

5G for the Industry – how to make most of the opportunities

IMI 2019

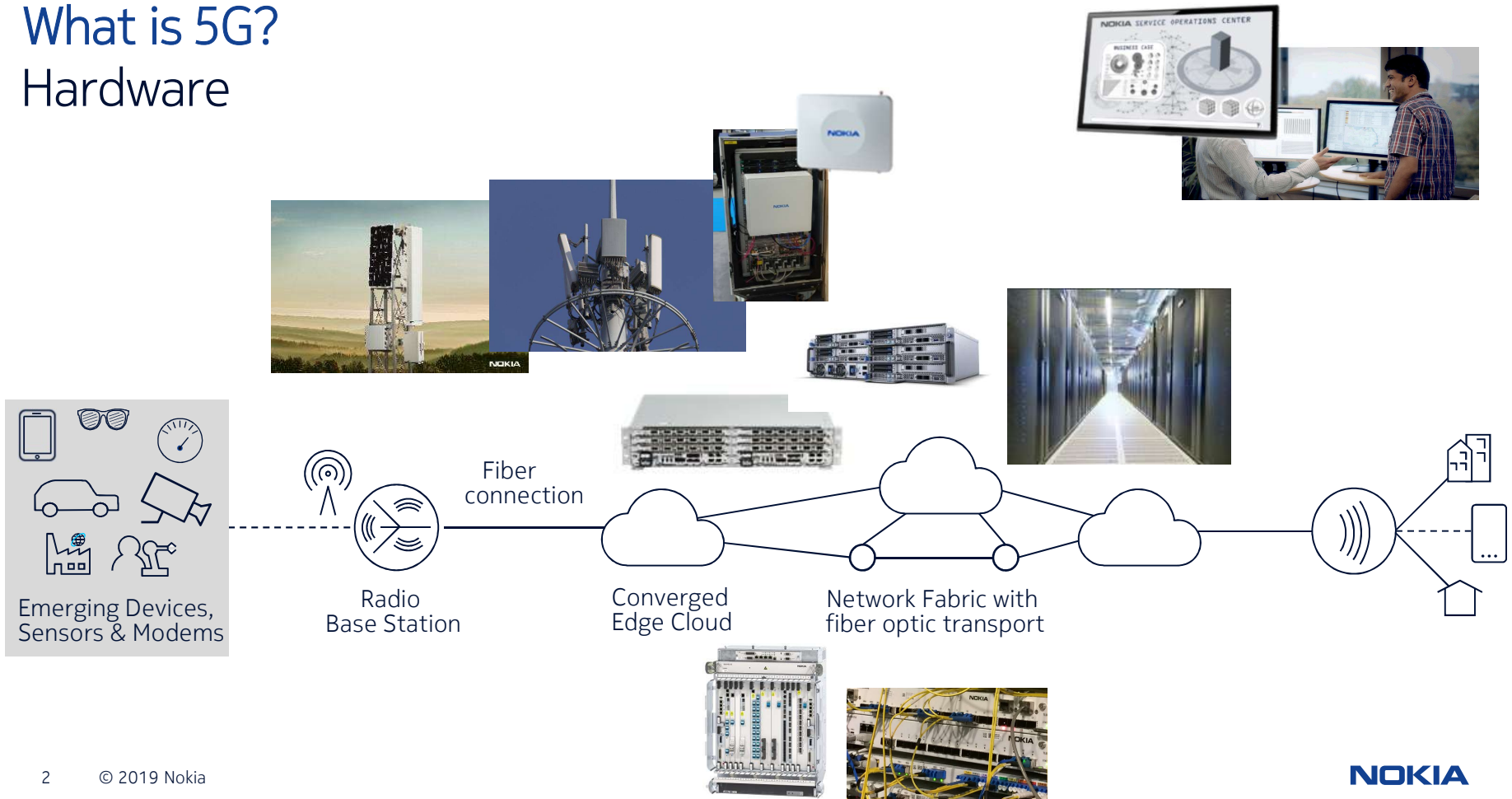
Mannheim

Sigurd Schuster, 20.11.2019

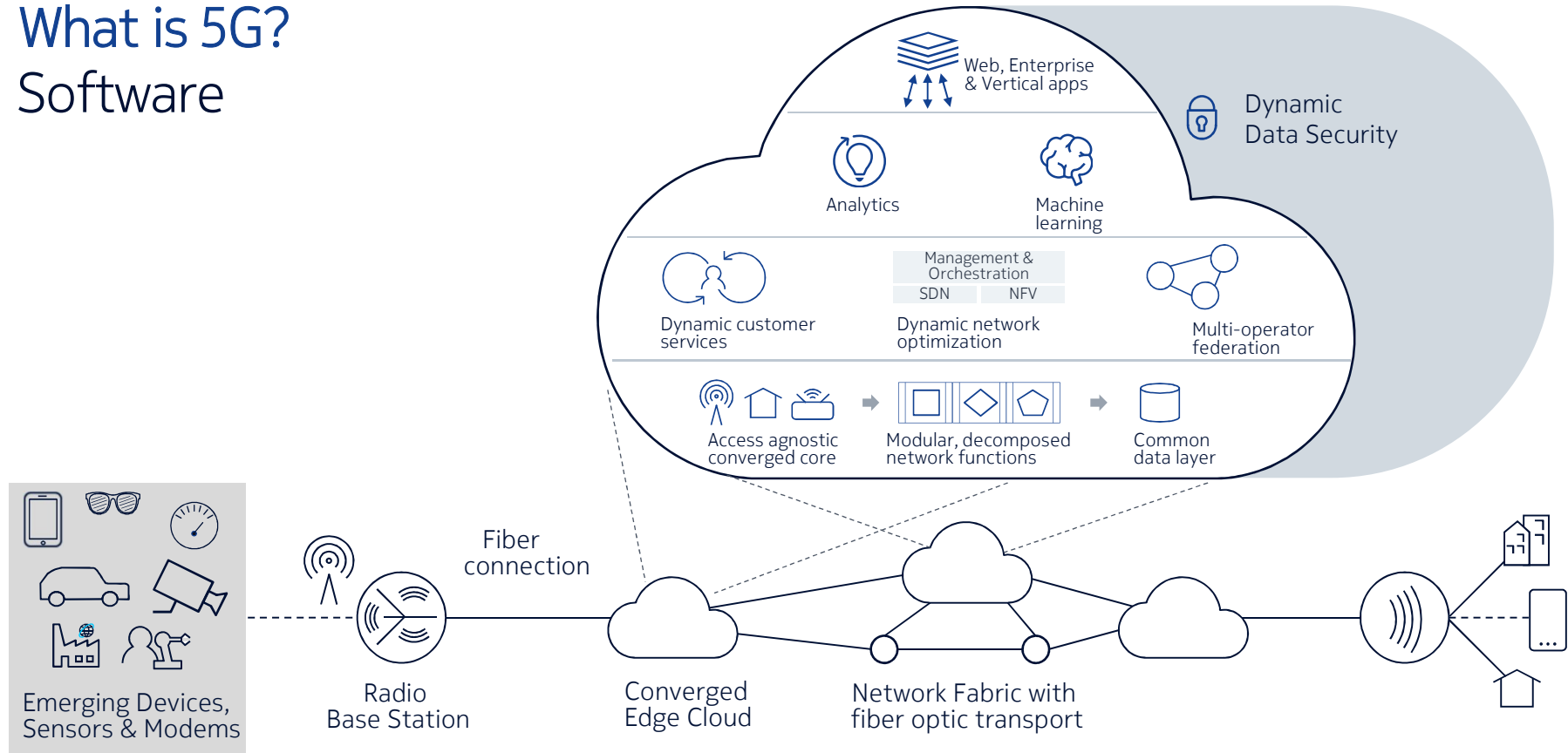


NOKIA

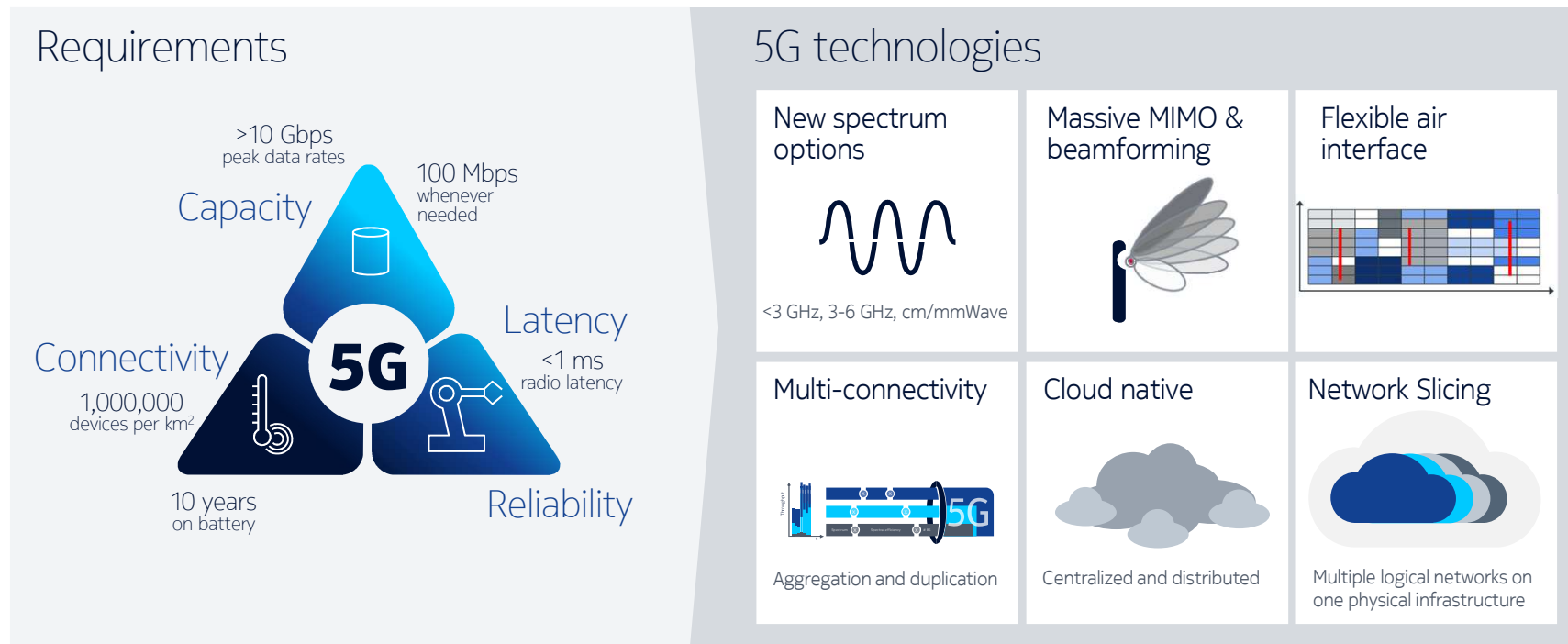
What is 5G? Hardware



What is 5G? Software



5G requirements and key technology building blocks



5G opens new opportunities

	Today	2020-25
Users	10M people	+100M 'things'
Speed	100 Mbps	100x faster
Latency	>>10 ms	10x less
Network service level	Best effort for all	Committed SLAs
Logical networks	1	Many (slices)

Use cases (examples)



Smart home



Mobile gaming



Industry 4.0



Connected cars



Drones



IoT wearables

Today up to 90% of data not collected in industrial campuses

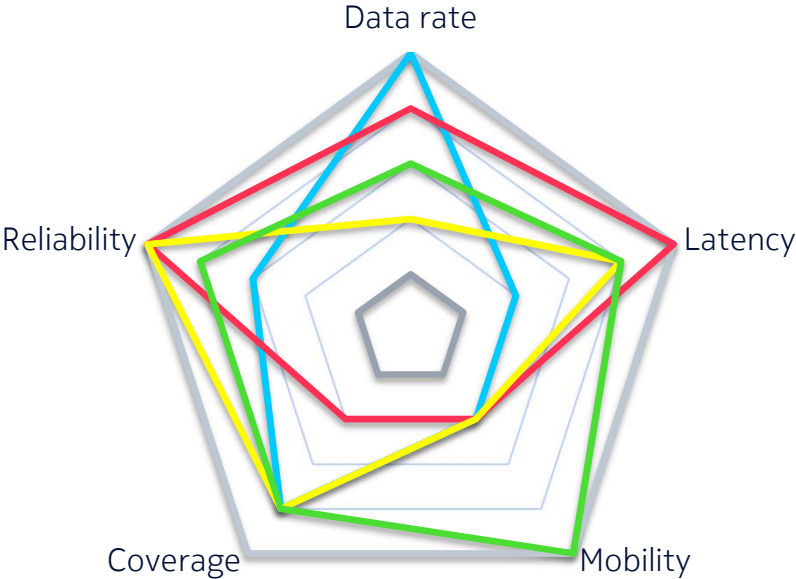
AUTOMATION: You can't control, digitalize and act upon what you do not observe...



Reliable wireless connectivity critical for 4th industrial revolution

New use cases have vastly diverging requirements

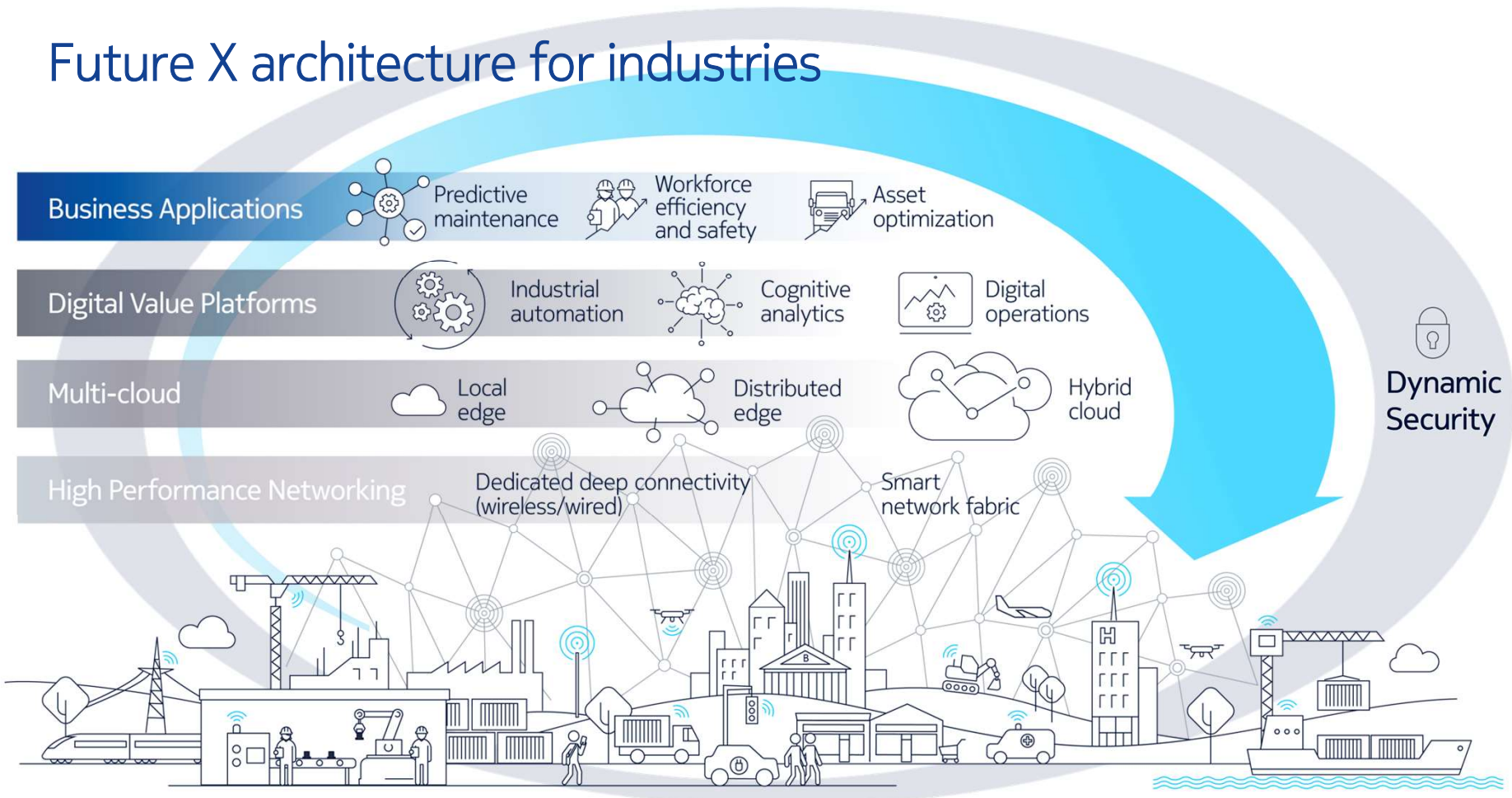
Network related requirements (IoT type examples)



Source: Münchner Kreis

- Minimum
- Maximum
- Augmented Reality
- Robot control
- Process engineering
- Autonomous Driving

Future X architecture for industries

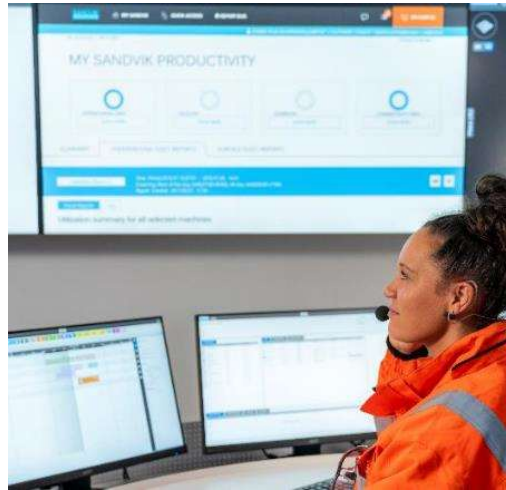


Energy, Mining and Logistics use cases

Increase efficiency of operation and maintenance



Wind park maintenance



IoT for mining operations



Port 4.0 automation

Industry use cases

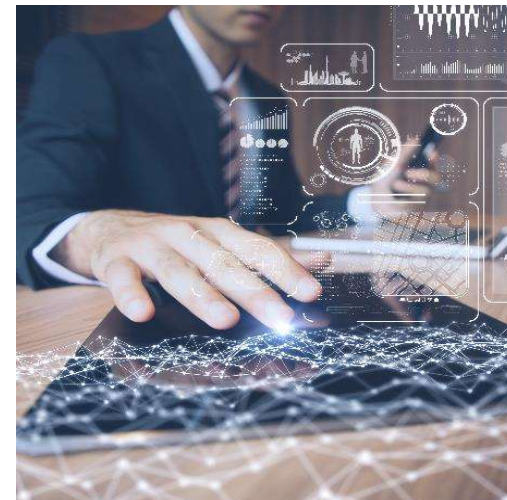
Gain flexibility and better quality while reducing cost



Flexible radio base station
factory



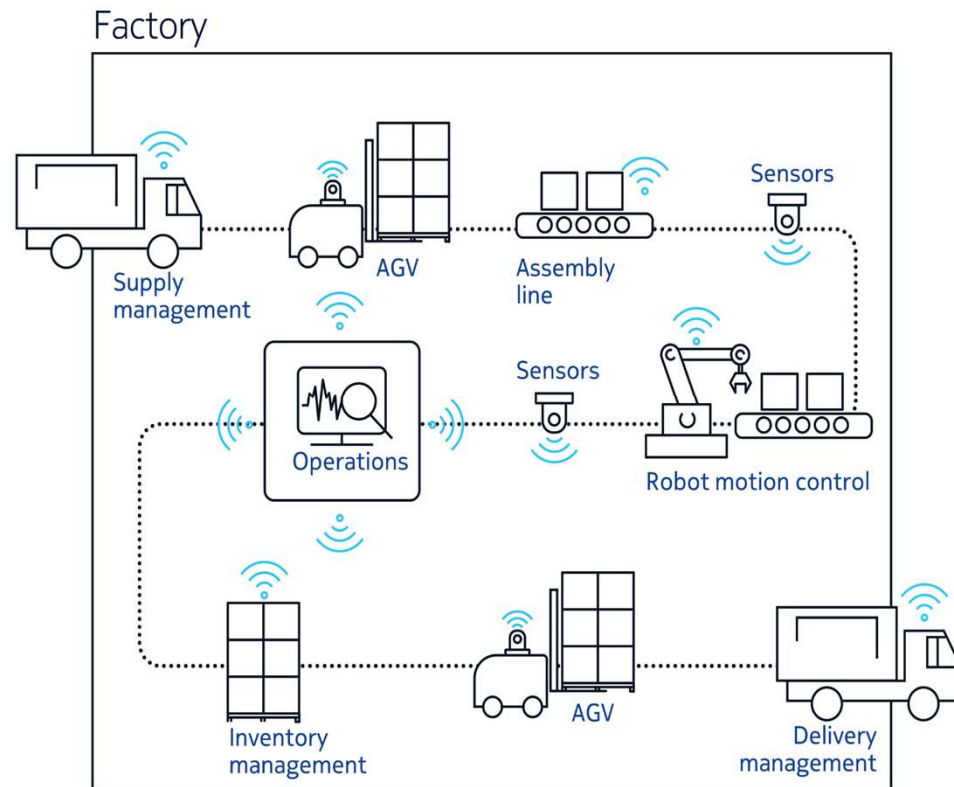
IoT equipped tools



Mobile handheld
inspection system

Factory of the future example use cases

- **Getting rid of wires** for fast reconfiguration – job lot size of one
- Supply management with real-time **asset tracking**
- Autonomous **on-campus distribution**
- Closed-loop remote **motion control** of robots
- **Digital twin** and **automation**
- **Firmware and software updates**
- **Quality assurance**







Proper wireless technology needs to be selected

Reliability, availability, security and performance requirements





Business-driven communications
Day-to-day communications

Broadband	on trains and in stations
	in passenger terminals to the skies
	in smart city hotspots
All enterprise and verticals normal business communications	

Business-critical communications
Operational efficiency, security, business innovation

Control systems	Mining  Mine operations
	Airport  Airport operations
	Oil rig  On-shore platform Off-shore production
	Factories  Workforce Machines

Mission-critical communications
Lives at risk
Potential for major environmental disaster

Train control	
Public safety services	
Power plant and grid control	
Critical M2M communication	

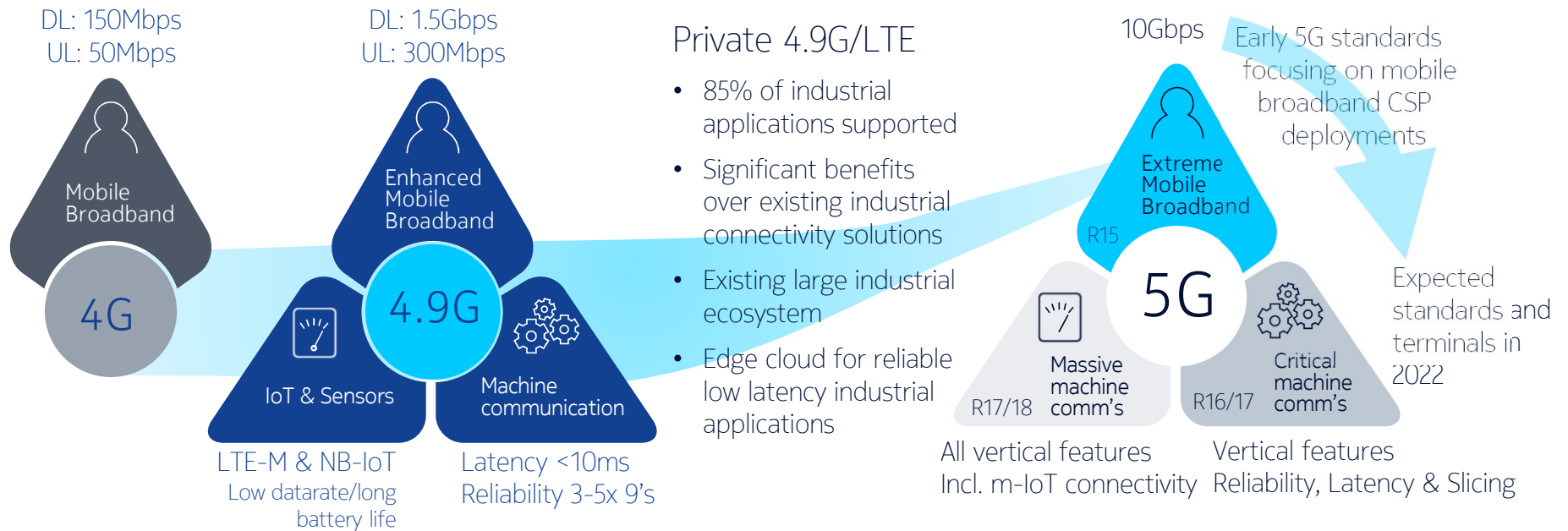
Increasing levels of guaranteed reliability, availability, security and performance

Wi-Fi

3GPP radio technologies (4G/LTE or 5G)

Start digitalizing and automating operations with private 4.9G/LTE

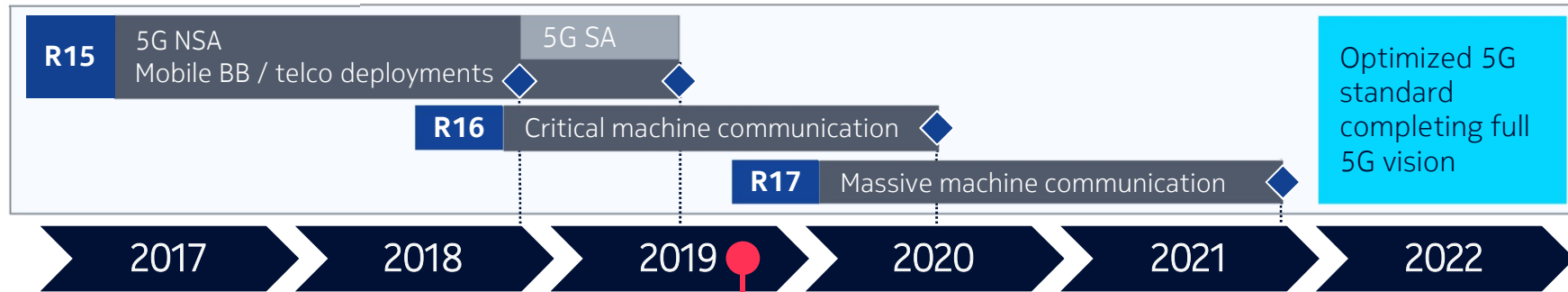
Prepare for 5G industrial use cases



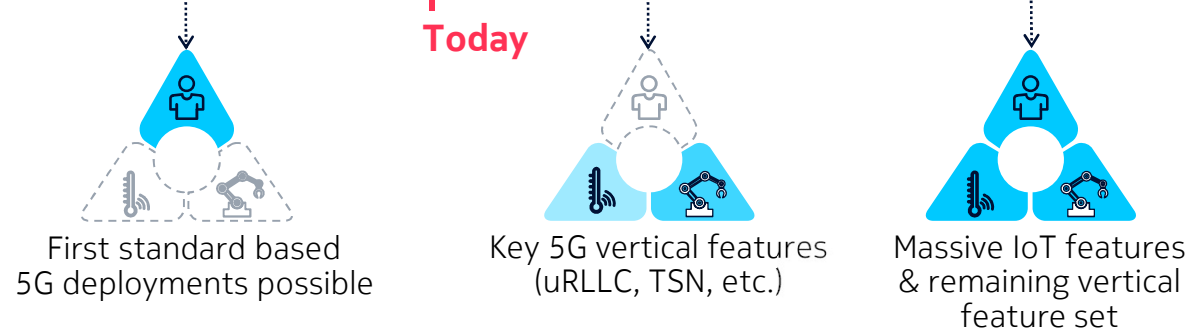
3GPP standardization timeline for 5G in three releases until 2021

Early 5G deployments with R15, vertical capabilities in R16 and R17

5G standards roadmap

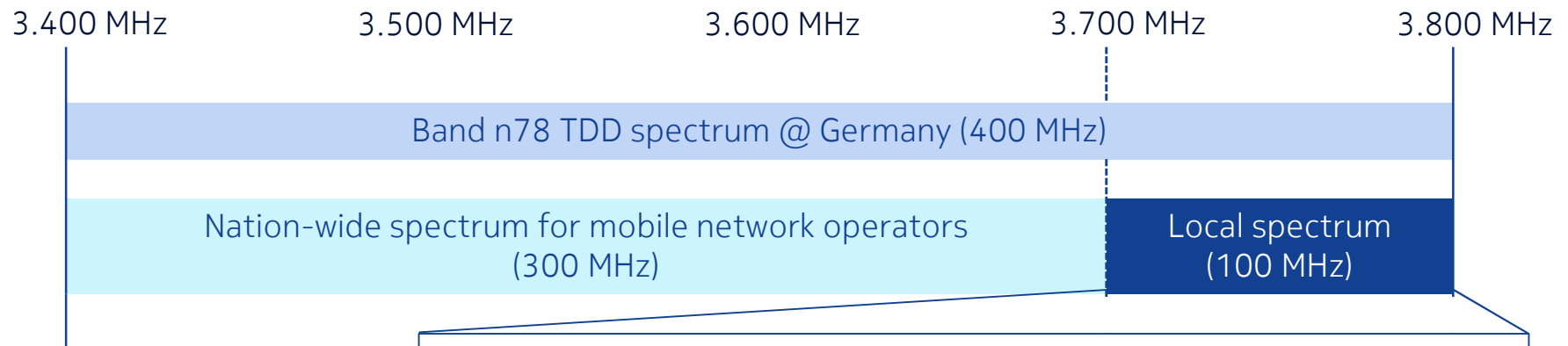


5G industry roadmap



5G spectrum @ band n78 in Germany

Dedicated enterprise spectrum for private campus networks



■ ■ ■ Deutsche Telekom

vodafone

Telefonica

1&1 DRILLISCH

Federal Network Agency (BNetzA) – Expected Terms & Conditions:

- 5G license bound to the property, i.e. ownership, rental or lease
- License term of minimum 10 years, max. prolongation until end of 2040
- “Use-it-or-loose-it” principle after 1 year
- Fees contain administration and governance components
- Start of the application process for enterprises in 2H / 2019
- Spectrum divided in 10 MHz blocks, but full 100 MHz can be allocated
- Bilateral alignment with neighbors in case of frequency interferences

Private wireless business models options

3 approaches to suit all requirements

Stand-Alone Private LTE/5G

Deployed in enterprise
Managed by enterprise



Core



Management

Private wireless as-a-service

Hybrid cloud powered
architecture

Automated edge
apps deployment &
Customer portal



CSPaaP / CSP Slicing

Hosted by mobile operator



Core



Management

Enterprise premises

LTE/5G Small Cells



Edge Cloud

Applications, Local break-out
& core functions subset





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