

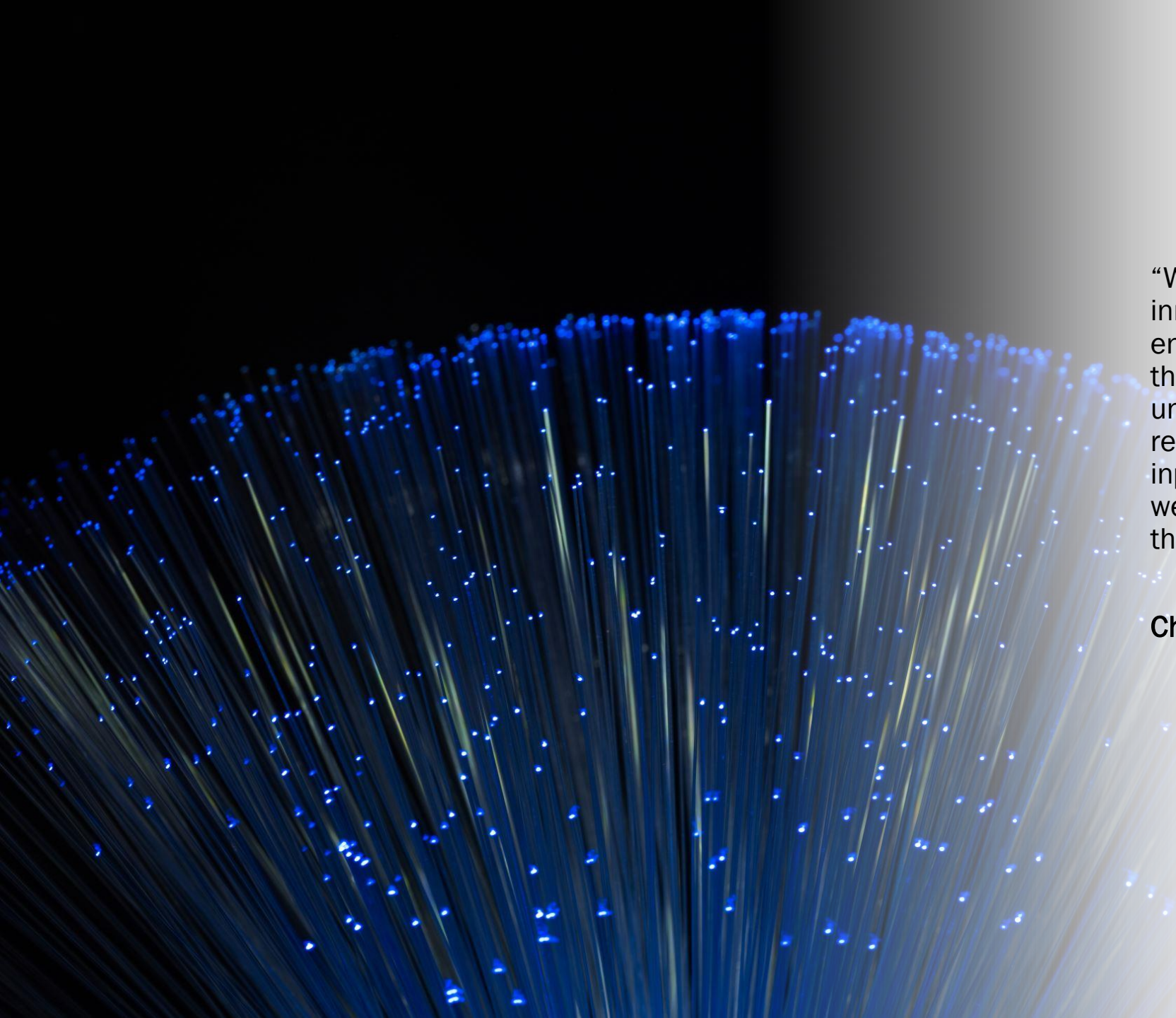


Mobile Communications Towards 2030



Presentation Slides

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“While 5G is at the beginning of a long era of innovation with a full road map of exciting enhancements, the work to research and study the next generation of possibilities is already underway. It is imperative that the Americas region build and maintain leadership, gathering input from wireless operators and vendors, as well as academia, other vertical industries, and the government.”

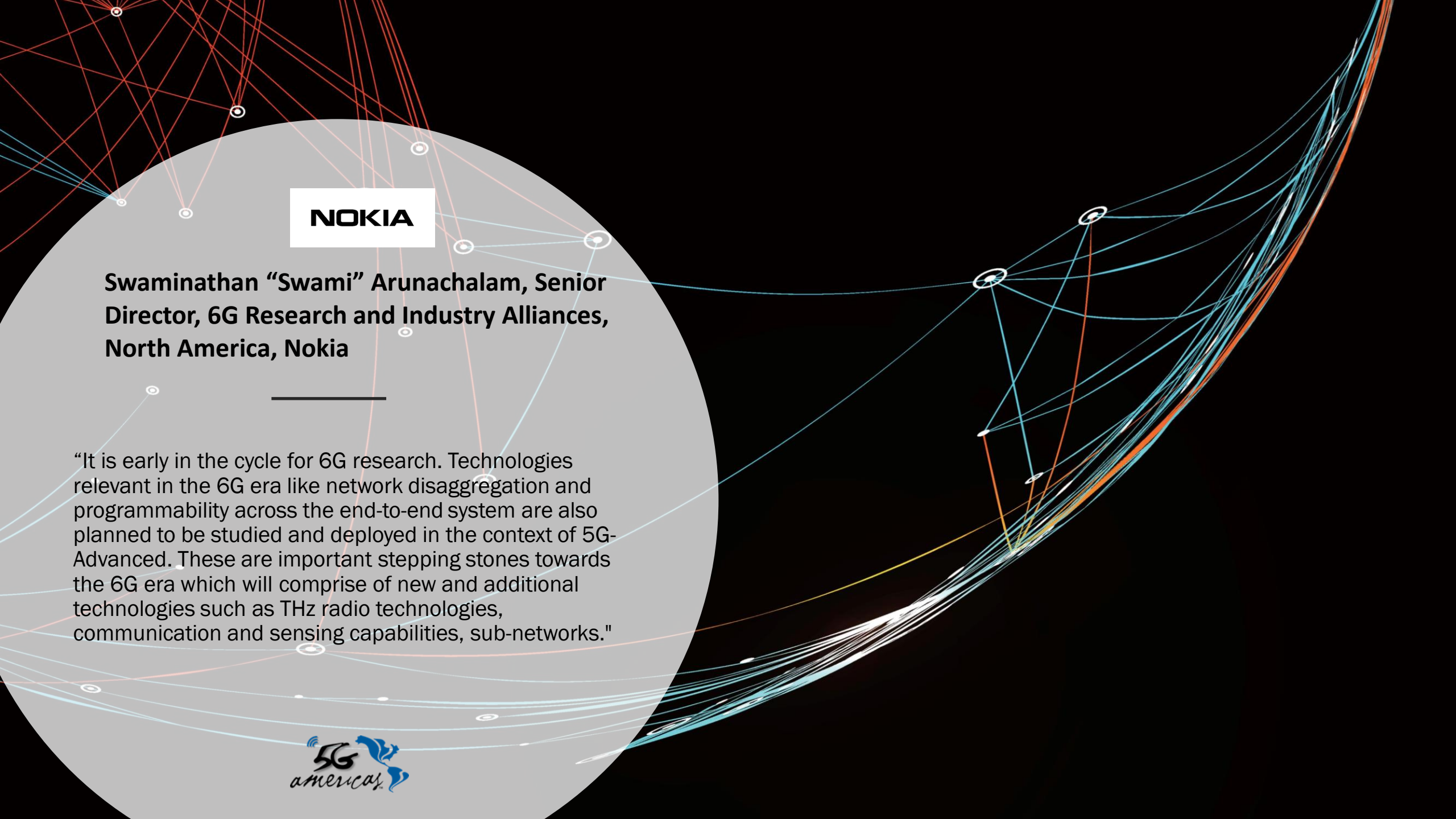
Chris Pearson, President, 5G Americas





“While 5G is still early in its lifecycle and is being evolved and enhanced through upcoming 3GPP releases while worldwide deployment continues, we recognize the need to begin to promote early commitment to creating a 5G to Next G marketplace and to ensure North America continues to lead in technology development. The groundwork for the next exciting chapter of wireless revolution is beginning as academia and US-based alliances are looking at advancing technology, along with the US government focused in forging fruitful partnerships with private sector.”

**Brian Daly, Assistant Vice President,
Standards & Industry Alliances, AT&T**



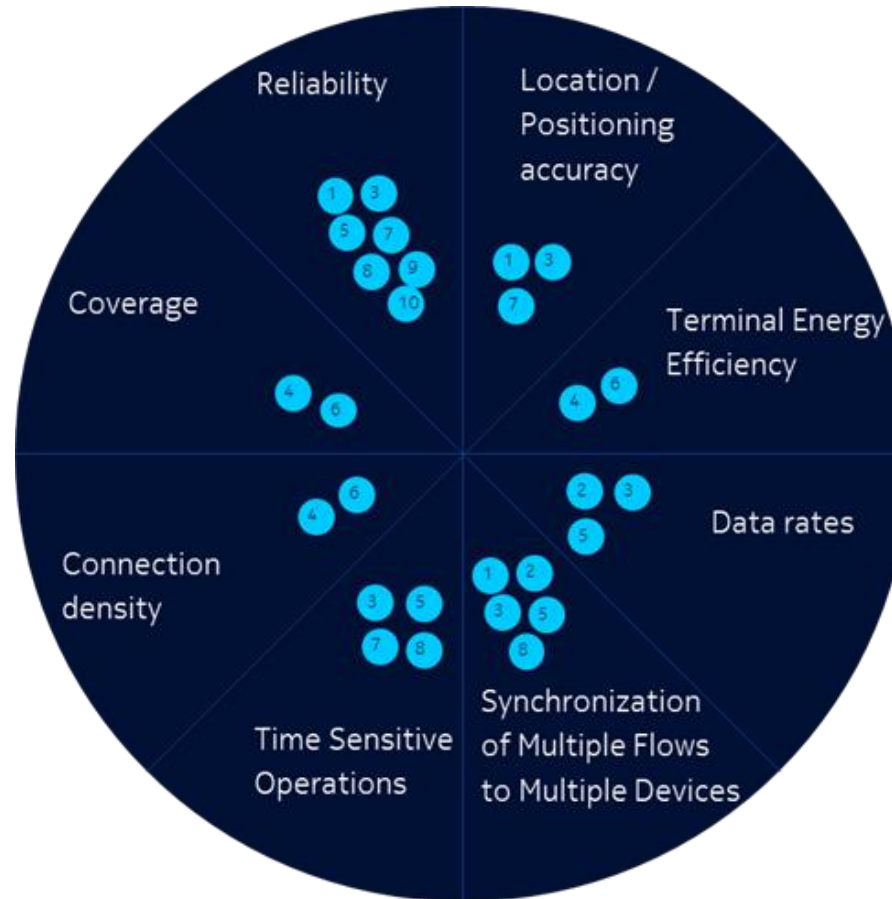
NOKIA

Swaminathan “Swami” Arunachalam, Senior Director, 6G Research and Industry Alliances, North America, Nokia

“It is early in the cycle for 6G research. Technologies relevant in the 6G era like network disaggregation and programmability across the end-to-end system are also planned to be studied and deployed in the context of 5G-Advanced. These are important stepping stones towards the 6G era which will comprise of new and additional technologies such as THz radio technologies, communication and sensing capabilities, sub-networks.”



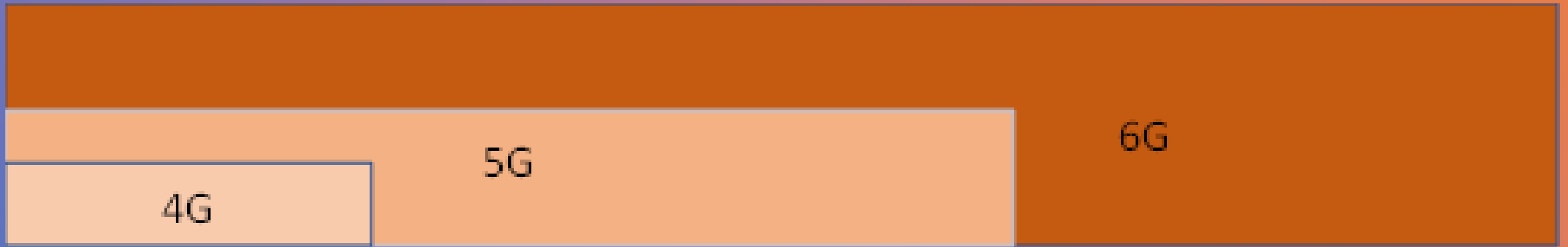
Use Cases to Tech Requirements mapping



Use cases

1. AR/VR/MR Usecase
2. Holographic Communication
3. Tactile/Haptic Communication
4. Smart manufacturing
5. Digital Twins
6. Smart Agriculture
7. Transportation Vertical
8. Medical/health Vertical
9. First Responder/Emergency Services
10. Government/National Security

Spectrum Usage for Different Generations



Above 110 GHz: Greenfield Air Interface Challenges & Beyond-leading-edge technical capabilities

Greenfield Air Interface Challenges

Severe path-loss and atmospheric absorption

RF front-end, photonics, and data conversion

Antenna, lens, and beamforming architecture

Reduce peak-to-average power ratio (PAPR)

Lower complexity and remain effective for THz operation

Beyond-leading-edge technical capability

Antenna gains from ultra-massive MIMO with accurate, practical THz multipath channel models.

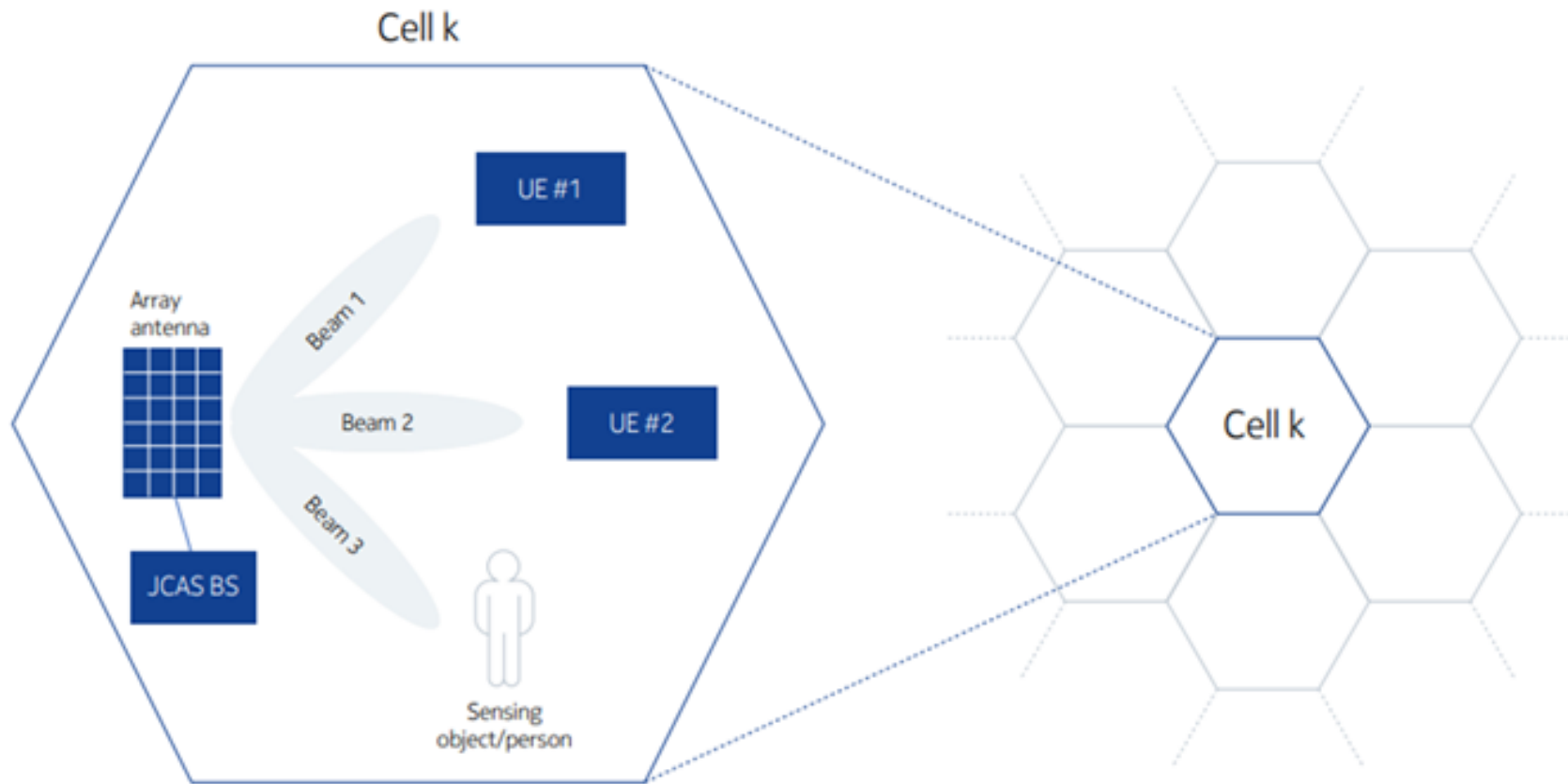
Power efficient, mW capable semiconductor technologies based on InP, GaAs, SiGe, and CMOS.

Metamaterials to block, absorb, enhance, or bend electromagnetic waves at THz frequencies.

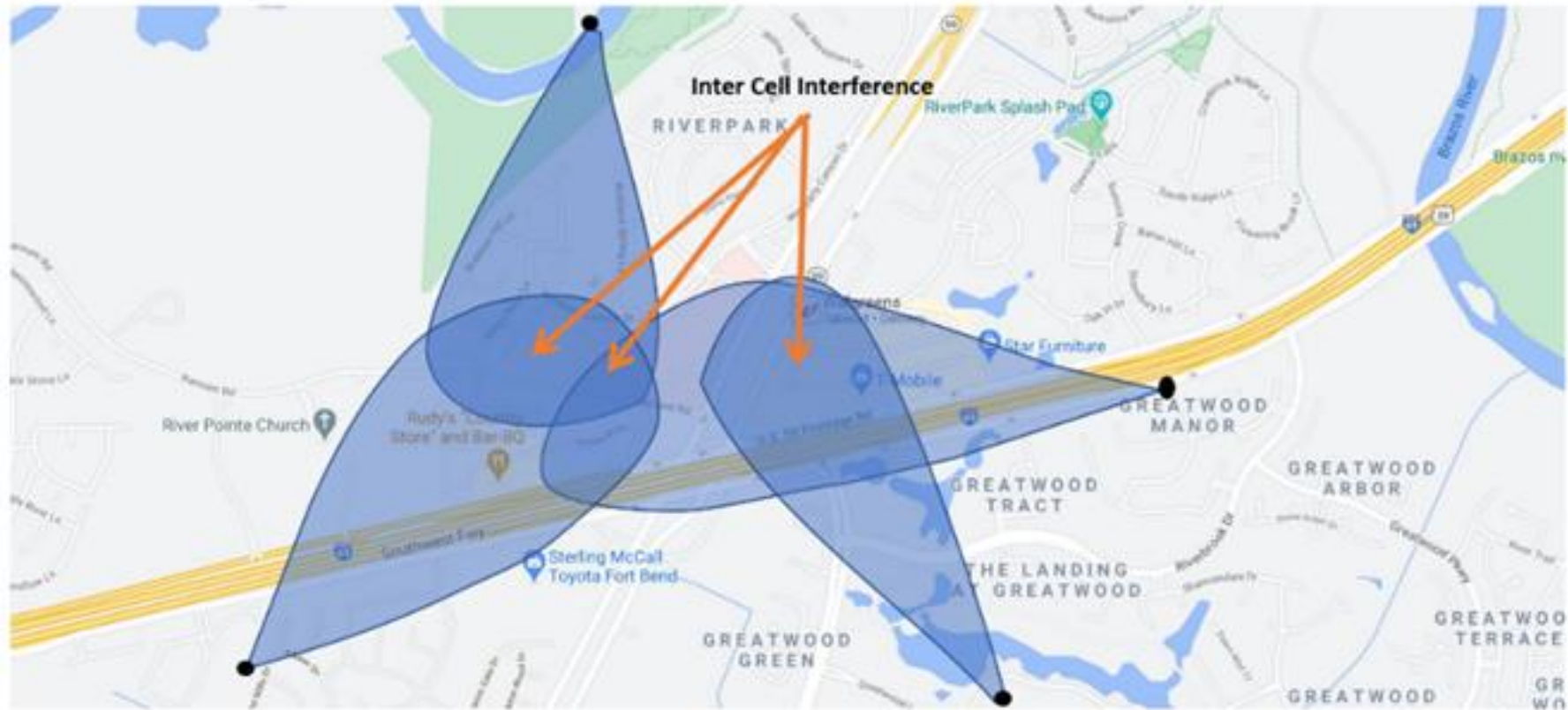
New waveforms to support GHz-wide channels.

New signals, channels, and protocols.

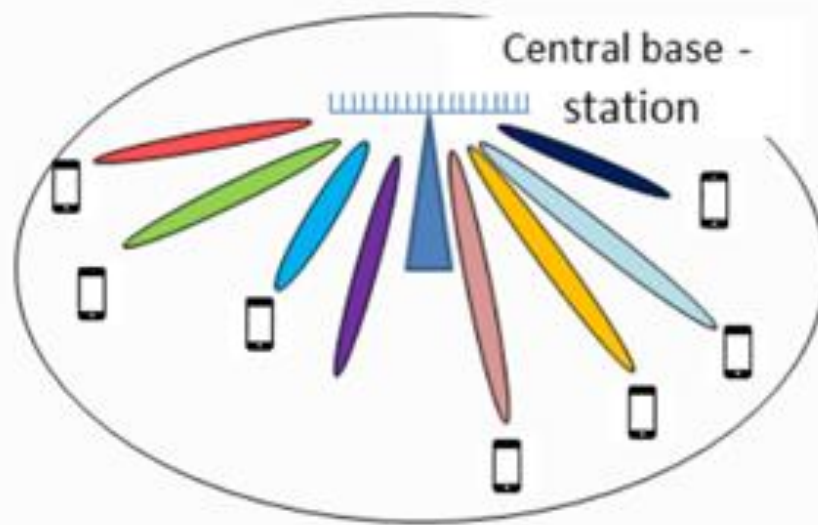
Basic joint communication and sensing (JCAS) system



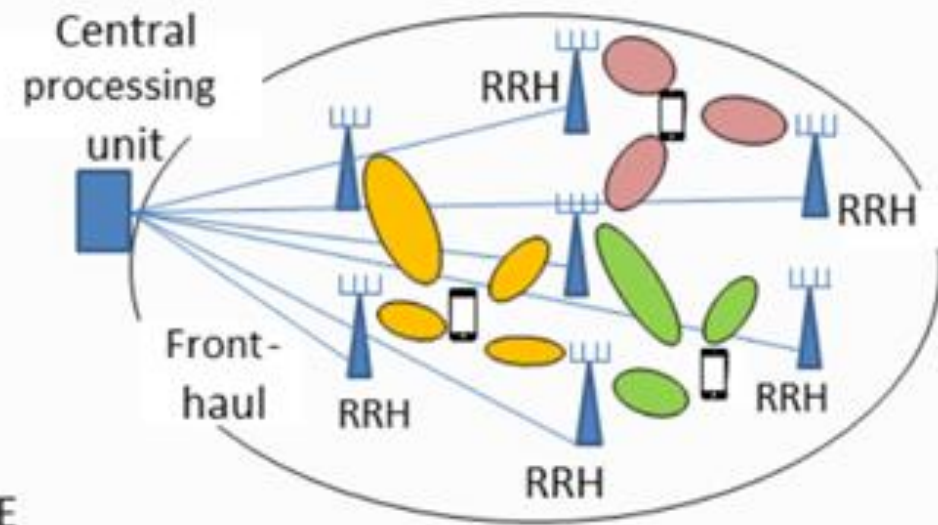
Inter-cell interference effects



Massive MIMO configuration (a) Centralized (5G) Base Station (b) Distributed (beyond-5G) base-station



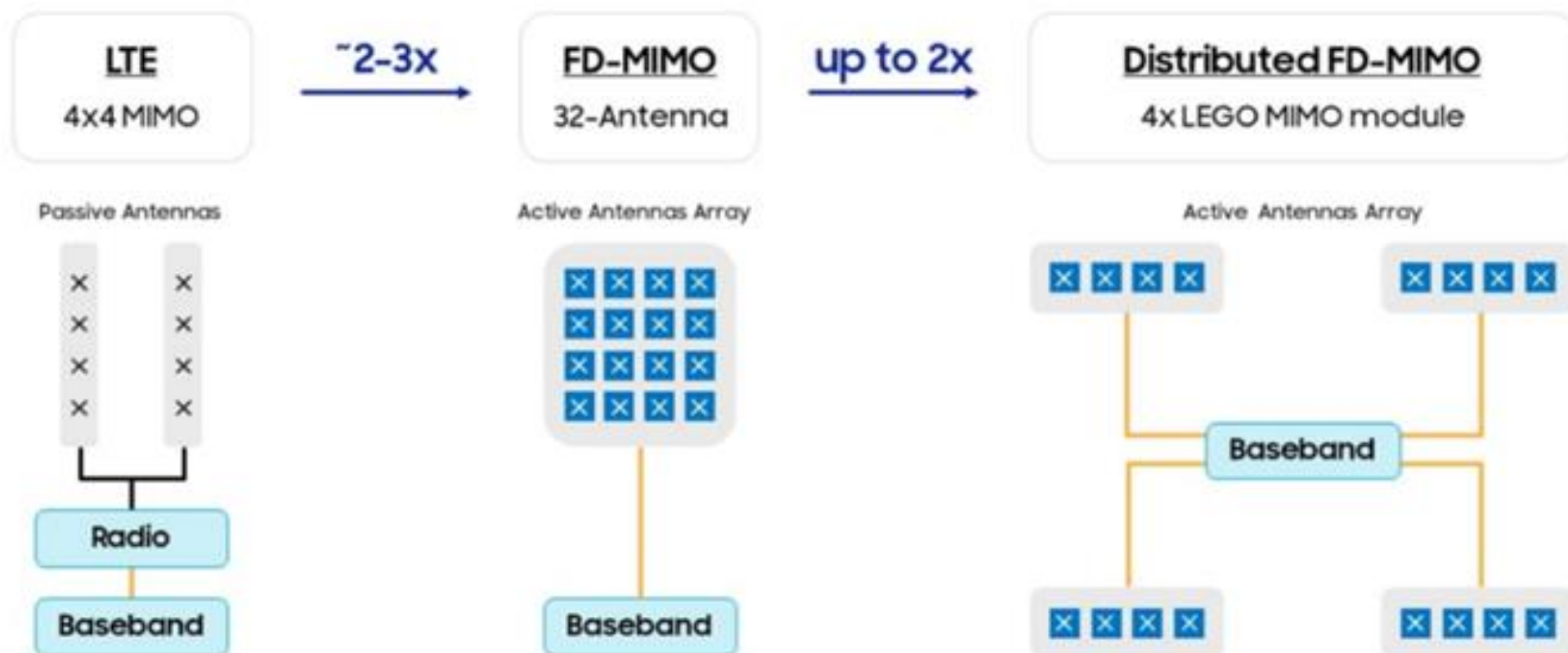
(a) Centralized



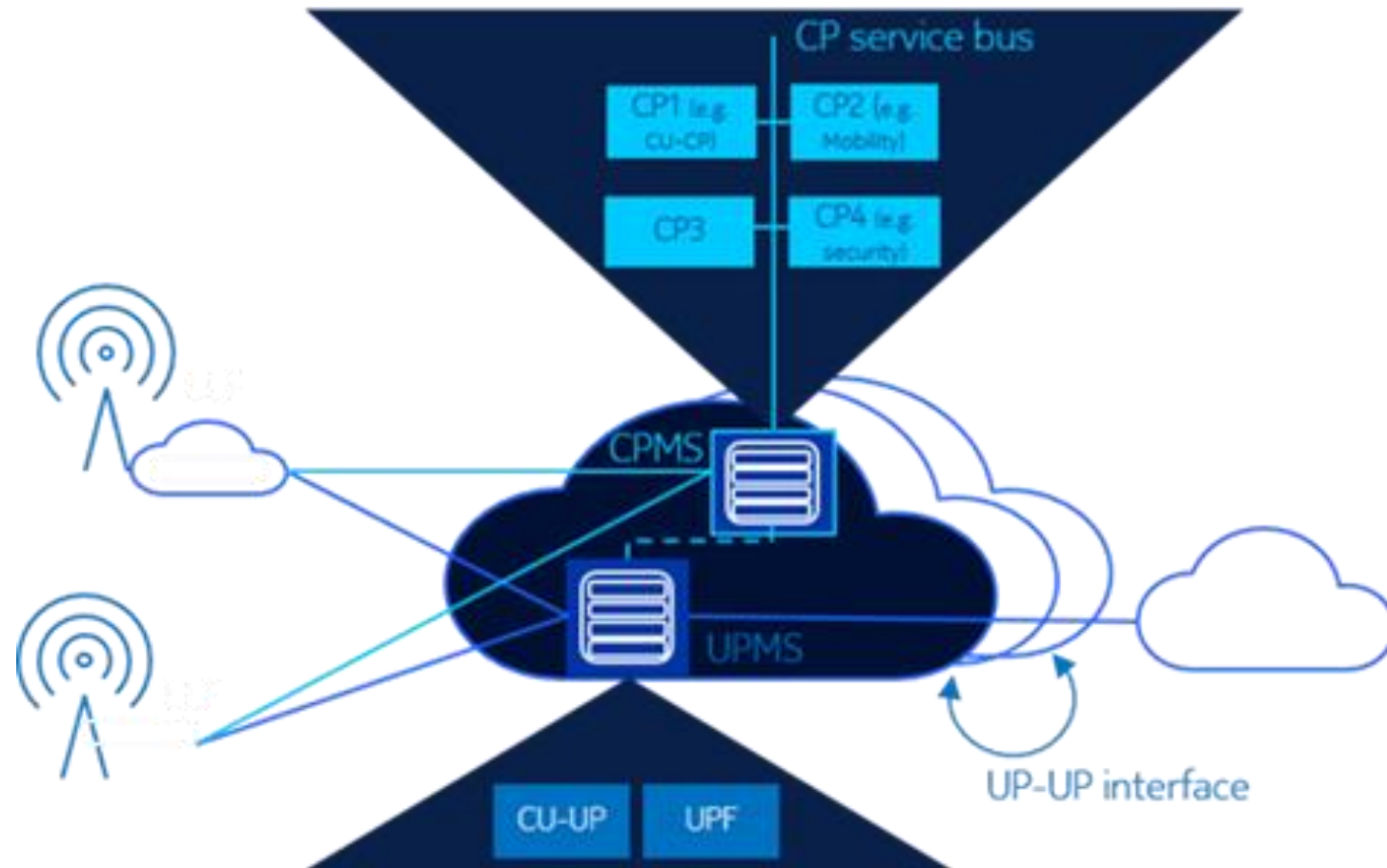
(b) Distributed

Massive MIMO configurations: (a) Centralised (5G) base-station (b) Distributed (beyond-5G) base-station

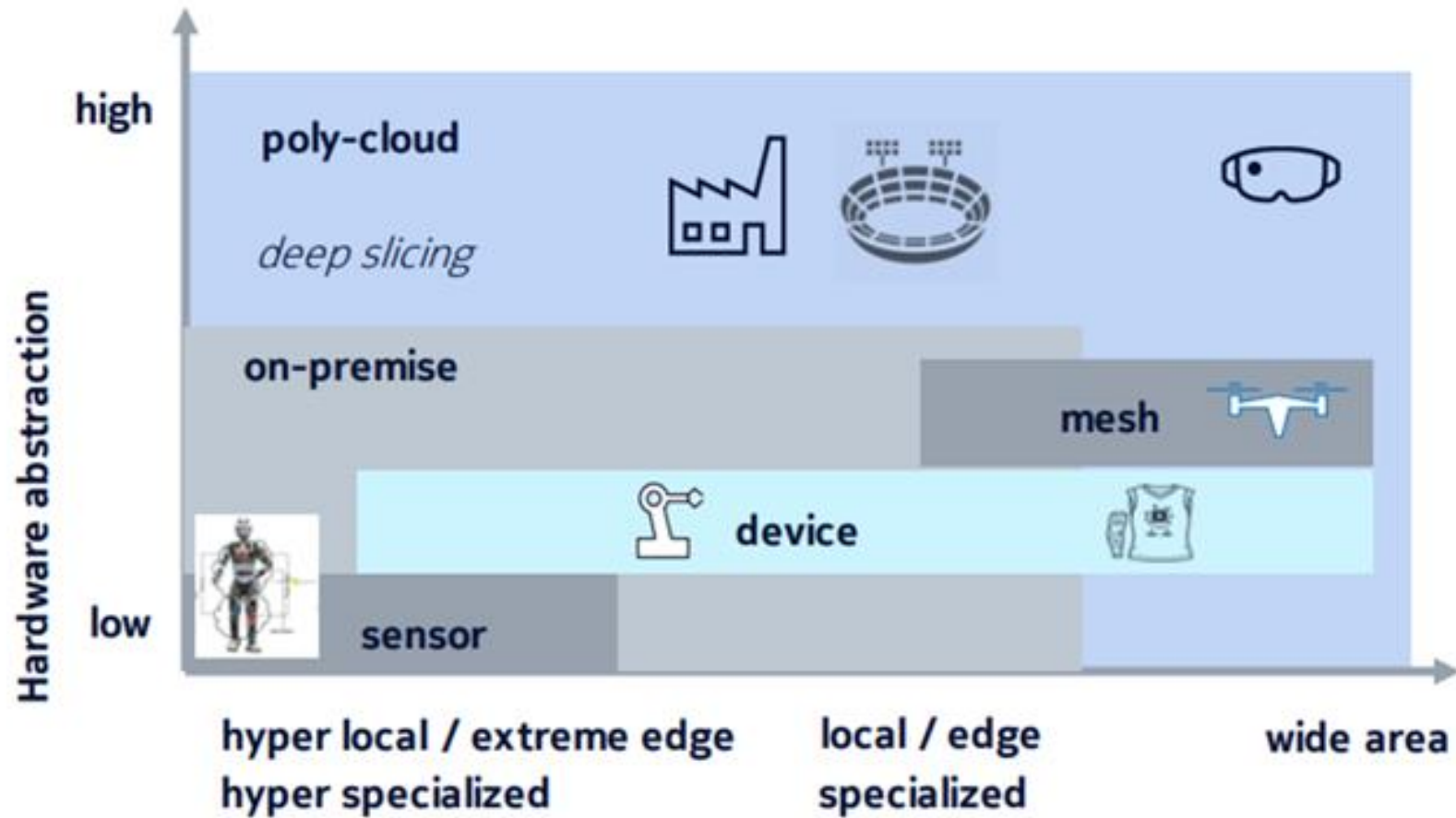
Comparison of LTE, FD-MIMO and D-FD-MIMO deployment scenarios



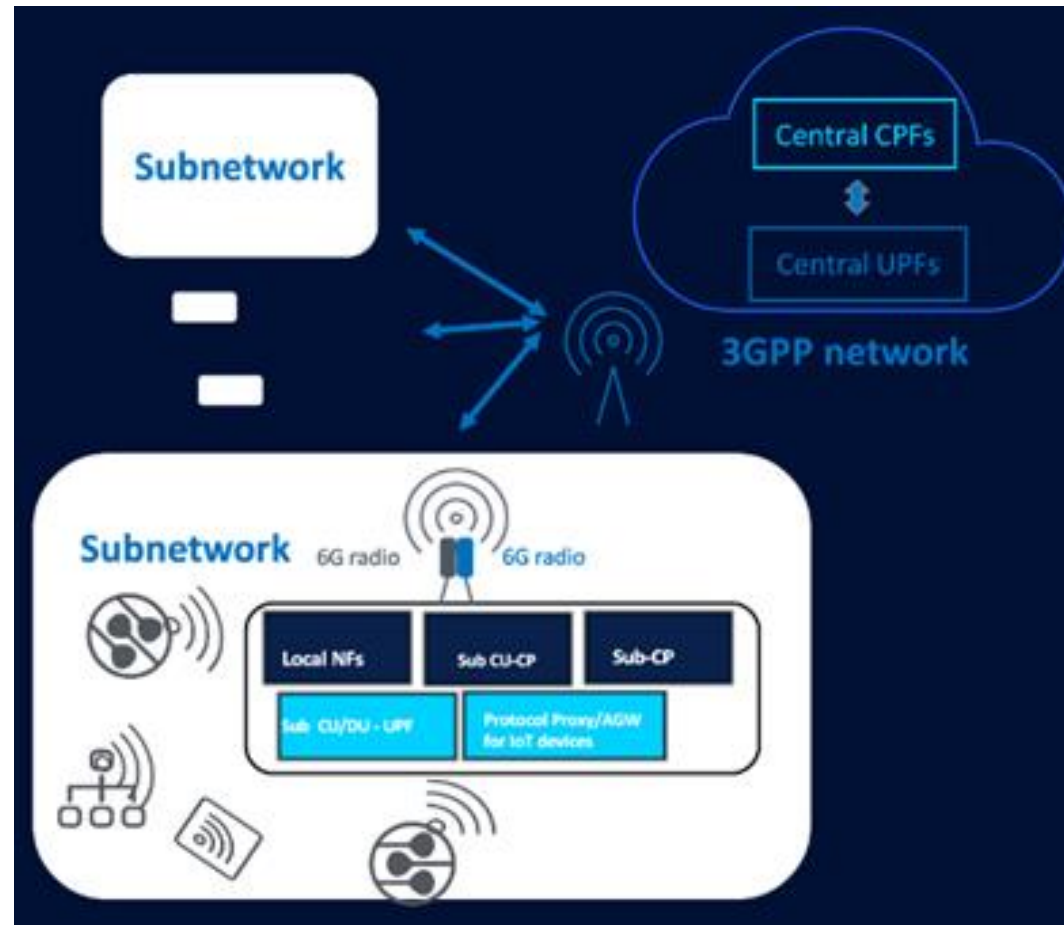
RAN Core Convergence



: 6G sub-networks classification



6G sub-network interconnection architecture



Technology Objectives for Secure Trustworthy Next G Systems



Potential technologies to technology requirements mapping

