



5G Design and Technology

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Mobile fueled the last 30 years—interconnecting people



Transforming our world

through intelligent connected platforms



Last 30 years
Interconnecting people

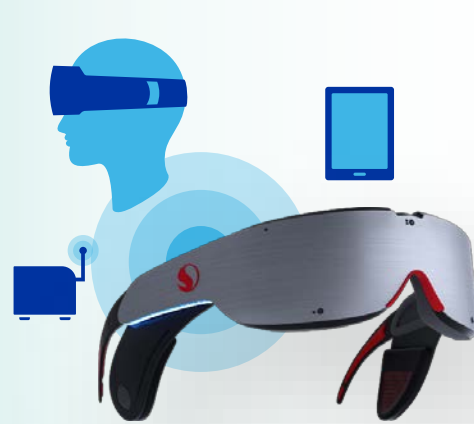


Next 30 years
Interconnecting their worlds

Utilizing unparalleled systems leadership in connectivity and compute

A unifying connectivity fabric

Always-available, secure cloud access



Enhanced mobile
broadband



Mission-critical
services

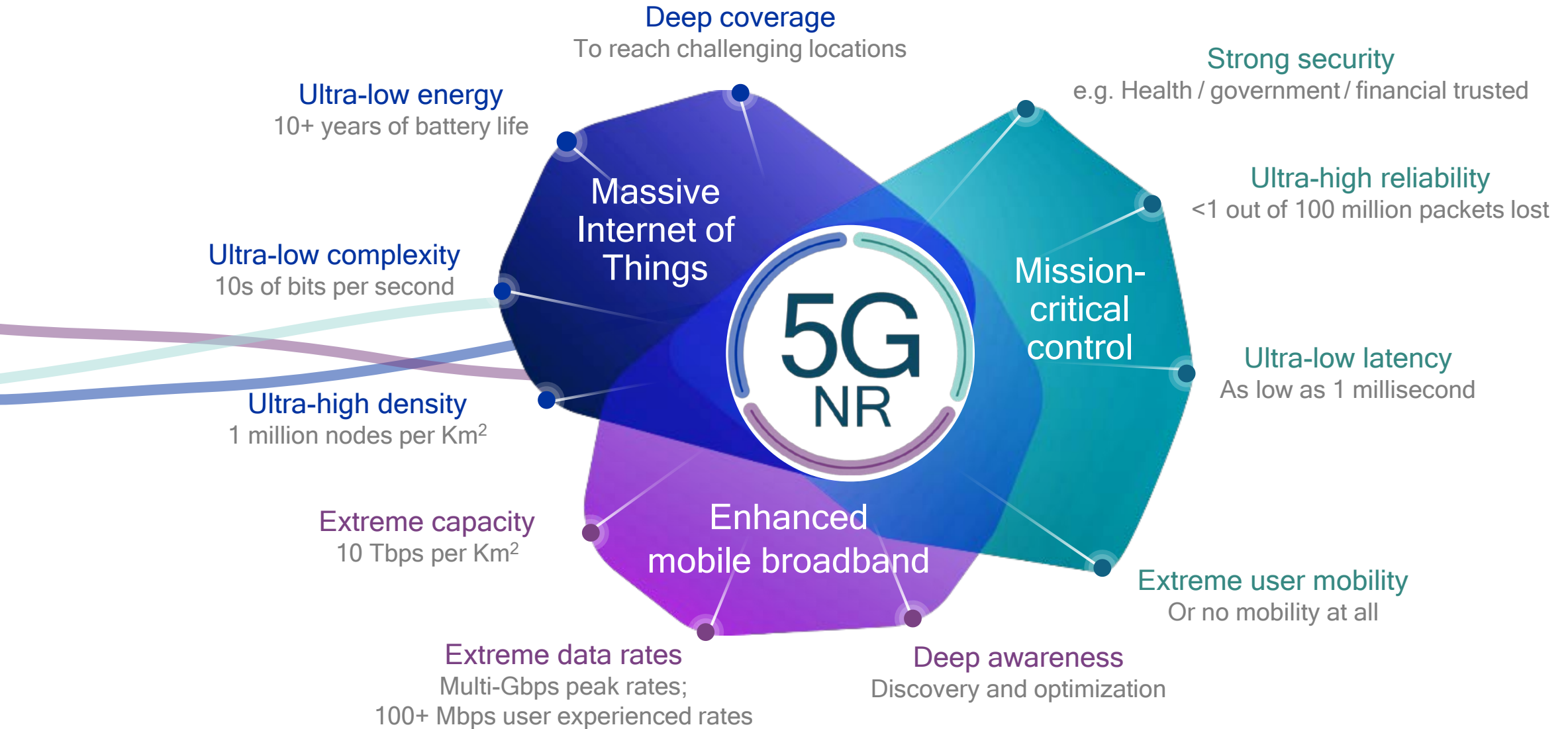


Massive Internet
of Things

Unifying connectivity platform for future innovation

Convergence of spectrum types/bands, diverse services, and deployments,
with new technologies to enable a robust, future-proof 5G platform

Scalability to address diverse service and devices



5G will redefine a wide range of industries

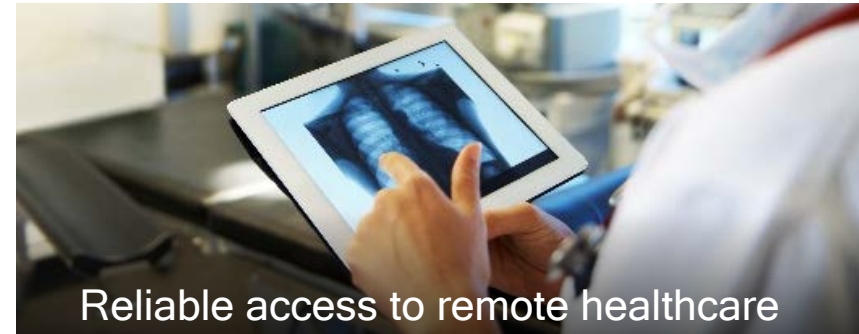
A platform for new connected services - existing, emerging and unforeseen



Immersive entertainment and experiences



Safer, more autonomous transportation



Reliable access to remote healthcare



Improved public safety and security



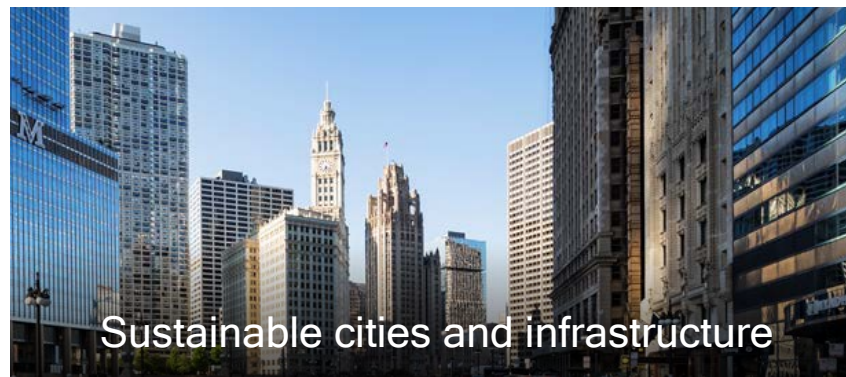
Smarter agriculture



More efficient use of energy/utilities



More autonomous manufacturing



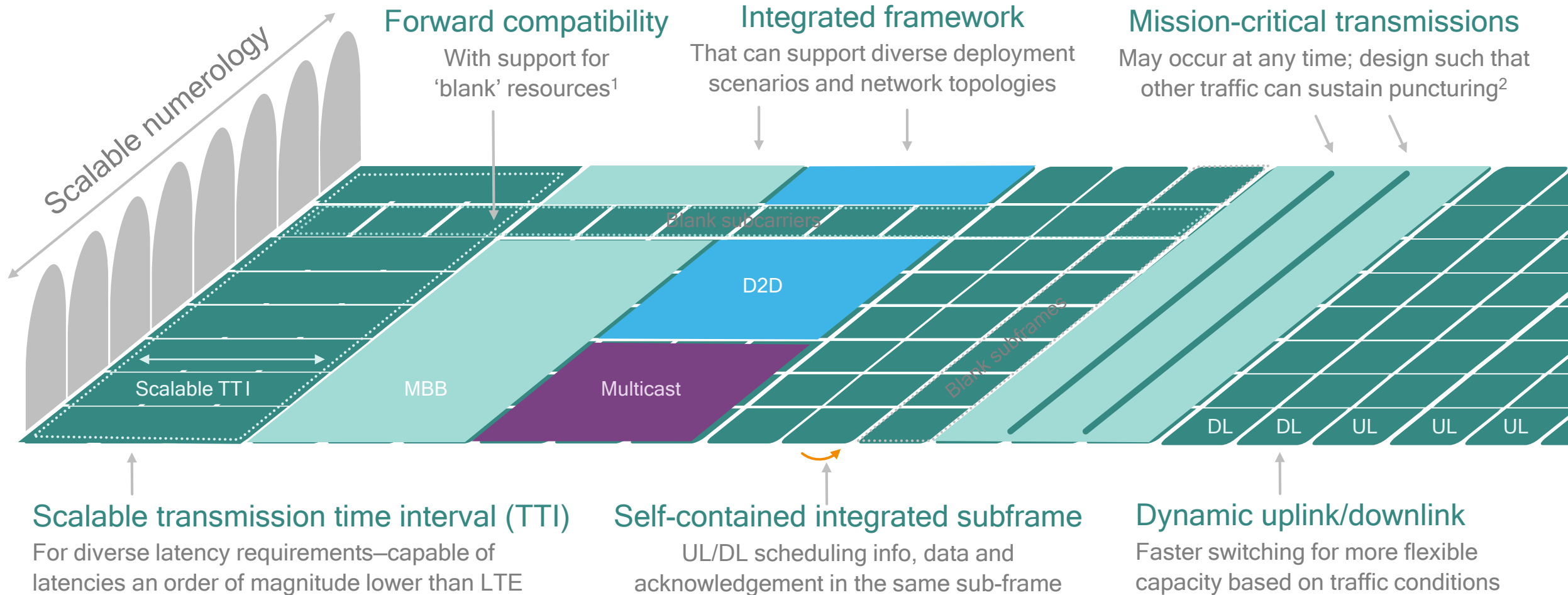
Sustainable cities and infrastructure



Digitized logistics and retail

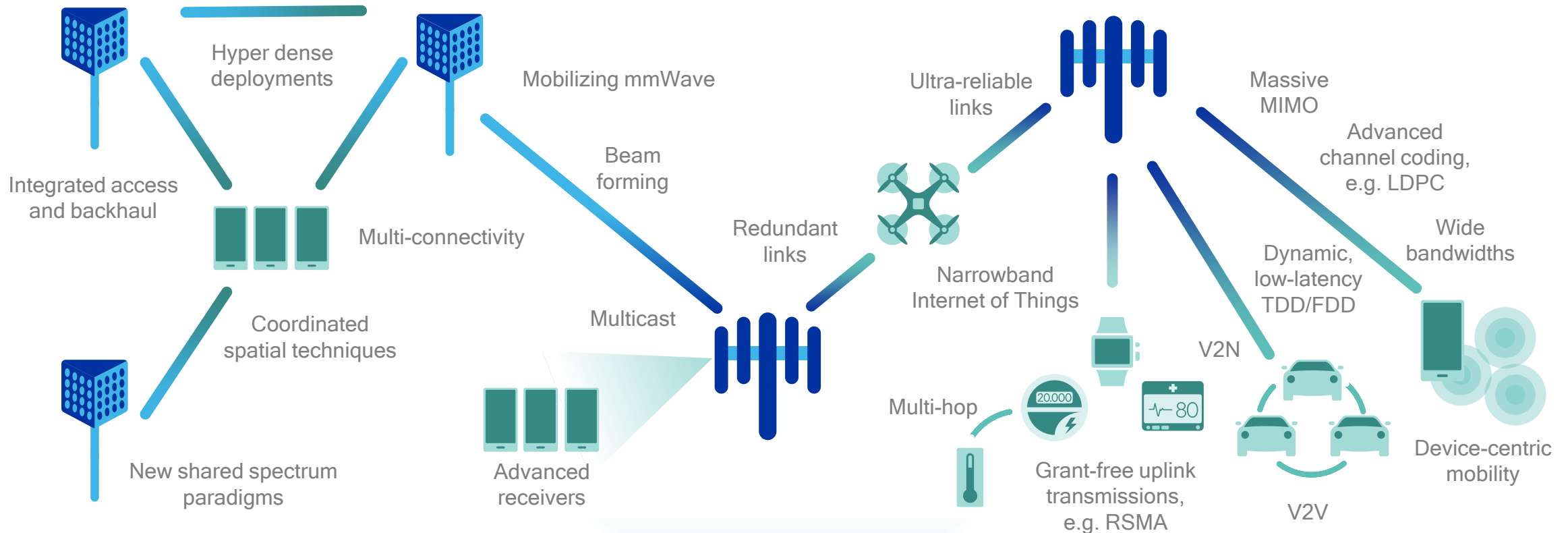
A flexible framework with forward compatibility

Efficiently multiplex envisioned and future 5G services on the same frequency



¹ Blank resources may still be utilized, but are designed in a way to not limit future feature introductions; ² Nominal 5G access to be designed such that it is capable to sustain puncturing from mission-critical transmission or bursty interference

Pioneering new technologies to meet 5G NR requirements



New levels of capability and efficiency

10x
experienced
throughput

10x
decrease in end-
to-end latency

10x
connection
density

3x
spectrum
efficiency

100x
traffic
capacity

100x
network
efficiency

Getting the most out of every bit of diverse spectrum



Low bands below 1 GHz: longer range for e.g. mobile broadband and massive IoT
e.g. 600 MHz, 700 MHz, 850/900 MHz

Mid bands 1 GHz to 6 GHz: wider bandwidths for e.g. eMBB and mission-critical
e.g. 3.4-3.8 GHz, 3.8-4.2 GHz, 4.4-4.9 GHz

High bands above 24 GHz (mmWave): extreme bandwidths
e.g. 24.25-27.5 GHz, 27.5-29.5, 37-40, 64-71 GHz



Licensed Spectrum
Exclusive use



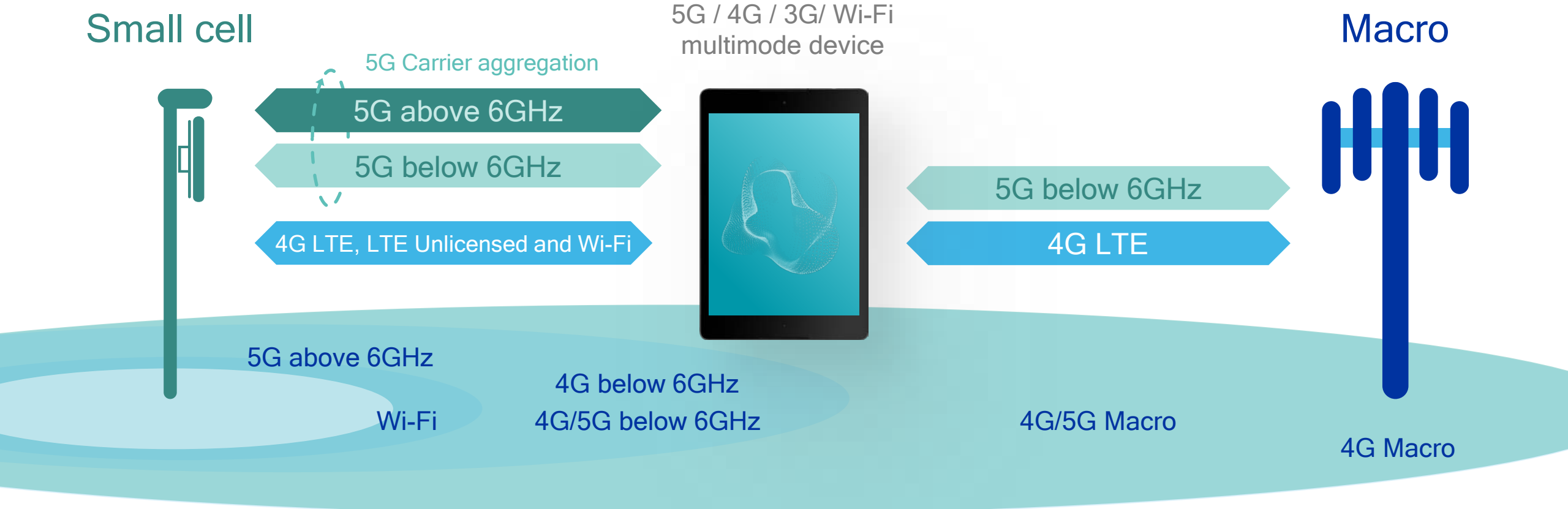
Shared Spectrum
New shared spectrum paradigms



Unlicensed Spectrum
Shared use

Simplifying 5G deployments with multi-connectivity

Fully leveraging 4G LTE and Wi-Fi investments for a seamless user experience



5G NR radio access designed to utilize LTE anchor for mobility management (non-standalone) or operate stand-alone with new multi-access 5G NextGen Core Network (NGCN)

We are accelerating the path to 5G NR

Best-in-class 5G prototype systems and testbeds



Test, demonstrate and verify our innovative 5G designs to contribute to and drive standardization

5G standards, technology and research leadership



Such as advanced channel coding, self-contained subframe, mobilizing mmWave, ...

Impactful trials and early deployments with network operators



Over-the-air interoperability testing leveraging prototype systems and our leading global network experience

Modem and RFFE leadership to solve 5G complexity



Roadmap to 5G significantly more complex and faster moving—builds upon our rich history of industry firsts

Thank you

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