5G VISION

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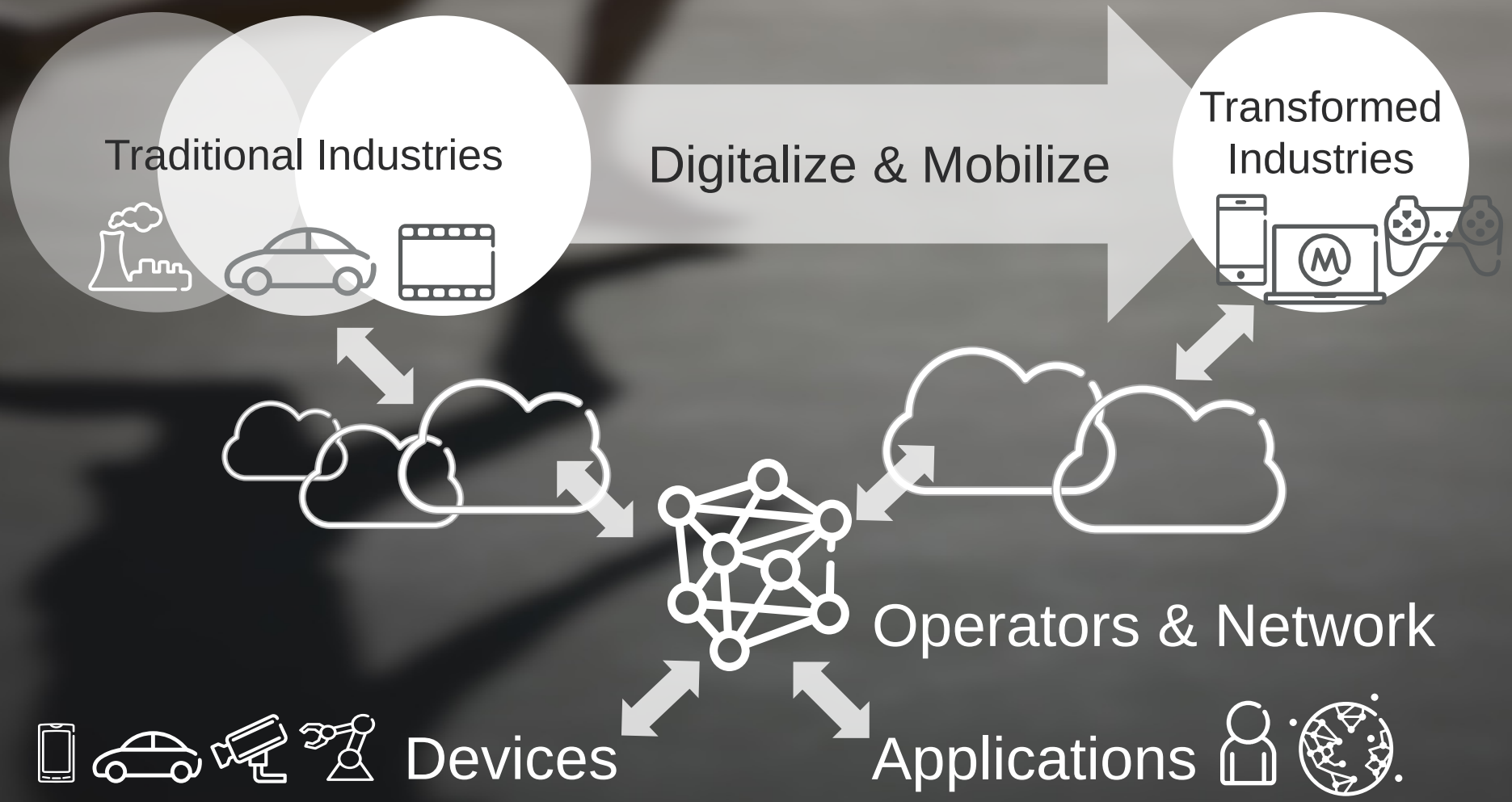
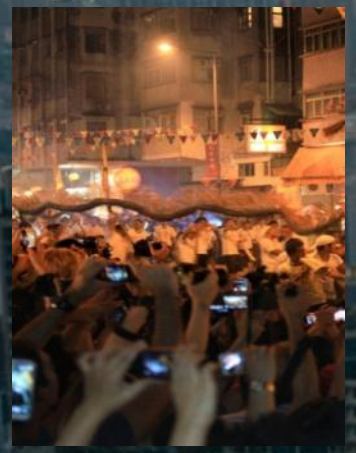
INDUSTRY TRANSFORMATION

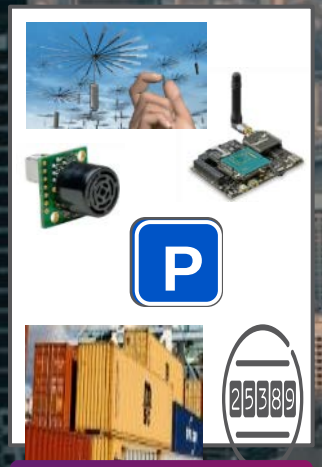


5G USE CASES



Broadband experience everywhere anytime

Mass market personalized media and gaming



Meters and sensors, “Massive MTC”

Remote controlled machines

Smart Transport Infrastructure and vehicles

Human machine interaction

And much more

Multiple use-cases supported by a common network platform

WIDE RANGE OF REQUIREMENTS

Data rates

Latency

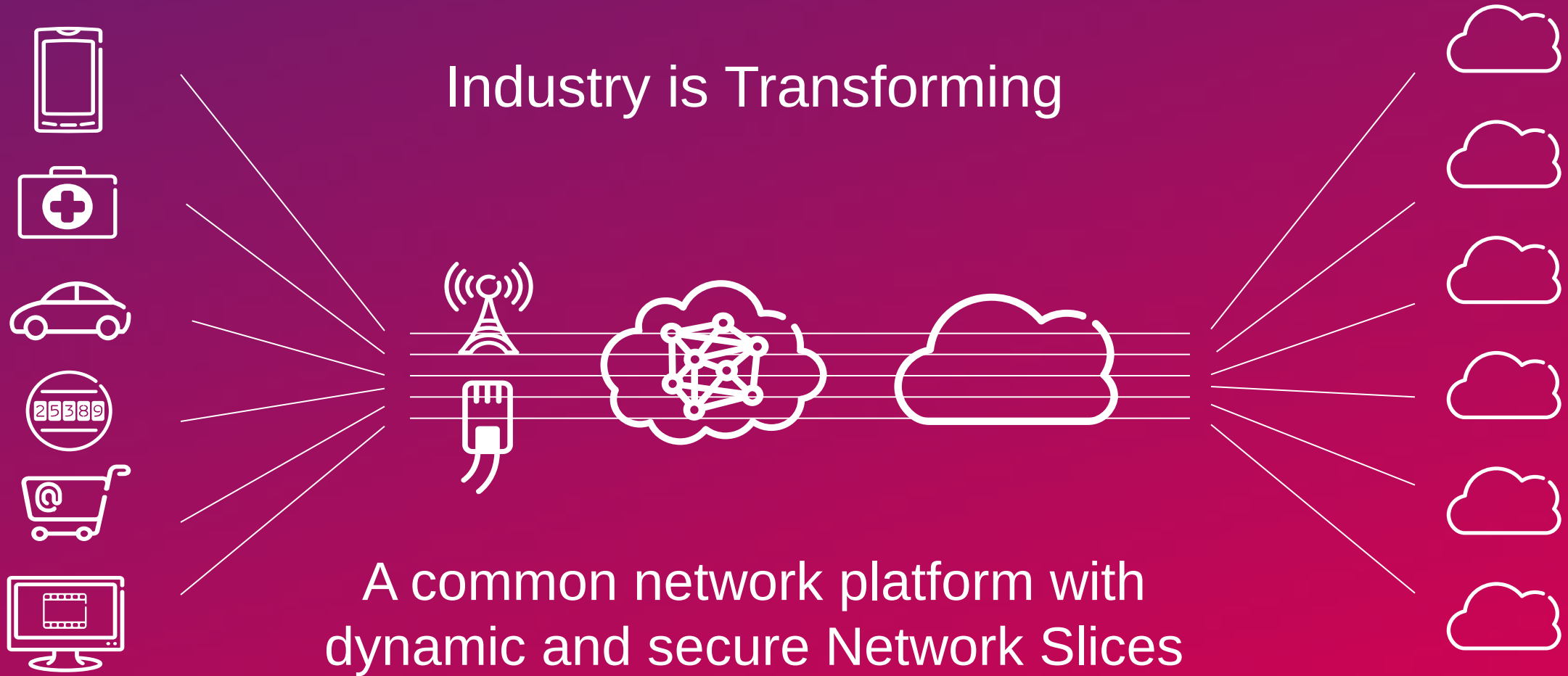
Traffic Volume Density

Energy Efficiency

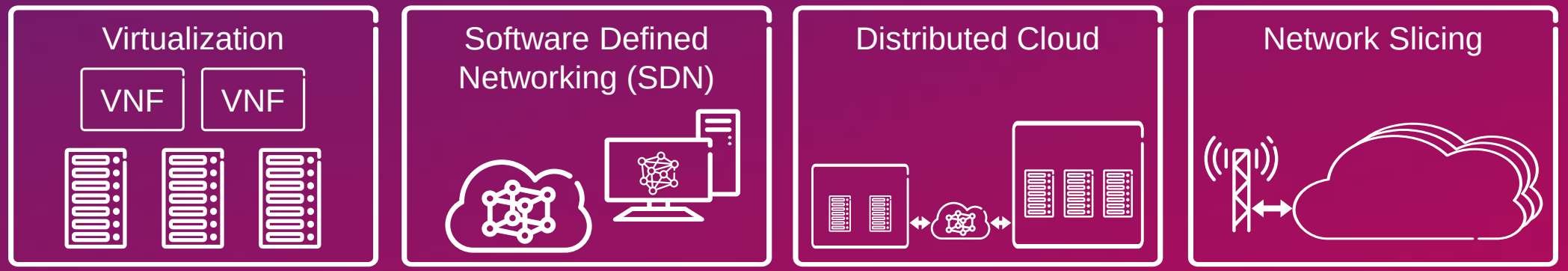
Reliability

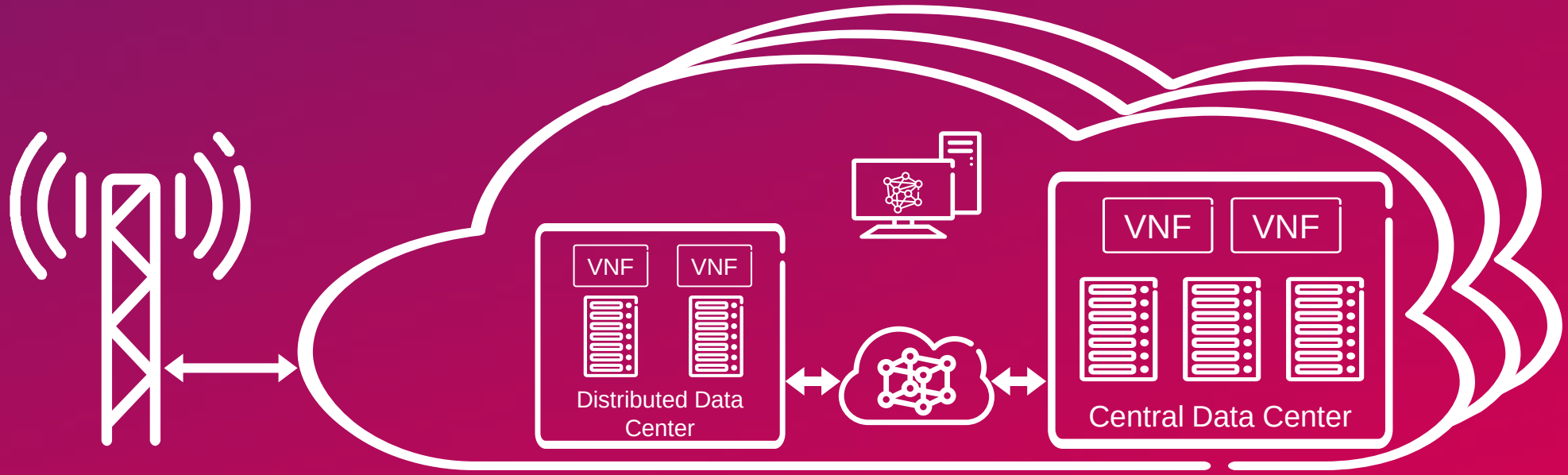
Device Density

ONE NETWORK – MULTIPLE INDUSTRIES

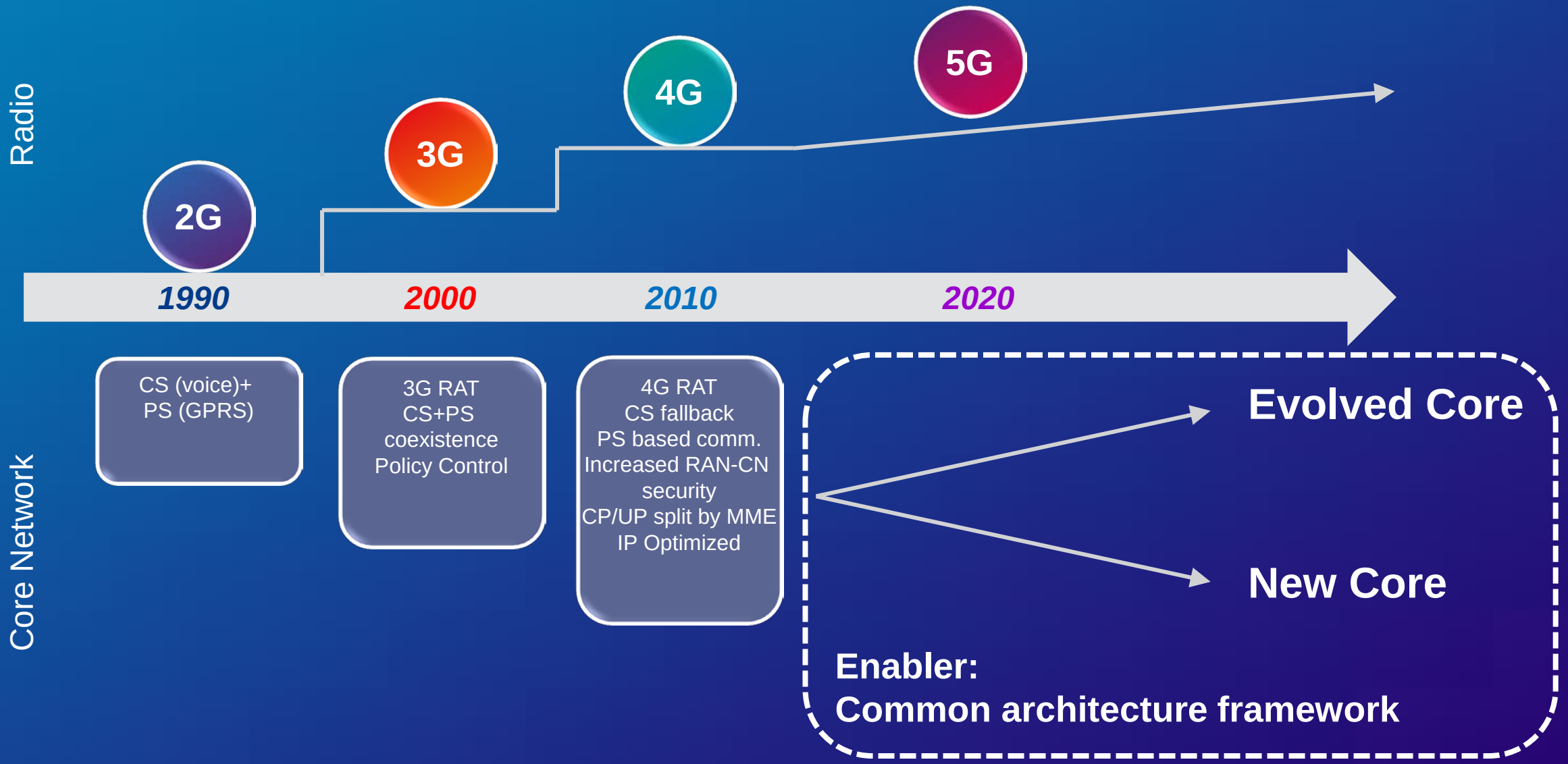


KEY CORE COMPONENTS

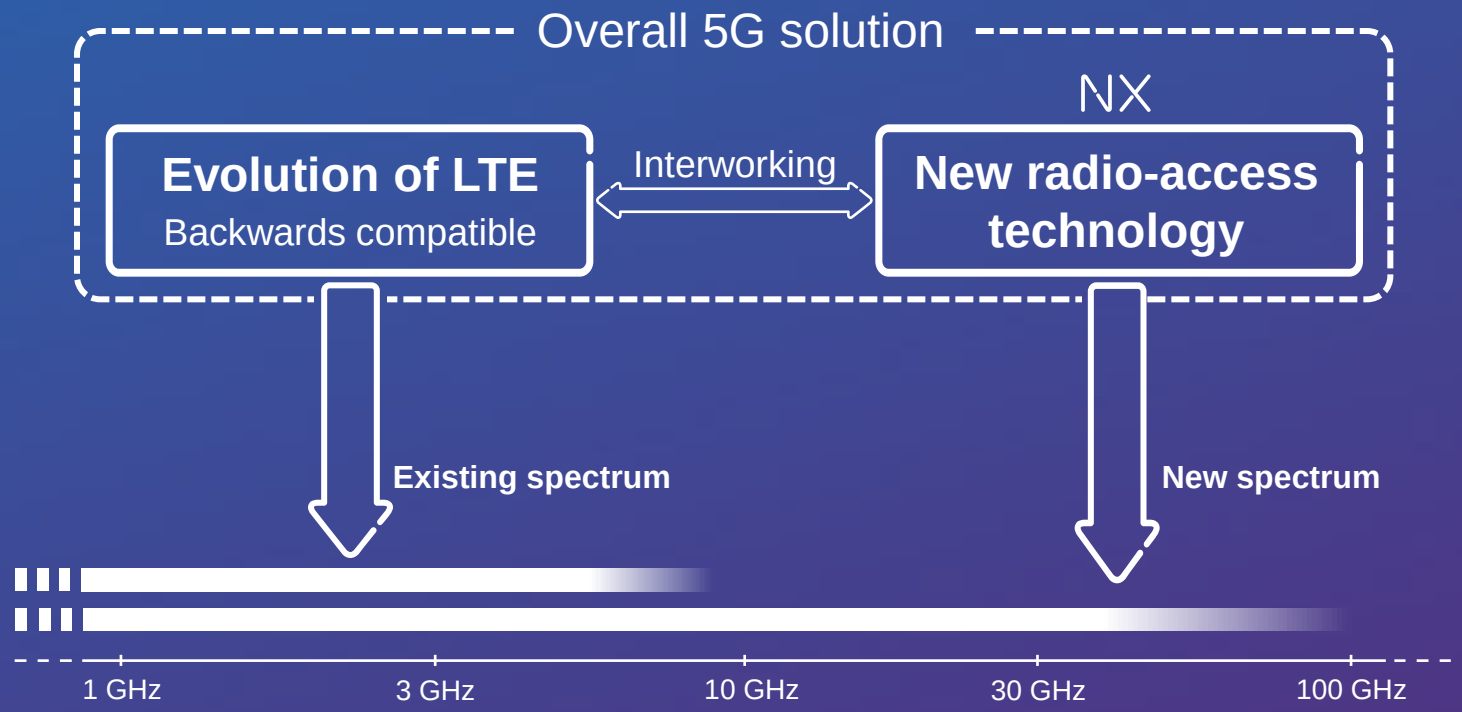




THE EVOLUTION OF THE CORE NETWORK



5G RADIO ACCESS & SPECTRUM



Spectrum flexibility

Flexible duplex

FDD and TDD

Dynamic TDD

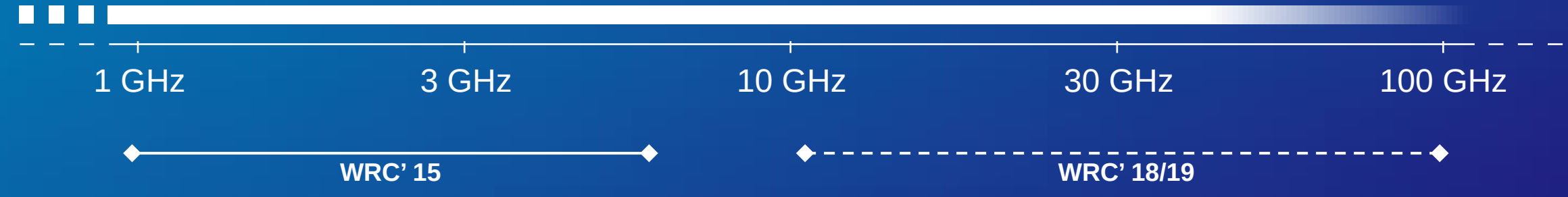
Full Duplex

Spectrum sharing

Unlicensed
Shared licensed

Complementing dedicated licensed spectrum

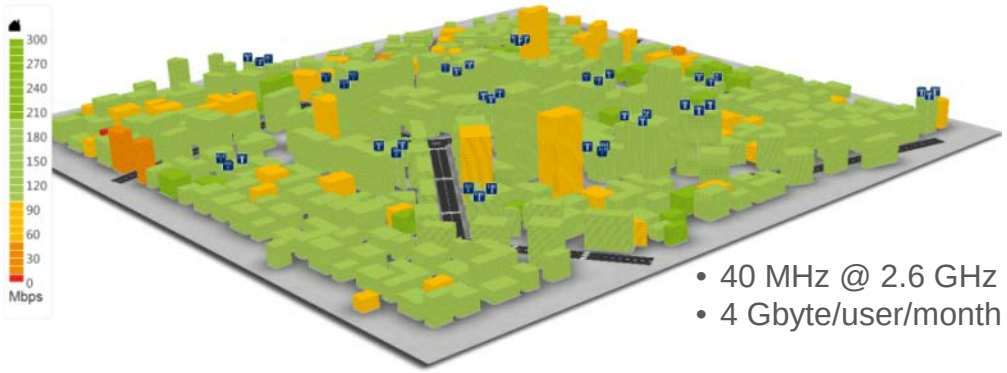
5G SPECTRUM



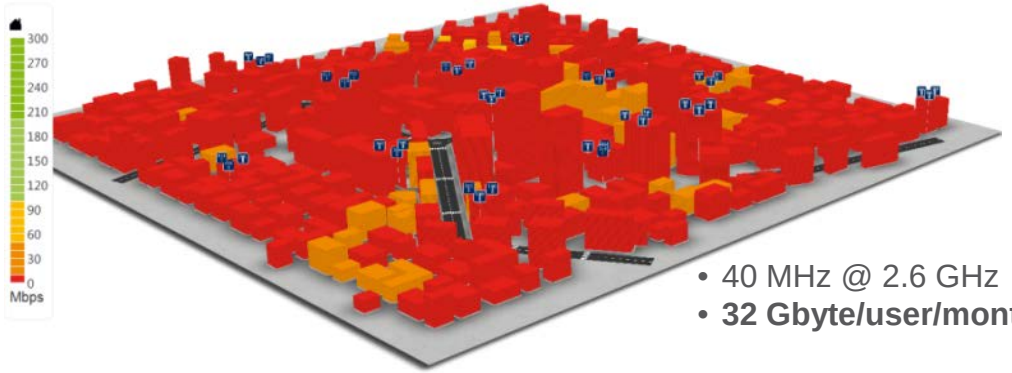
Lower frequencies for full-area coverage…

…complemented by high frequencies for extreme capacity and data rates in dense scenarios

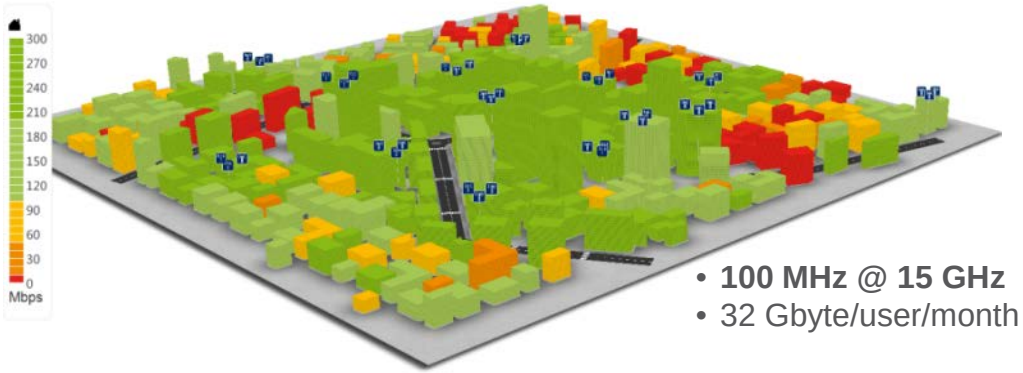
HIGH-FREQUENCY OPERATION



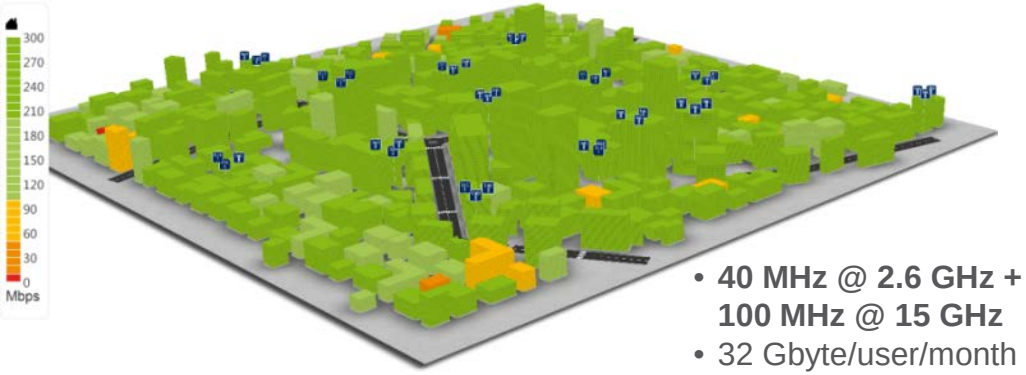
- 40 MHz @ 2.6 GHz
- 4 Gbyte/user/month



- 40 MHz @ 2.6 GHz
- **32 Gbyte/user/month**



- **100 MHz @ 15 GHz**
- 32 Gbyte/user/month

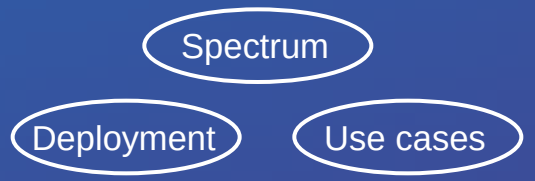


- **40 MHz @ 2.6 GHz + 100 MHz @ 15 GHz**
- 32 Gbyte/user/month

Higher-frequency spectrum needed to satisfy future traffic demand
Joint low-frequency/high-frequency operation needed for full-area coverage

TECHNOLOGY AREAS

Flexible and scalable design



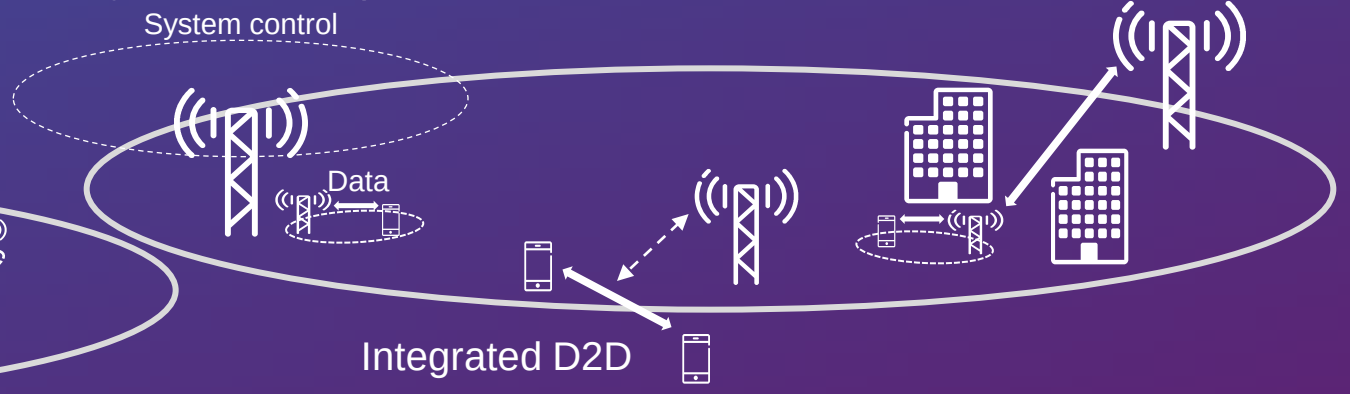
Extension to higher frequencies

Ultra-Lean Design

Beam-formed transmission

Multi-site connectivity

System control plane



Access/backhaul integration

BEAM-FORMED TRANSMISSION

To enable the capacity, data rate, and coverage needed in the 5G era

For both high and low frequencies

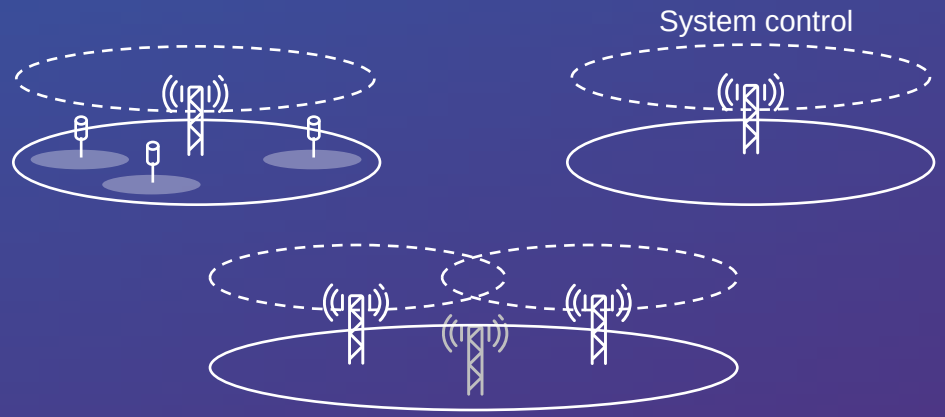
For both NX and LTE

Beam-centric NX design

- self-contained data transmissions
- mobility between beams rather than nodes
- system plane matched to beam-formed user plane

ULTRA-LEAN DESIGN

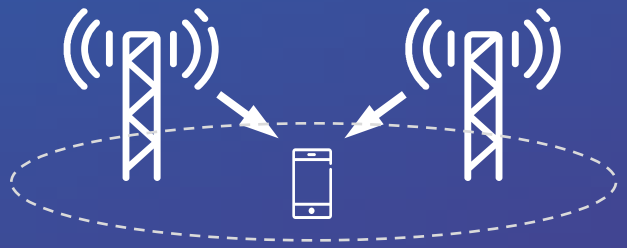
- Ultra-lean design
  - Higher achievable data rates
  - Reduced energy consumption
  - Future-proof design



- System Control Plane
  - Decouple system and data functionality
  - Minimize broadcast – provide sysinfo on demand
  - Data capacity scales independent of system overhead
  - Enables advanced antenna solutions

MULTI-SITE CONNECTIVITY

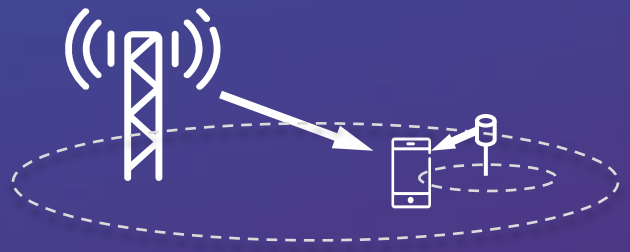
Intra-layer



Reception of beams from multiple sites

- Continuous connectivity ➡ Mobility robustness
- Distributed MIMO ➡ Higher data rates

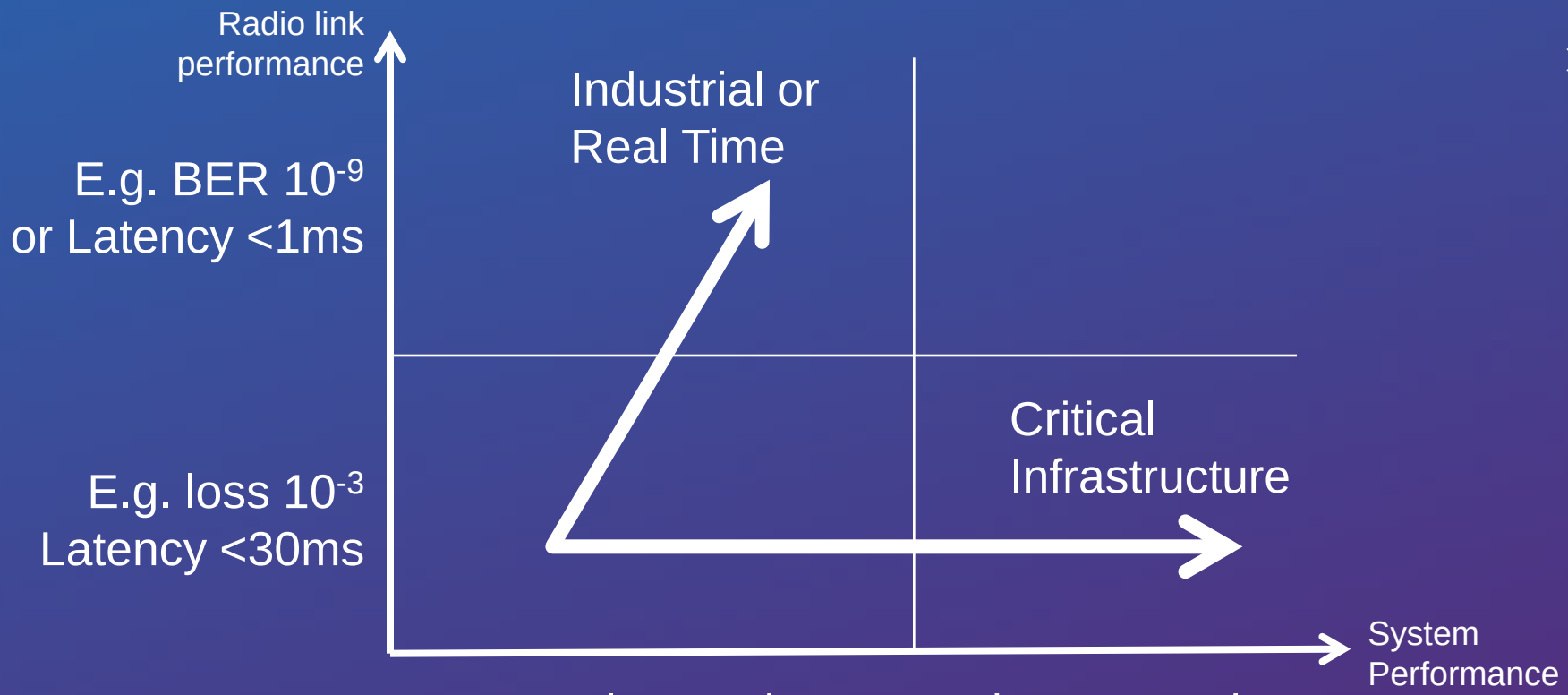
Inter-layer



Simultaneous connection to macro and pico

- Robustness despite spotty small-cell coverage

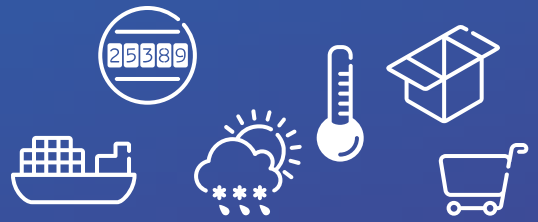
EXTREME RELIABILITY



› Coordination
- Spatial diversity
- Multi-hop/Mesh
- Network coding
- D2D
- Interference cancellation
- Spectrum use
- Channel coding

MACHINE-TYPE COMMUNICATION

MASSIVE



Low cost, low energy consumption, large number of devices

- Efficient sleep modes
- Flexible device bandwidth
- D2D relaying for coverage extension

CRITICAL

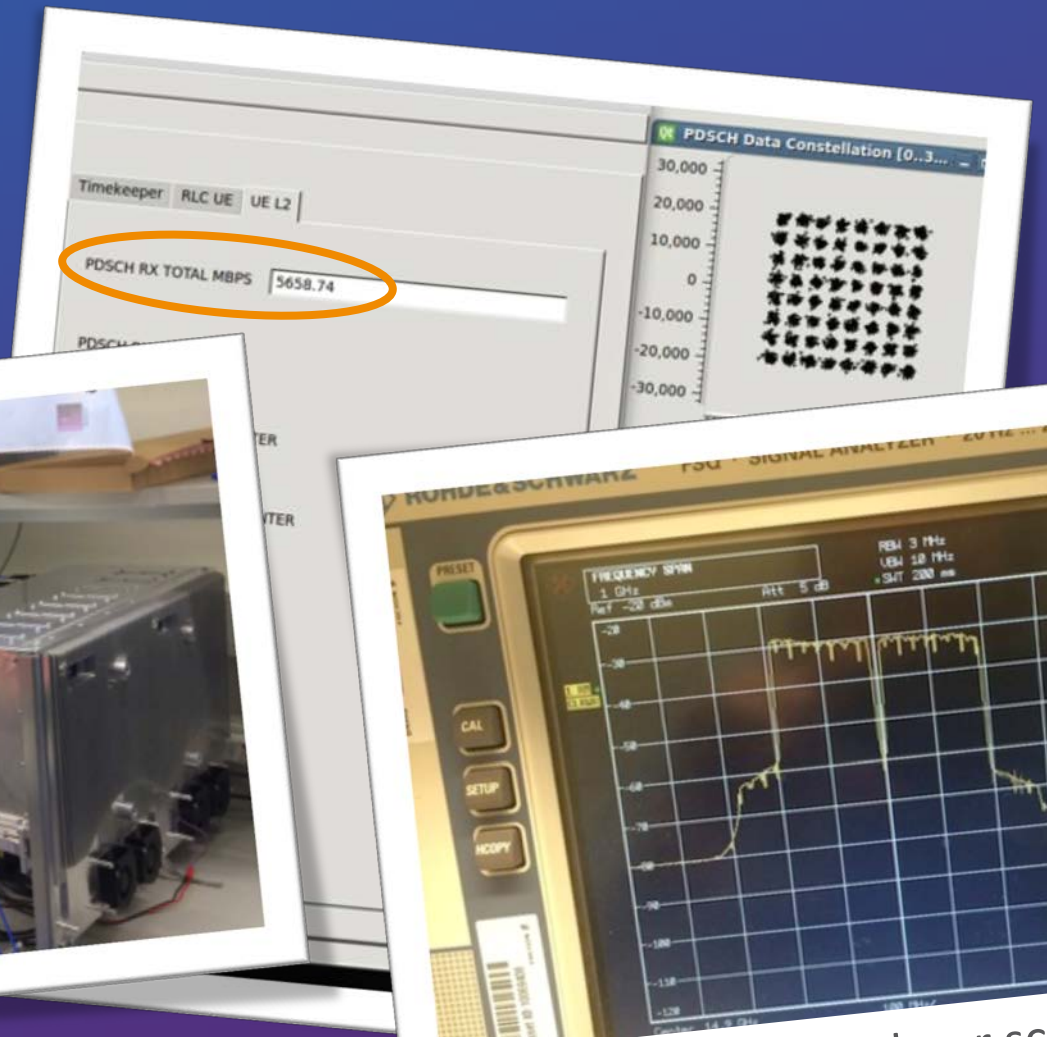
Very low latency and ultra-high reliability

- Very short TTI
- Coding/frame structure allowing on-the-fly decoding
- Multi-level diversity

5G RADIO TEST BED
WORLD'S FIRST > 5 GIGABIT/S IN LAB

Lab mobile

First over-the-air tests



Spectrum analyzer screenshot:
400 MHz BW @ 15 GHz

SUMMARY

Industries and society are transforming

Tough requirements on future networks from increased demand and new services

Key technology concepts and components are identified, researched and evaluated

ERICSSON