NOKIA

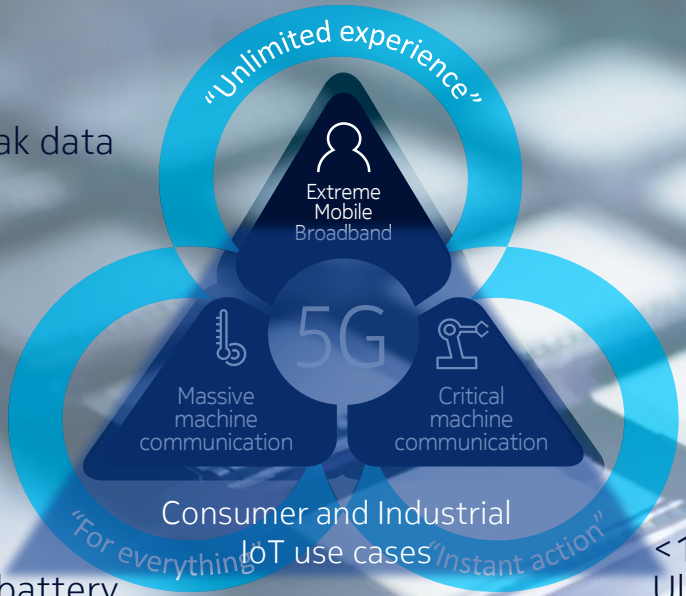
5G for Industrial IoT

Dr. Kimmo Kettunen
Senior Architect
Nokia Bell Labs

© 2018 Nokia

5G Future X
Unleashing the 5G potential

x10k traffic
>10Gbps peak data



10 years on battery
1M devices/km2

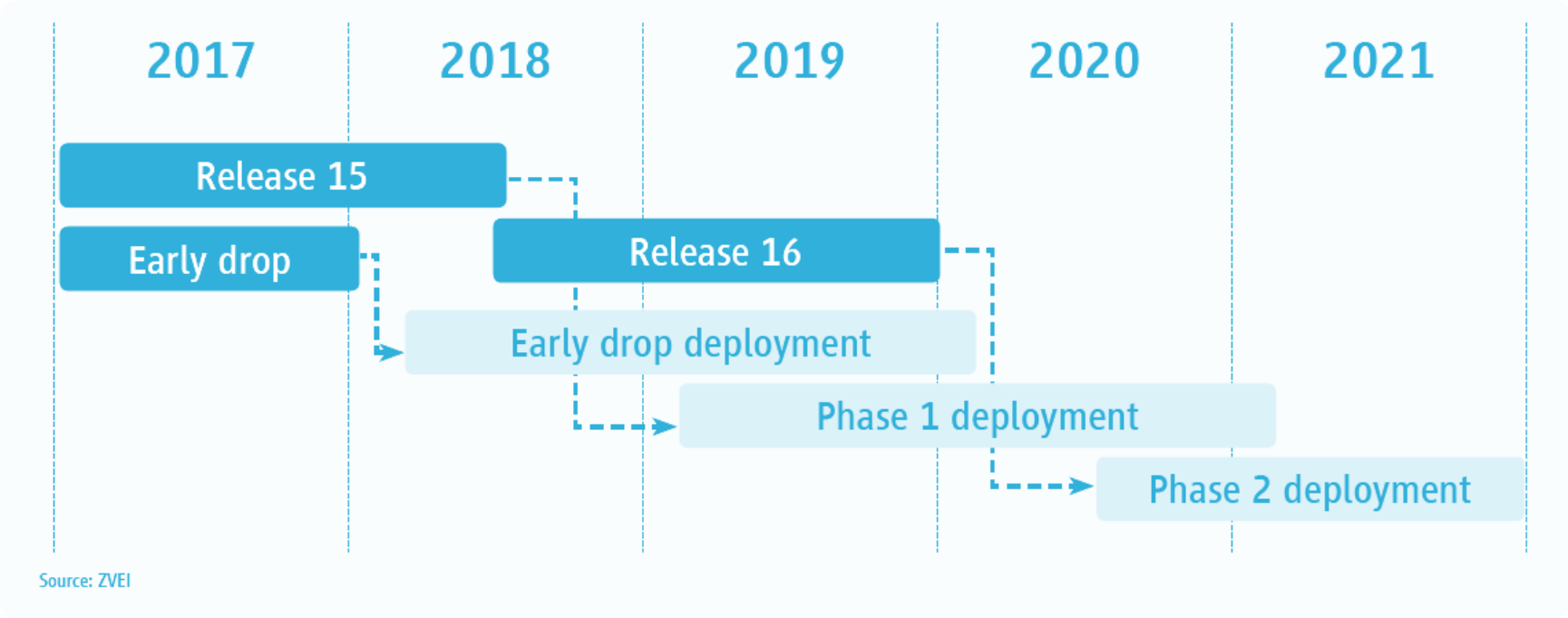
<1ms latency
Ultra reliability

Optimization focus
Bit/s/Hz/m2/joule/$

Architecture design
Cloud native
Scalable
Automated
AI driven
Open

© 2018 Nokia
NOKIA

5G timeline in 3GPP

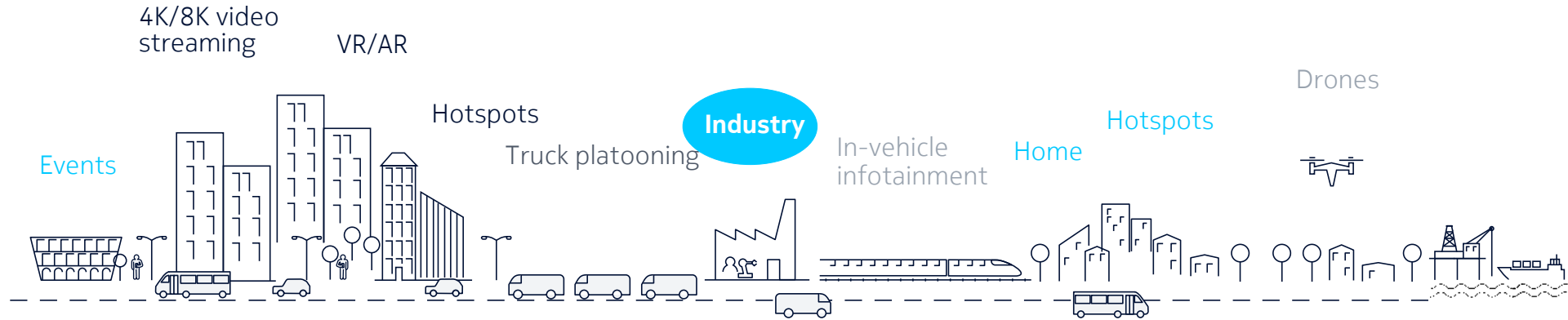


Source: ZVEI

© 2018 Nokia

5G early market use cases

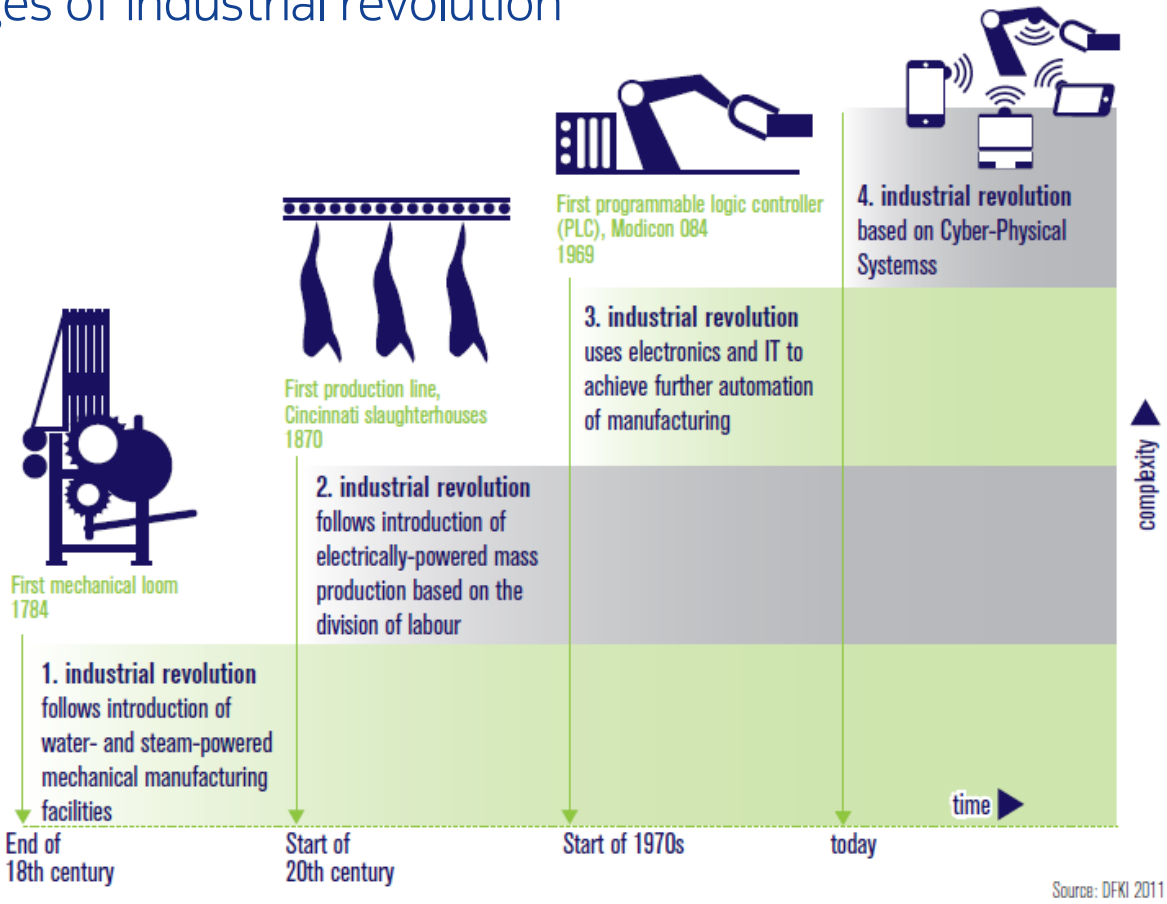
Dense city area use cases	Highway use cases	Public transport and safety	Dedicated use cases



Powerful Efficient Intelligent Flexible

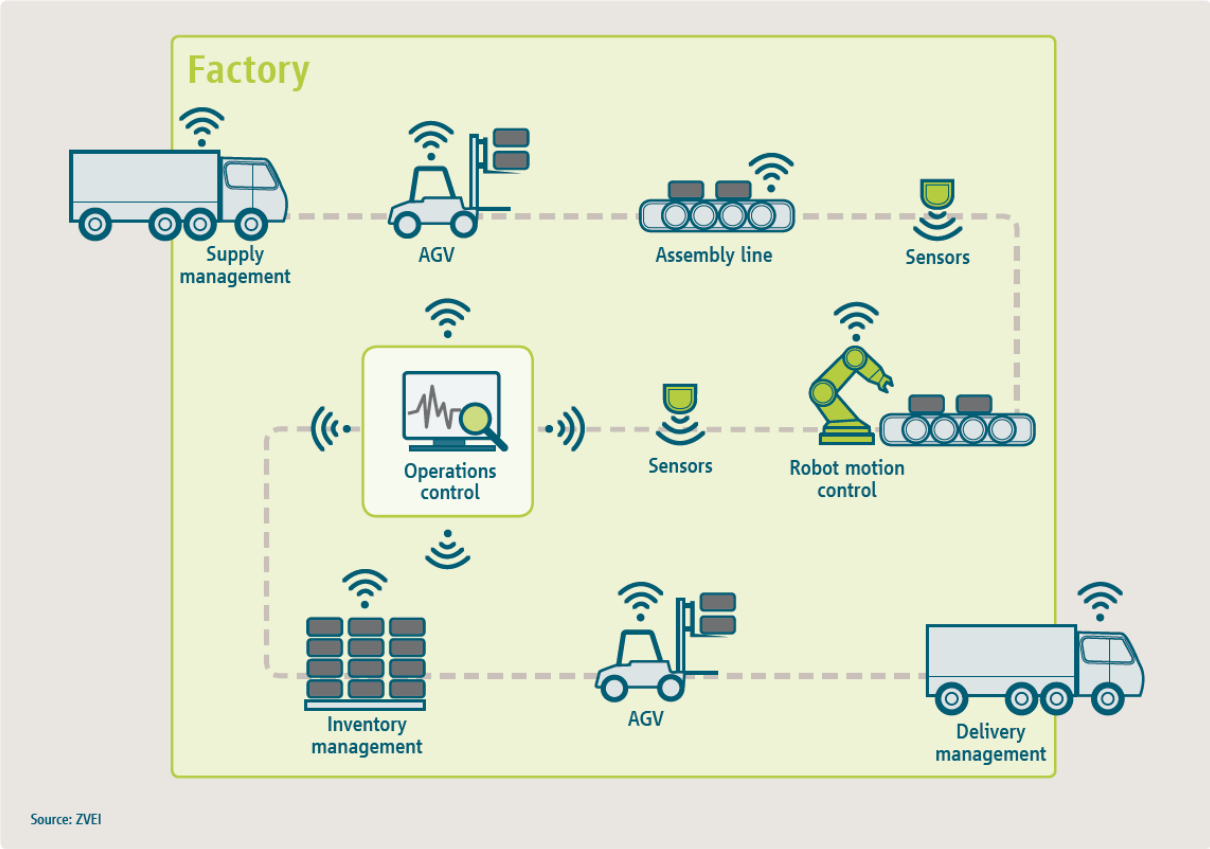
© 2018 Nokia
NOKIA

The four stages of industrial revolution
Industry 4.0



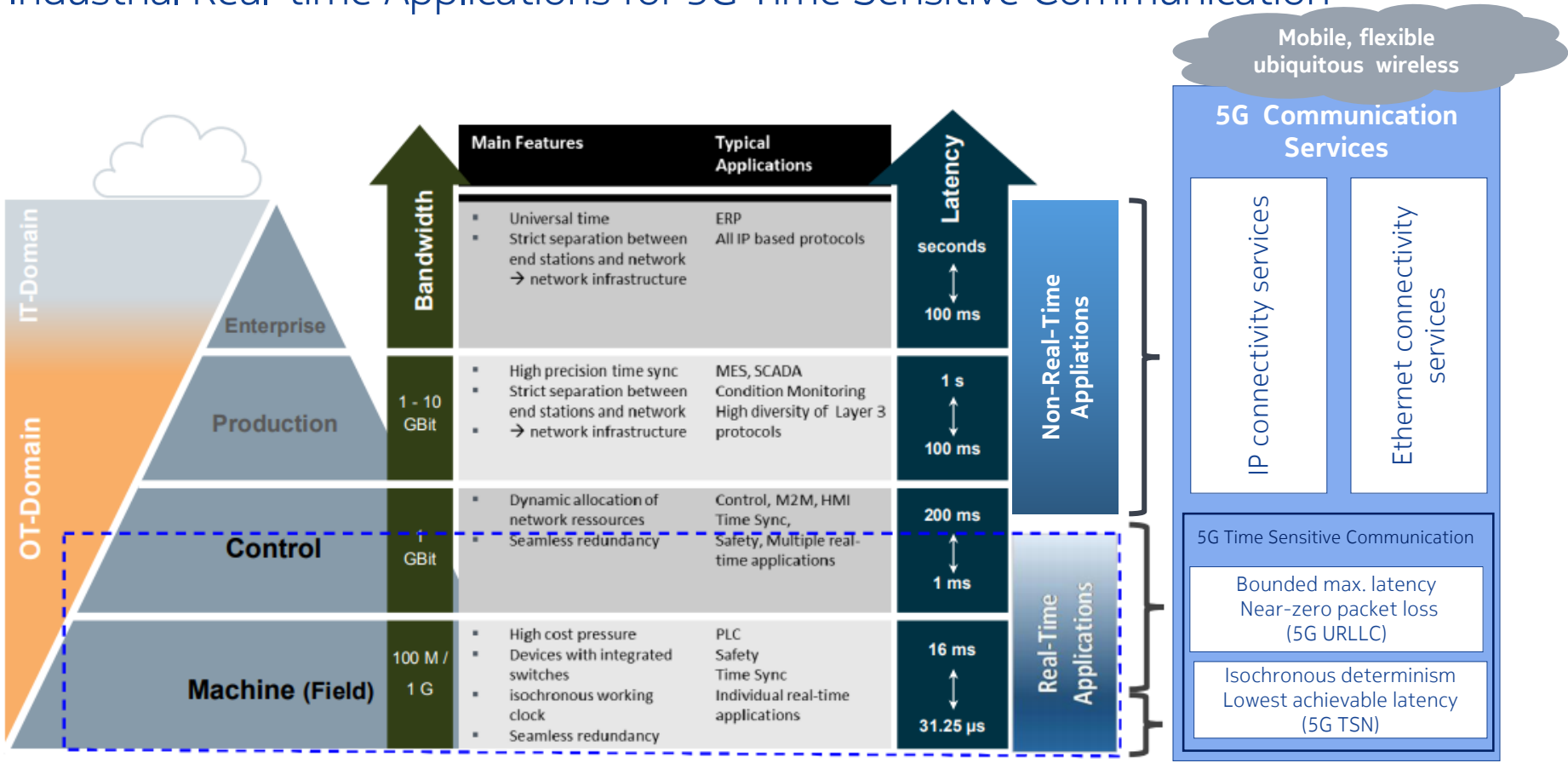
© 2018 Nokia

Example application areas of 5G in the factory of the future (5G-ACIA)



© 2018 Nokia

Industrial Real-time Applications for 5G Time Sensitive Communication

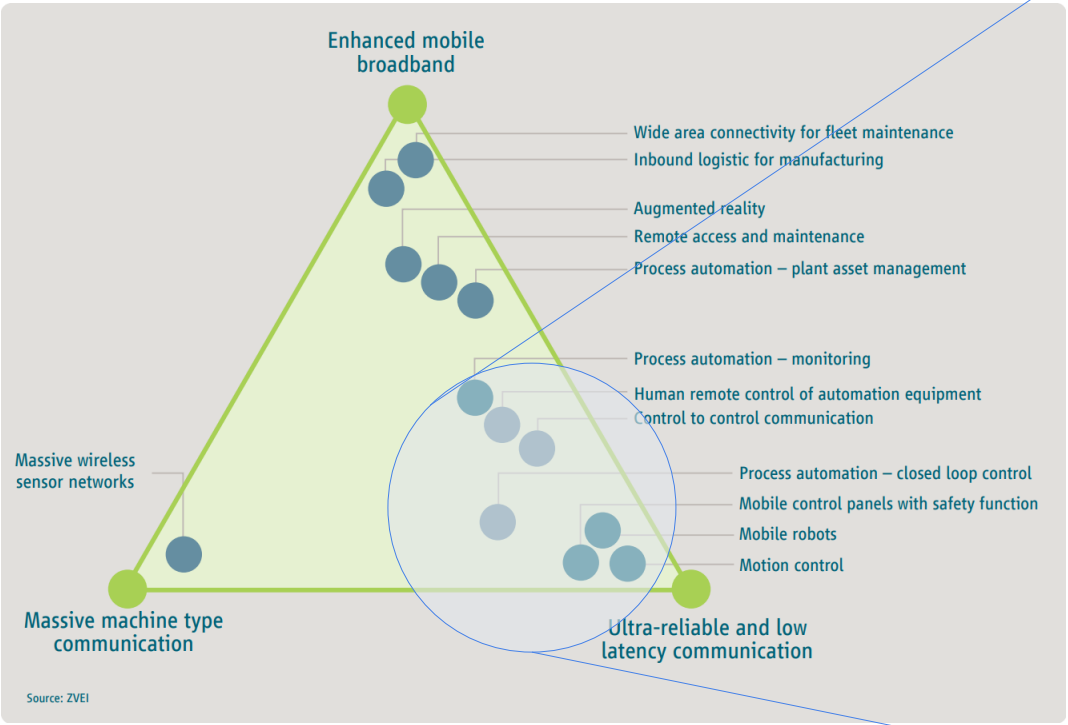


© 2018 Nokia

Adapted from: http://ieee802.org/1/files/public/docs2017/tsn-chen-RAP-whitepaper-0917-v01.pdf

NOKIA

Selected industrial use cases for 5G Time Sensitive Communication



High level use case		Indicative value of wireless and mobility
Motion control	Printing machine	+
	Machine tool	+
	Packaging machine	++
Mobile robots	Cooperative motion control	+++
	Video-operated remote control	+++
Mobile control with safety function	Assembly robots or milling machines	+++
	Mobile cranes	+++
Process automation closed loop control		+
Human remote control		++
Process automation monitoring		+

© 2018 Nokia

NOKIA