5G for people and things
Key to the programmable world

Instituto Superior Técnico
24as Palestras sobre Comunicações Móveis

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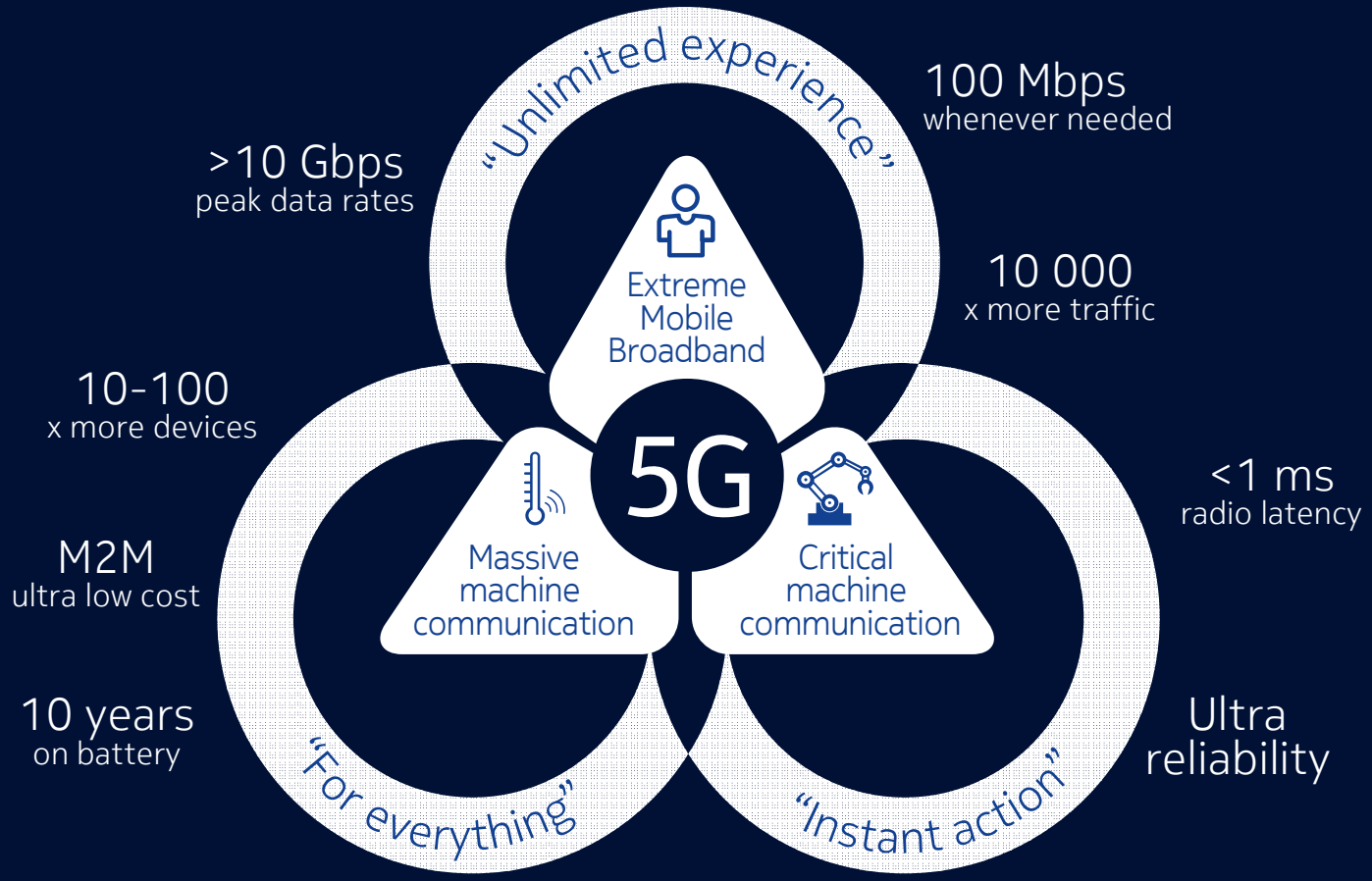
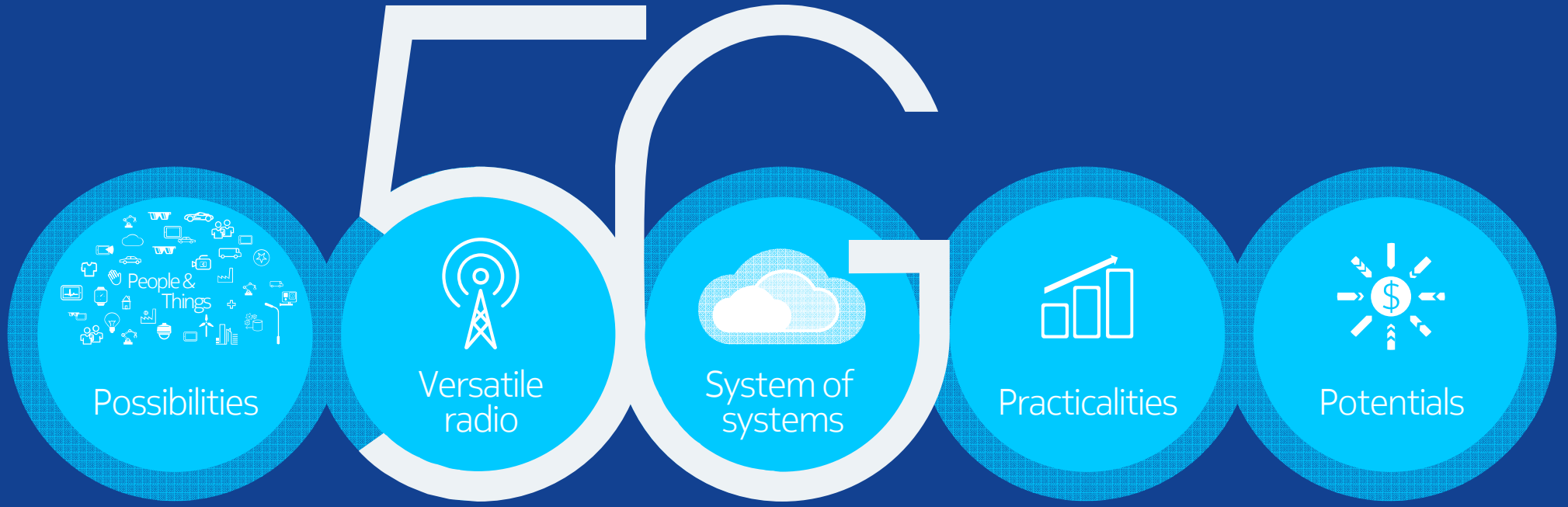
2016.05.18

5G will change the world





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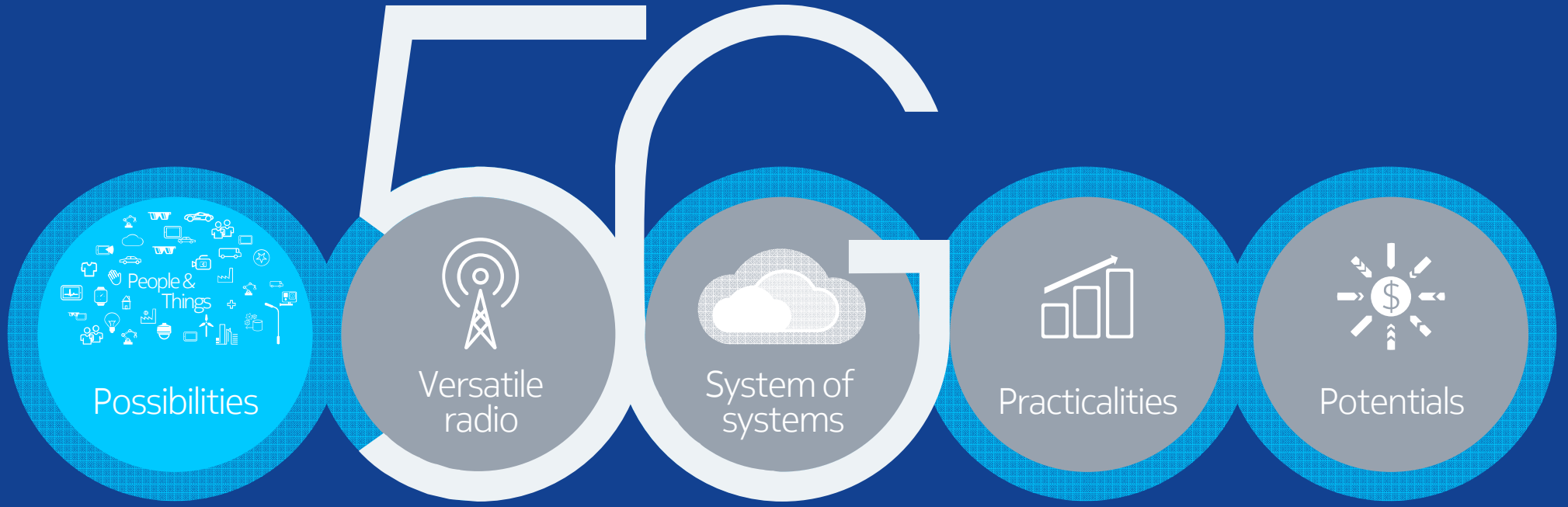

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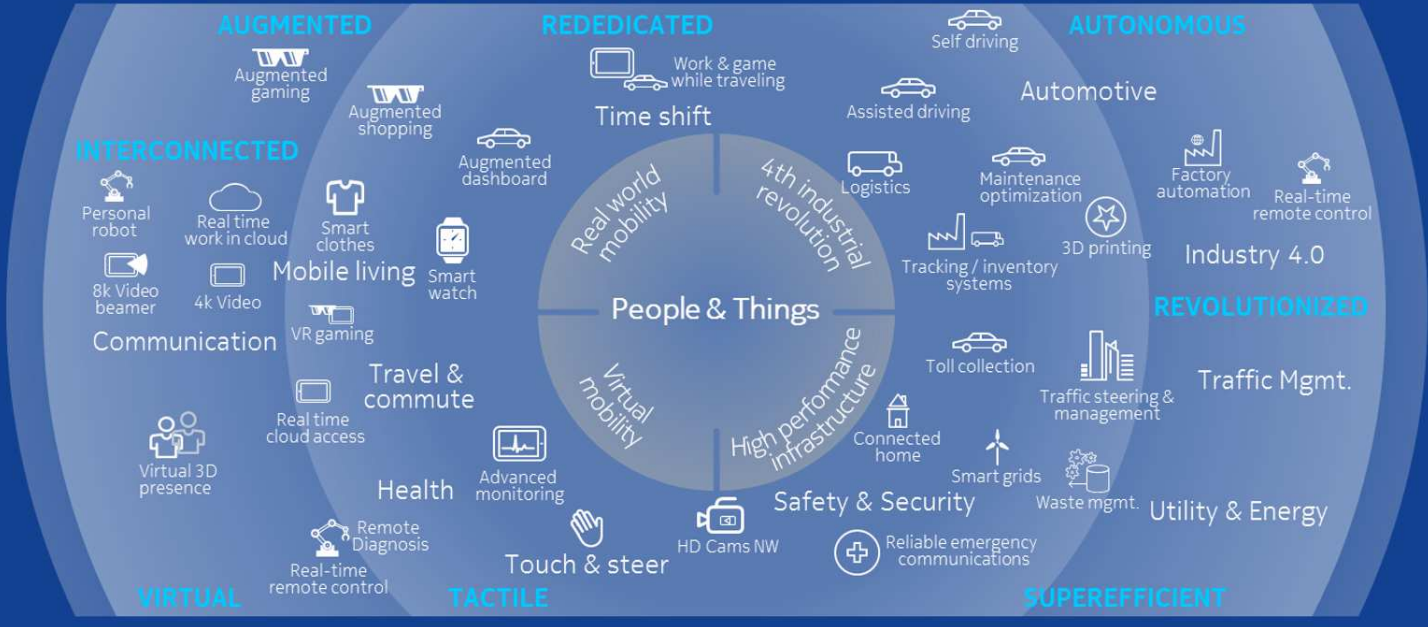
Explosion of possibilities: new performance levels of people and things



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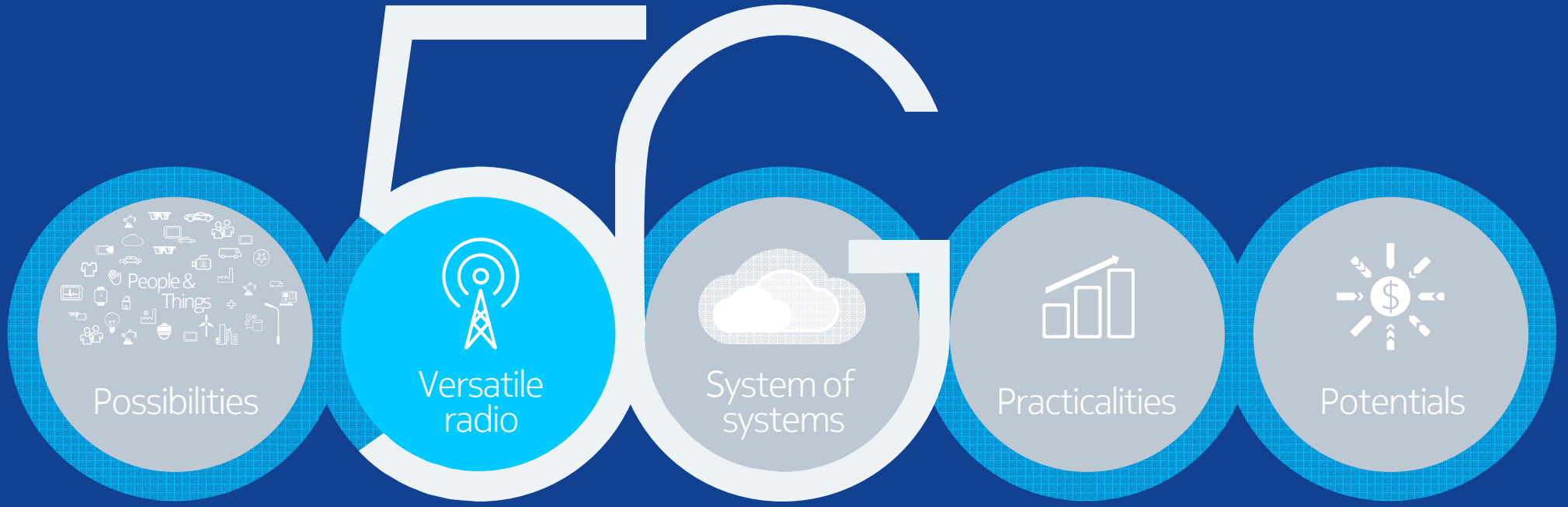

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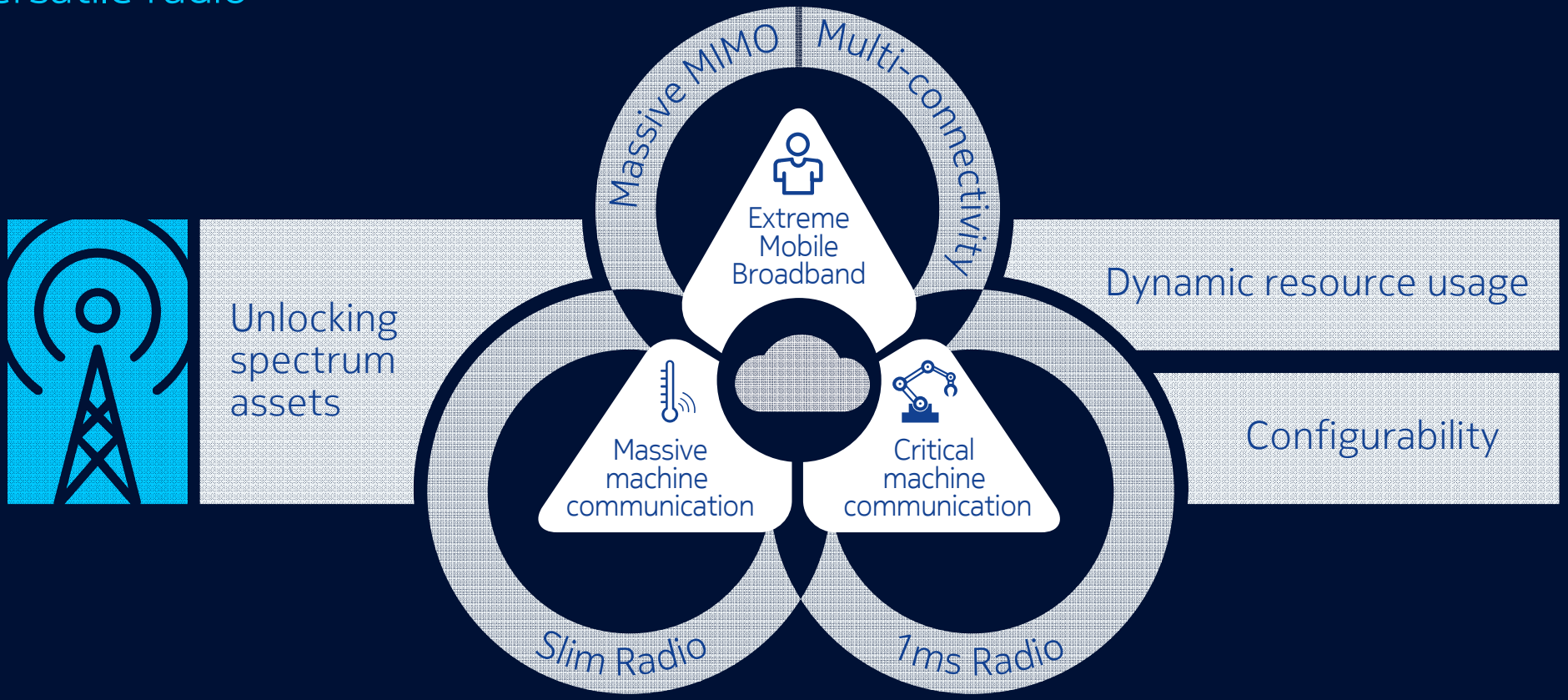
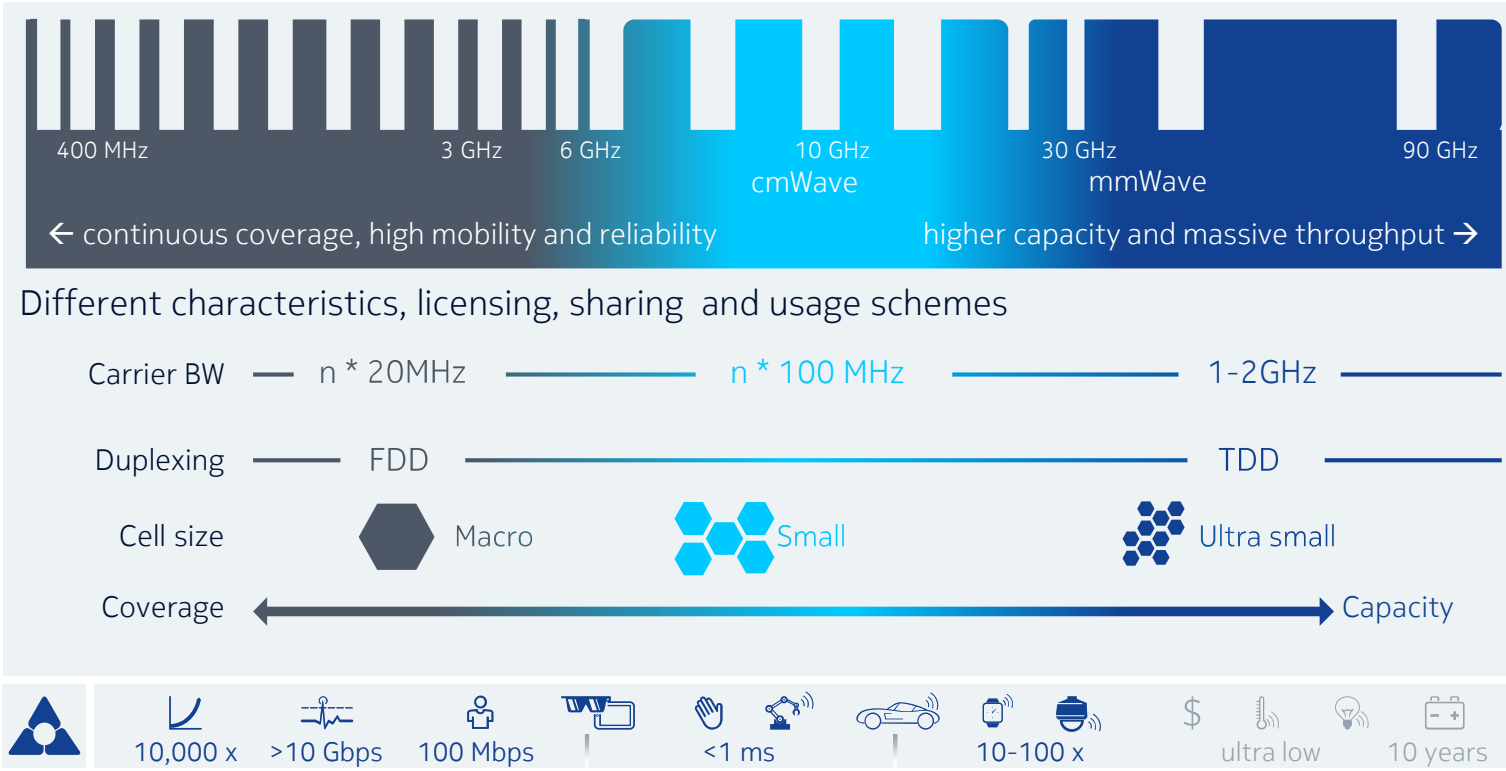
Versatile radio



Unlocking new spectrum assets | Foundation for 5G

Leveraging all bands , ranging from ~400MHz - 100GHz



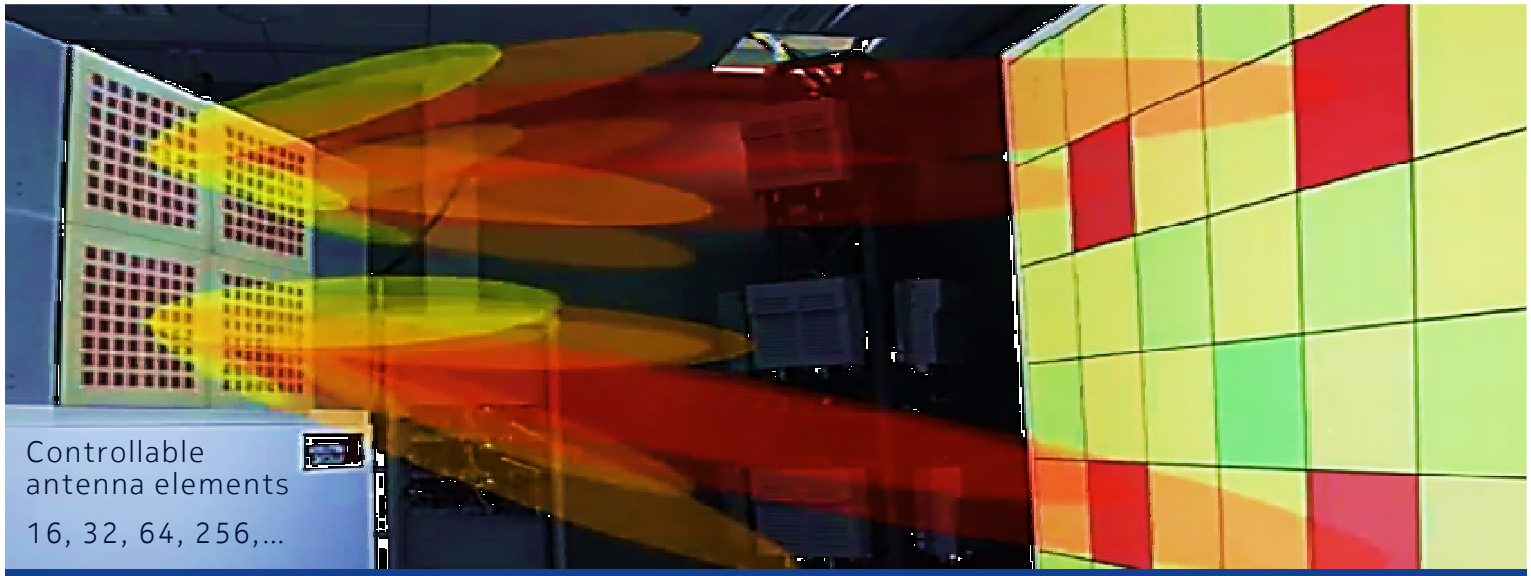
Leading METIS I & II spectrum work package

Pre-commercial
73GHz system,
15Gbps over 2GHz

World's 1st trials
on shared spectrum access

Native massive MIMO | Let the capacity follow the demand

Chip-scale antennas, high beamforming & multiplexing gain



Exploiting high frequency bands with chip scale antenna array research
→ Compensating path loss with high antenna gain

10,000 x | >10 Gbps | 100 Mbps | <1 ms | 10-100 x | ultra low | 10 years

700%
Cell edge gain

+80%
Spectral efficiency

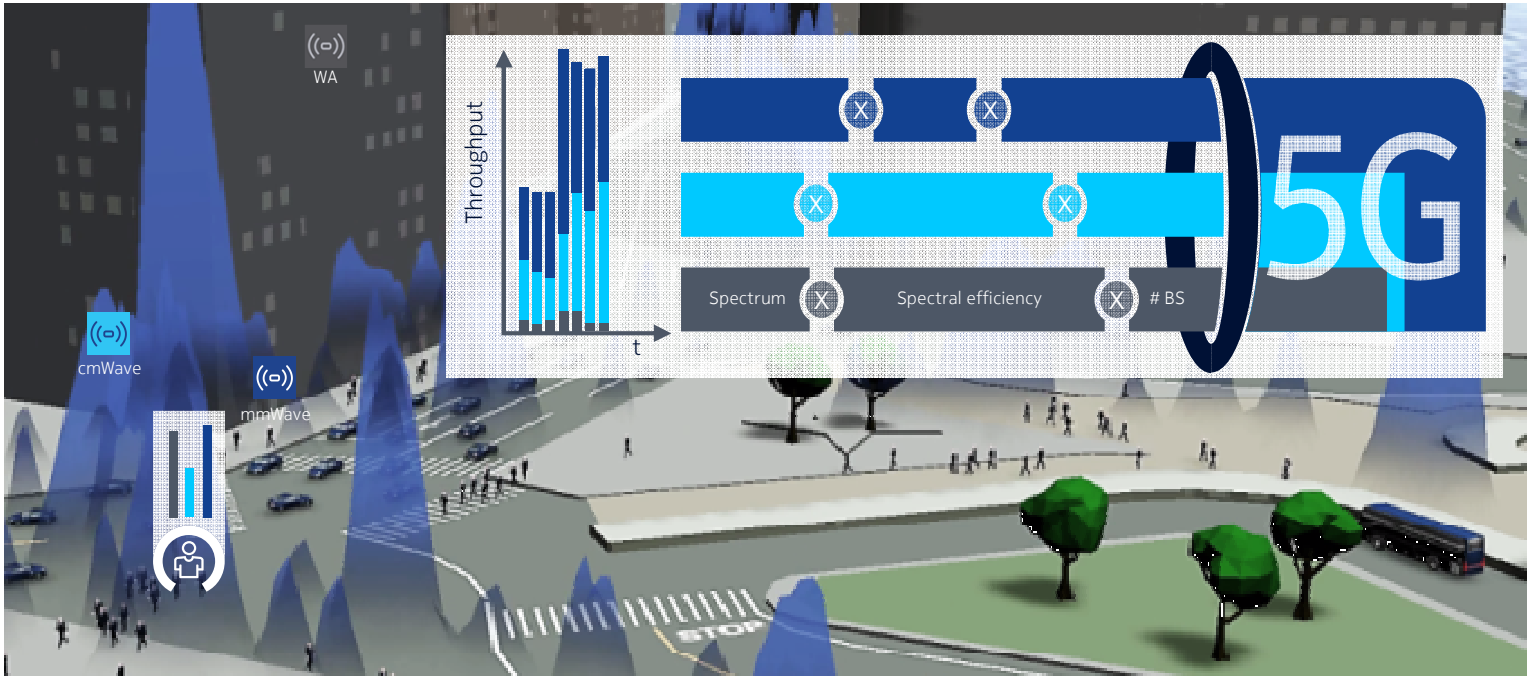
Cooperation with top notch industry and university partners

mmWave trials
with DOCOMO

>20Gbps
at 8x8 MIMO with SKT

Multi-Connectivity | Perception of infinite capacity

Multiple radio technologies collaborating as one system



10,000 x | >10 Gbps | 100 Mbps | <1 ms | 10-100 x | ultra low | 10 years

Extreme mobility robustness and ultra reliability

>100 Mbps anywhere

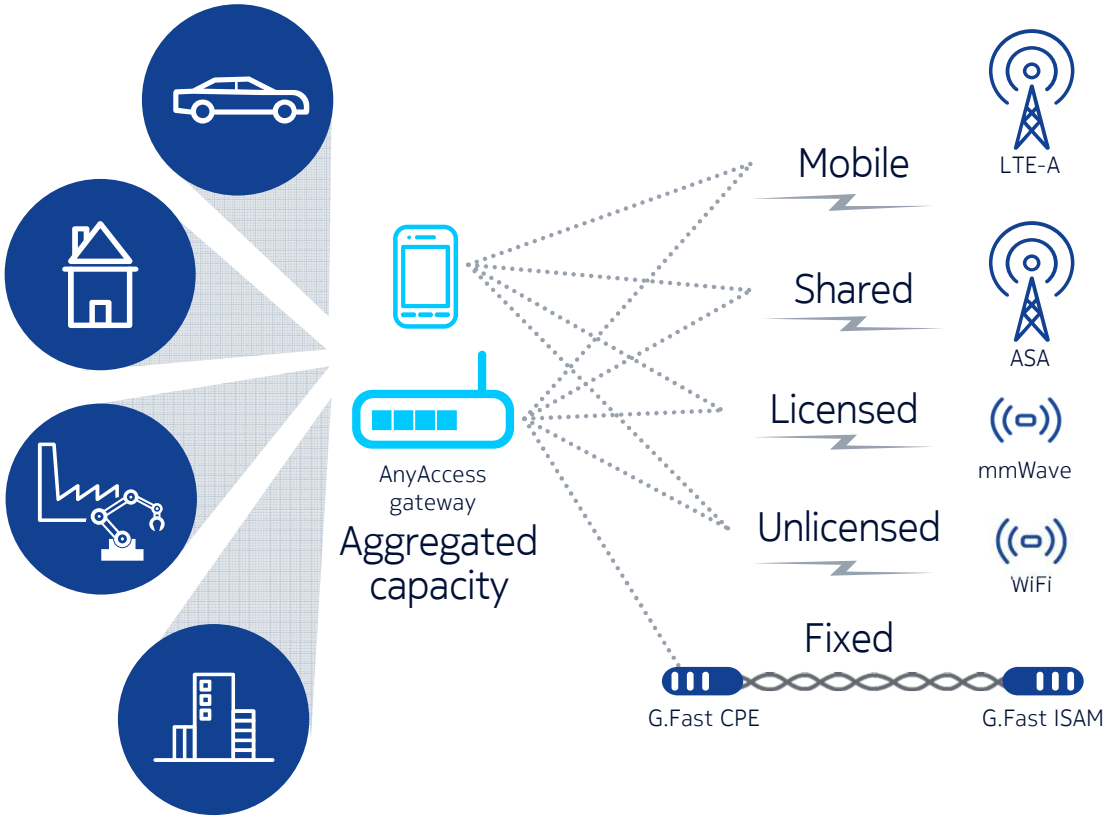
>30 Gbps throughput*

Massive Capacity combining any kind of mobile and fixed access

*Combining any access

5G Massive Capacity - world record

>30Gbps for the user, new business for operators



300x faster than 100Mbit/s commercial fiber services today

8K Virtual Reality and UHD video to the mass market

- Combining any kind of access
- For fixed, mobile, human and machine type devices
- For all traffic types

Slim Radio | Low cost & power for massive machine type communication

NB-IoT for small, infrequent & low cost data transfer

Power saving

Longer sleeping cycles*

Less signaling for wakeup

Power Save Mode

Simplified modems

Narrowband transmission

Reduced transmit power

Limited downlink transmission modes

UE processing relaxations

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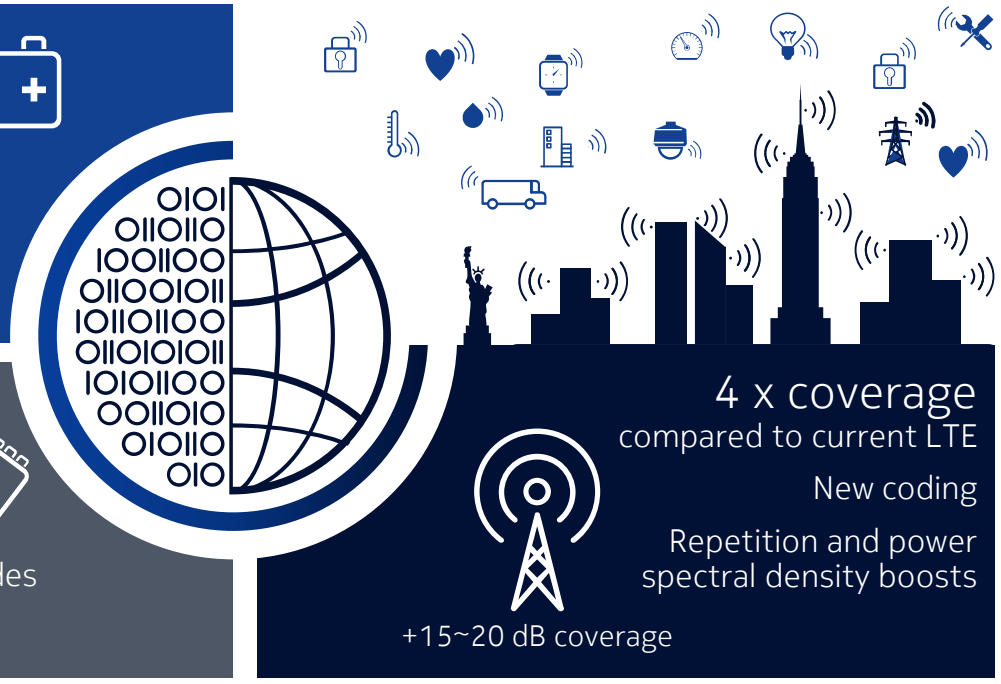


4 x coverage
compared to current LTE

New coding

Repetition and power spectral density boosts

+15~20 dB coverage

10,000 x	>10 Gbps	100 Mbps	<1 ms	10-100 x	ultra low	10 years

>10 years
Battery life with two AA batteries

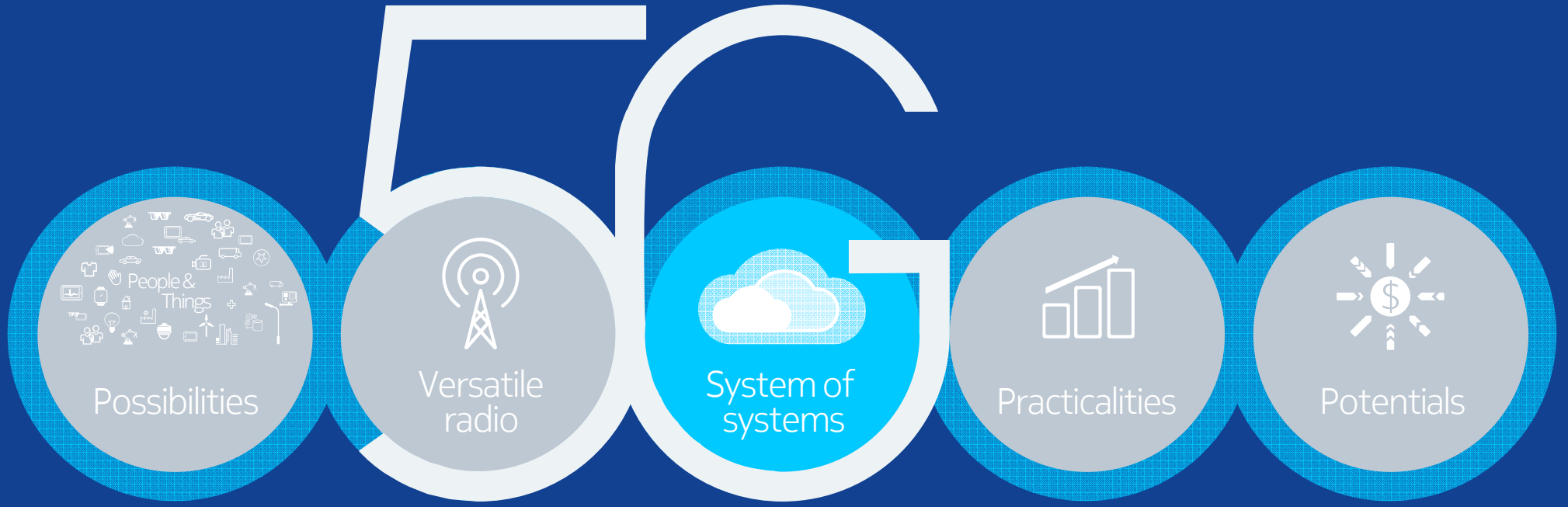
Very low device cost

Live trial with KT

MWC 2015
First live demo
on commercial Nokia FlexiZone and core

Driving for availability in 3GPP Rel.13, 2016

*) Extended Discontinuous Reception (DRX)



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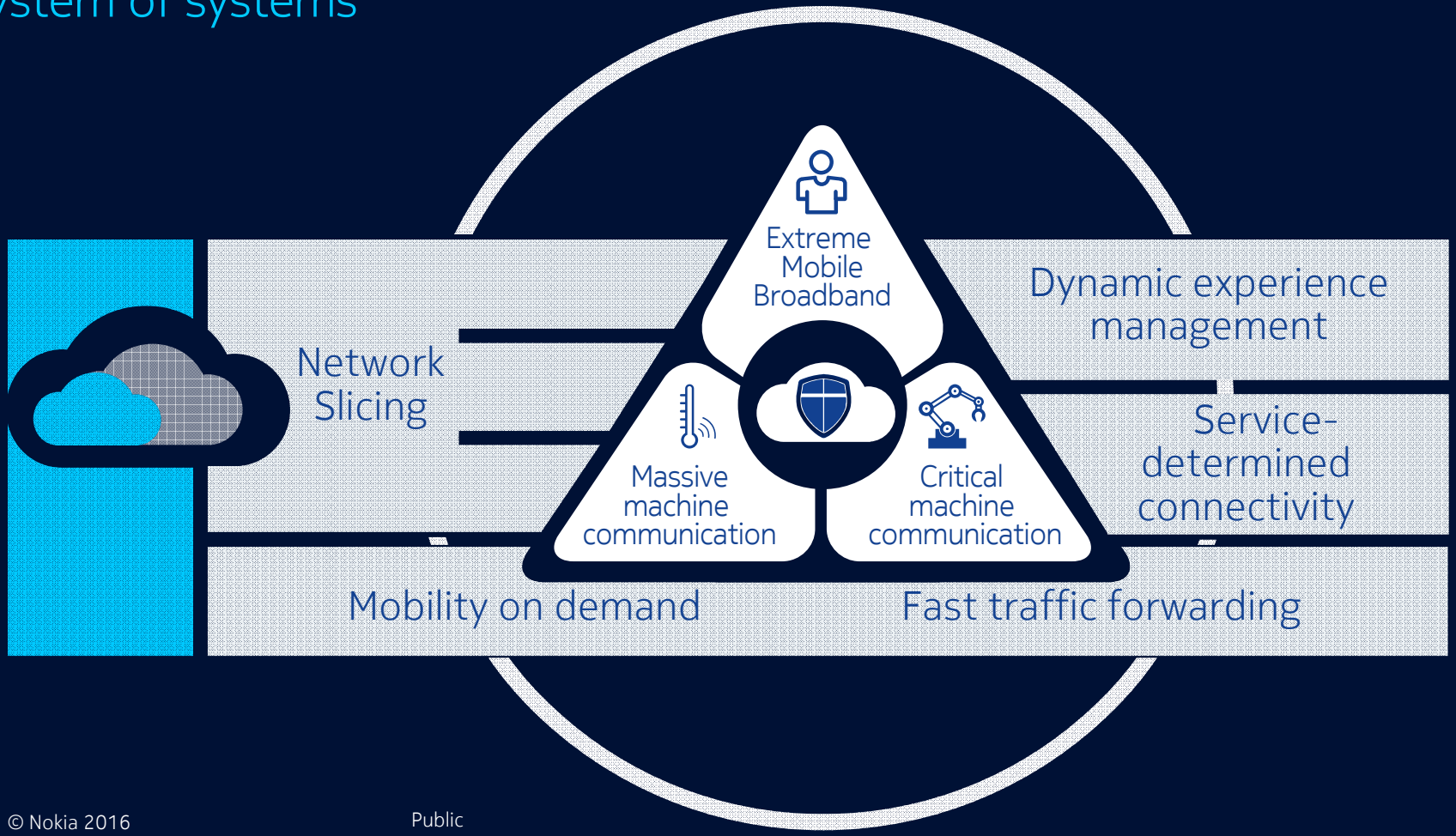
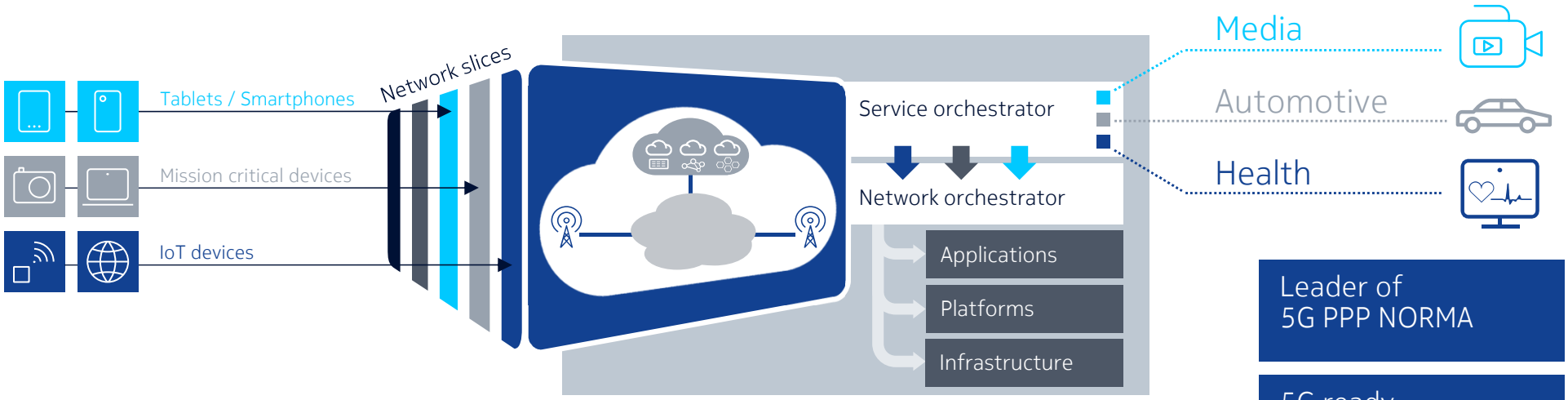
System of systems



Network Slicing | Optimized service delivery for heterogeneous use cases

Multiple independent instances on one physical network



Full automation and self-optimization

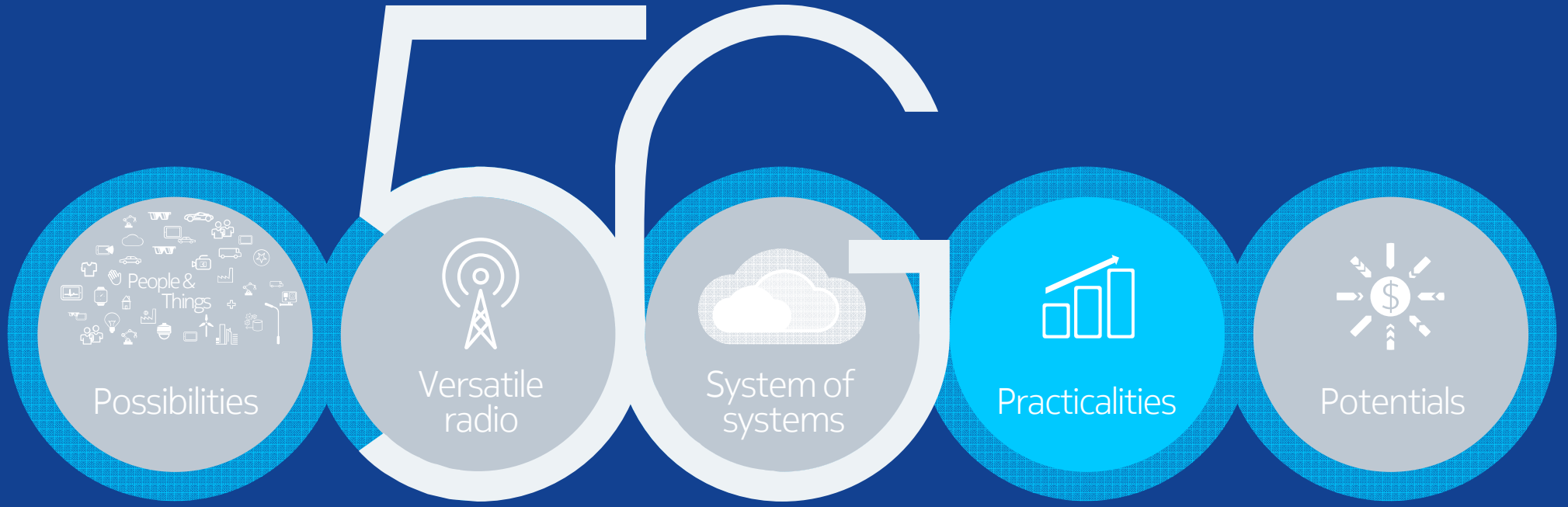
Leader of 5G PPP NORMA

5G ready AirFrame data enter

Programmable core and transport

10,000 x | >10 Gbps | 100 Mbps | <1 ms | 10-100 x | ultra low | 10 years

*5G Novel Radio Multiservice adaptive network Architecture



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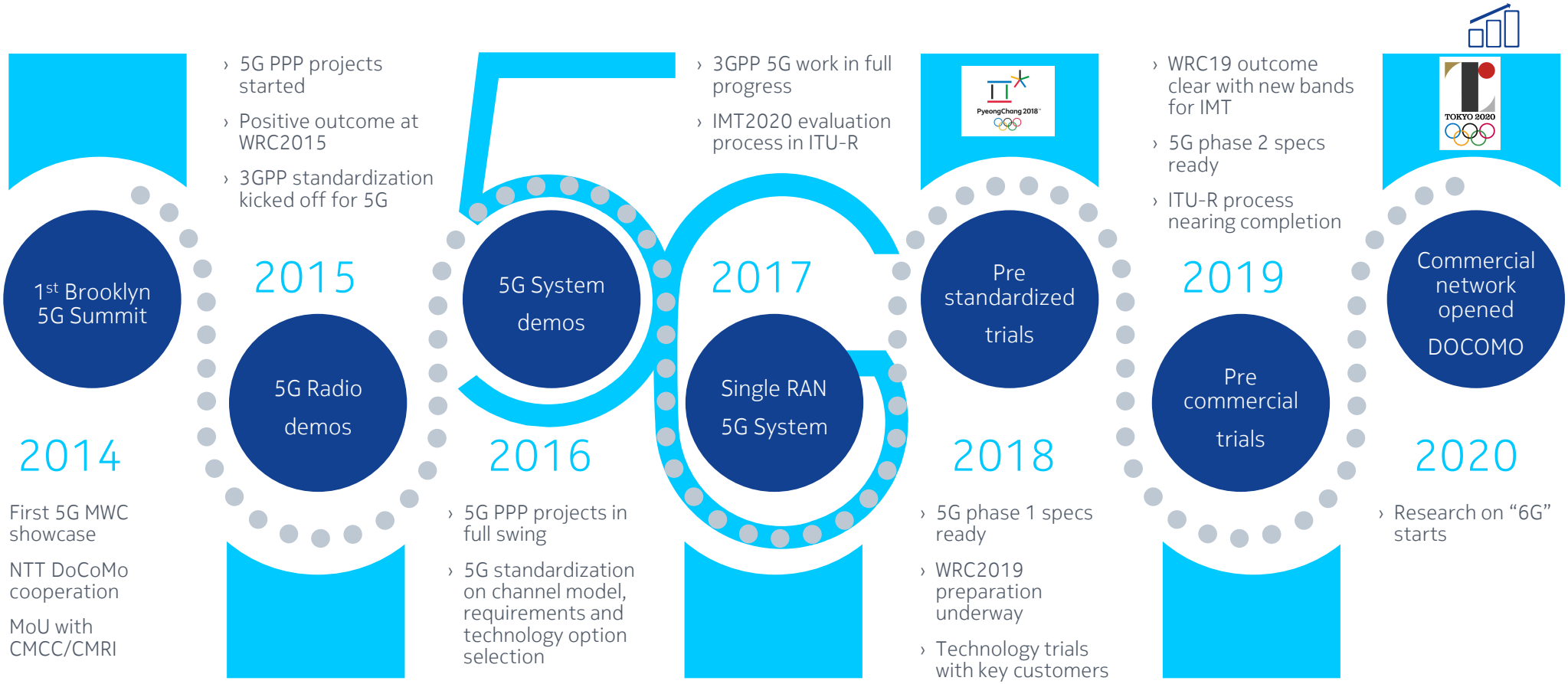
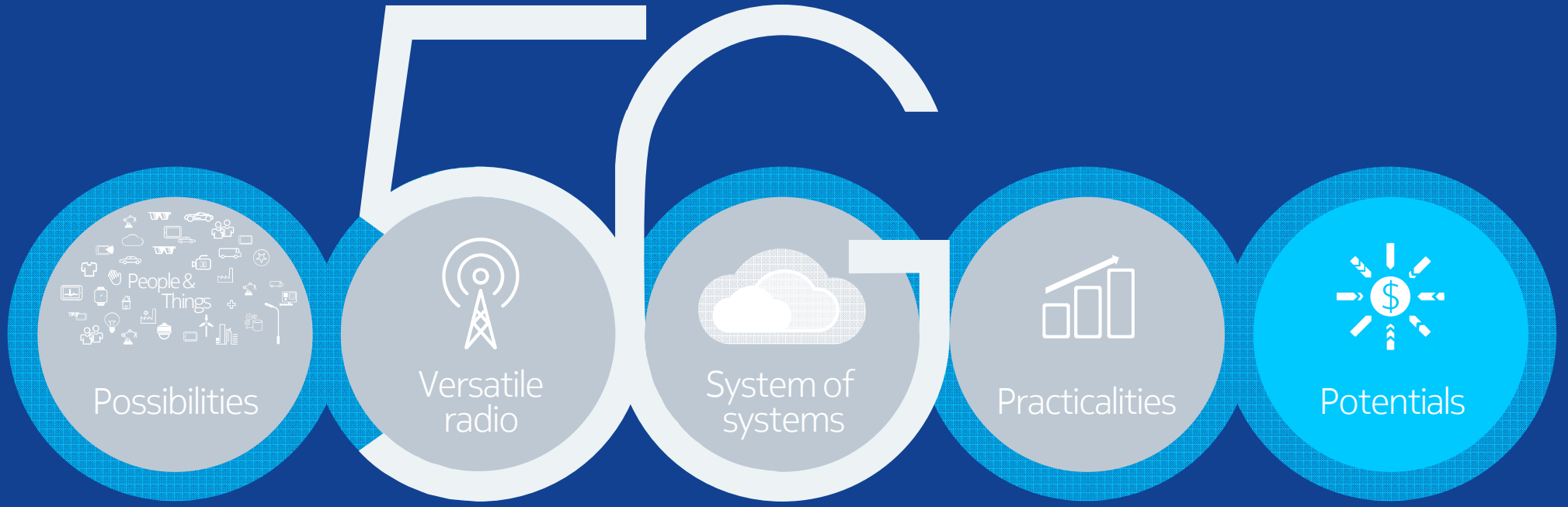
Key milestones on the road to 5G





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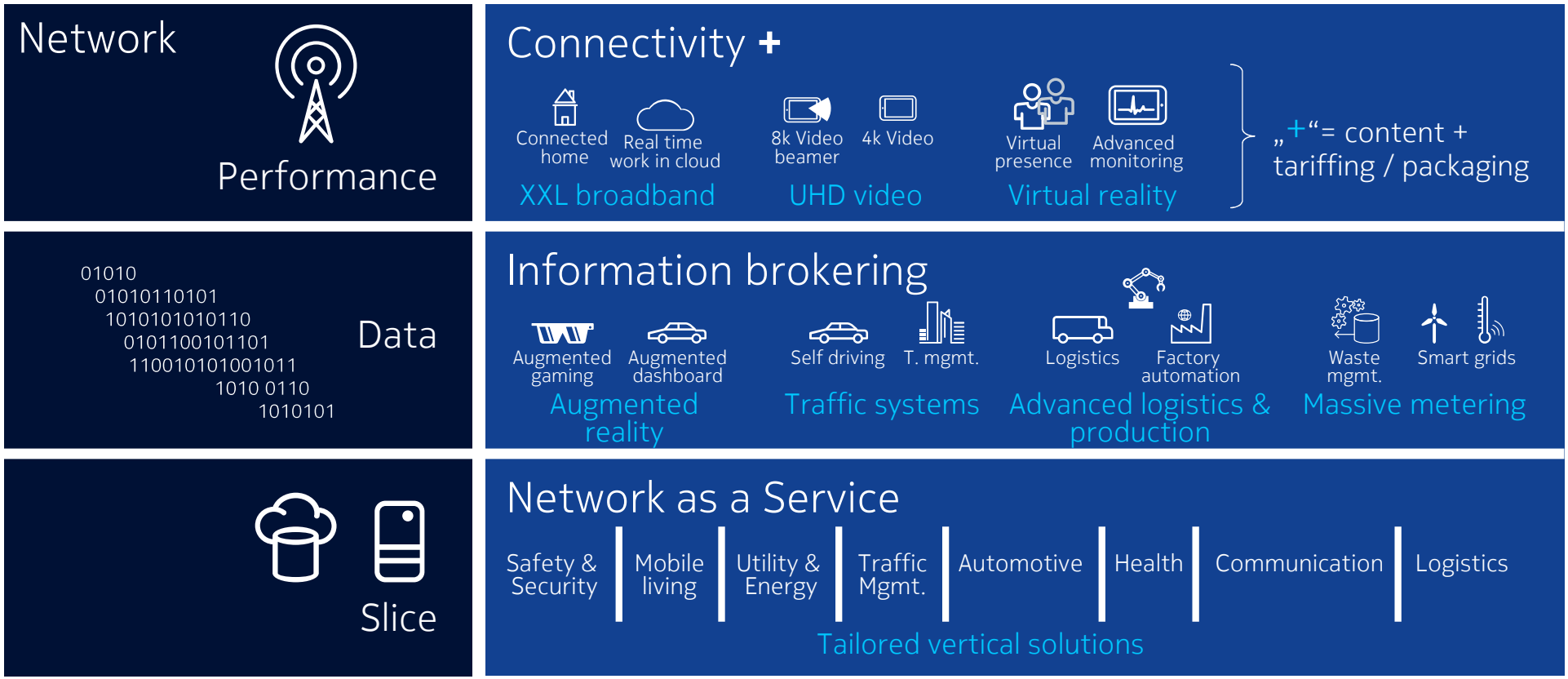
Business models powered by network performance, data and slicing



  Public

Preparing 5G for commercial reality

5G

Possibilities

Opening the door for massive broadband and the next generation IoT

Versatile radio

One versatile radio for diverse use cases, deployments and frequency bands

System of systems

Powered by a programmable, cognitive and distributed architecture

Practicalities

Leveraging LTE while reaching out to new performance levels

Potentials

Business models are powered by network performance, data and slicing

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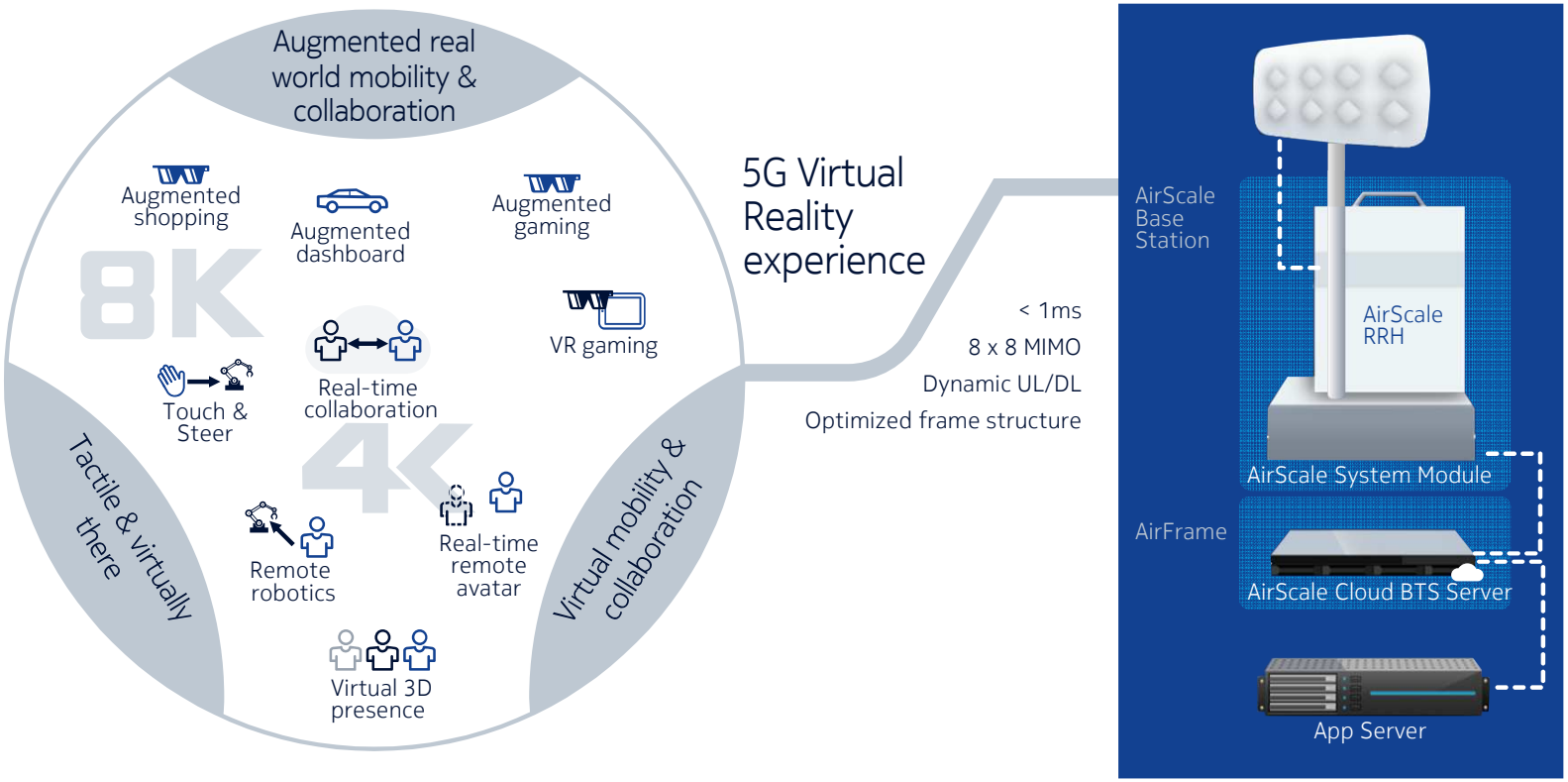
5G on commercial AirScale radio access - world's first

Investments today will meet future demands



  Public

Leading 5G

The first to run 5G on a commercially available base station

Nokia shows what 5G can really do, helping operators to prepare for new business

Solutions piloting in 2016 and commercially ready from 2017 onwards

www.networks.nokia.com/innovation/5G

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