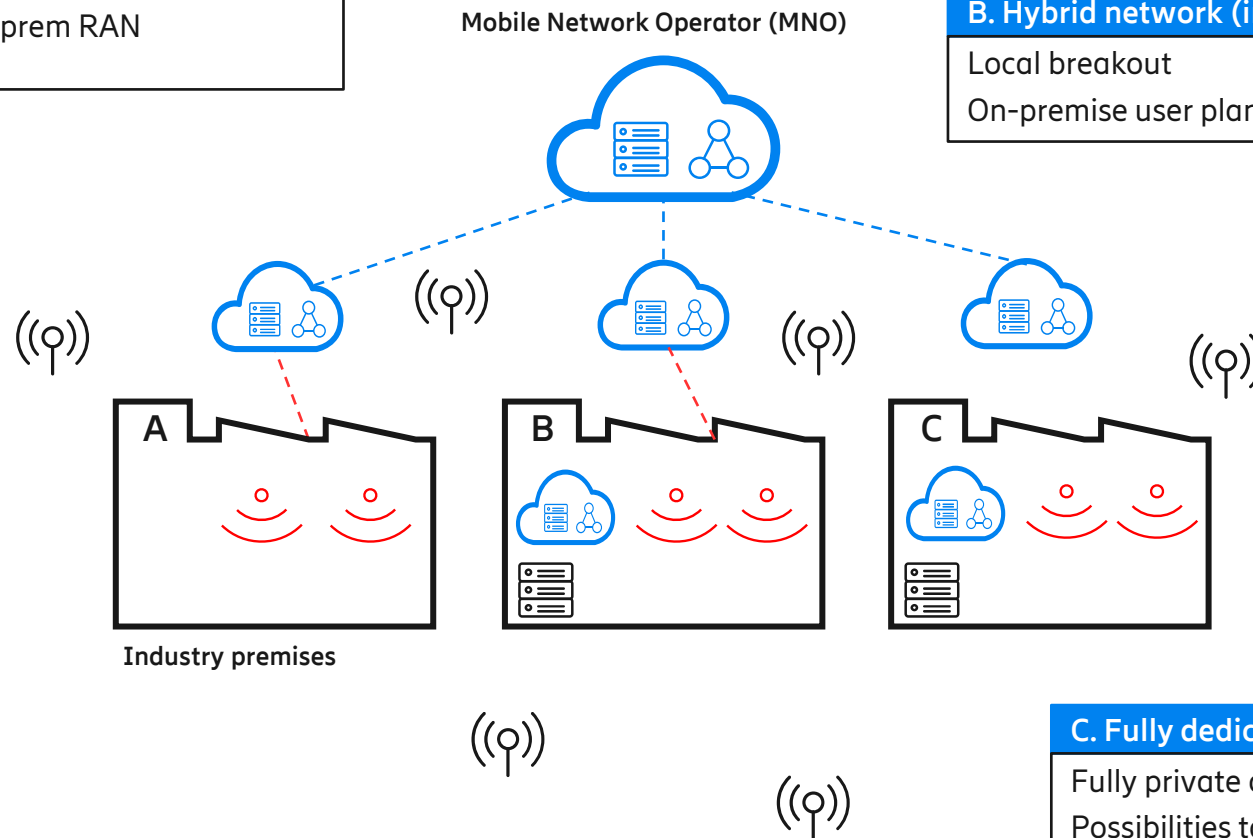
C. Fully dedicated network

Fully private on-premise network

Possibilities to integrate with public network

Mobile Network Operator (MNO)

A

B

C

Industry premises

Industry Spectrum raises the attention of industry

Mid band
Chile, China, Croatia, Czech Republic, Denmark, Finland, France, Germany, Japan, Netherlands, Norway, Poland, Sweden, UK, US

High band, mmW
Australia, Brazil, Croatia, Finland, Germany, Hong Kong, Italy, Japan, Malaysia, Republic of Korea, Sweden, UK

https://www.ericsson.com/en/reports-and-papers/white-papers/5g-spectrum-for-local-industrial-networks

3 ways for industries to access wireless spectrum

1. Managed service from mobile operator

2. Lease spectrum from mobile operator

3. Local dedicated spectrum (assigned by regulator)
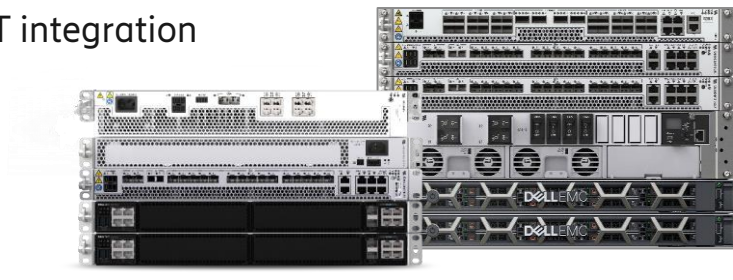
Ericsson Private 5G

Ericsson Private 5G

Pre-packaged

Scalable for all network sizes

Plug-and-play

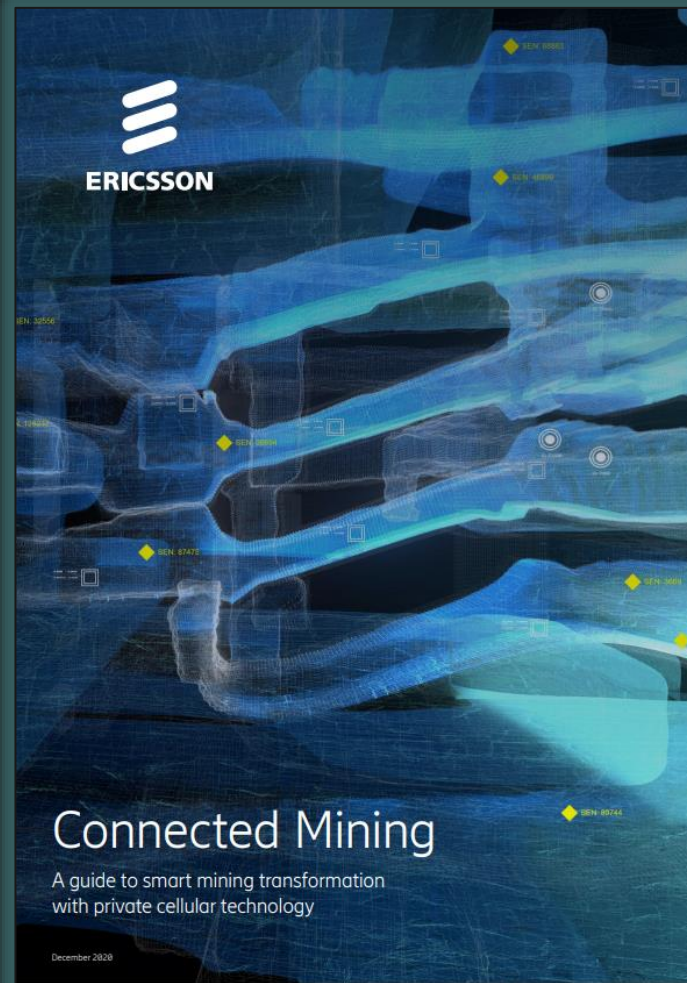Life-cycle management over-the-air

Open APIs for IT integration

Macro radio
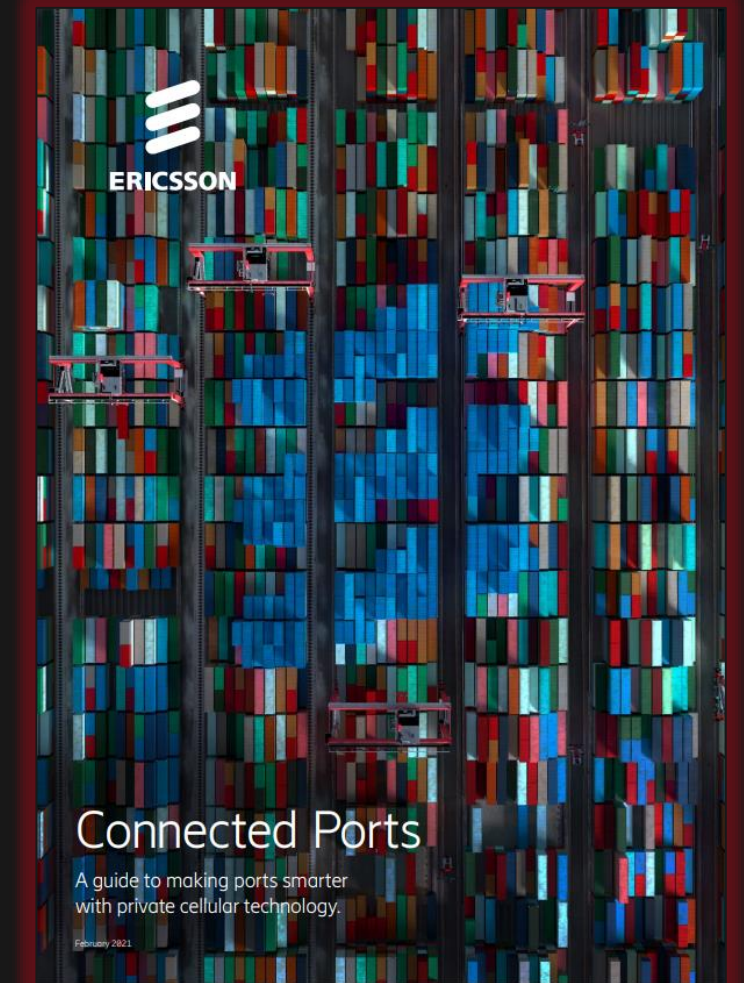
Micro radio

Radio dot

AIR

S L
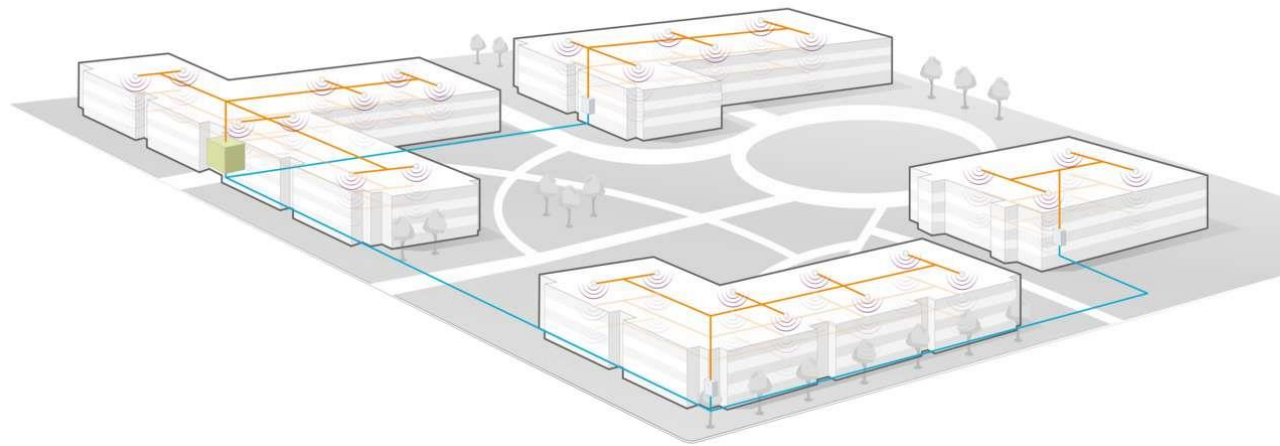
5G for Industry 4.0 narratives

Ericsson Connected Manufacturing report

A guide to smart mining transformation with private cellular technology (ericsson.com)

A guide to making ports smarter with private cellular technology - Ericsson