

Building the 6G/AI Intelligent Fabric for tomorrow's society

Dr. Magnus Frodigh, Advisor CTO office, Ericsson

The intelligent fabric



The Intelligent Fabric

Always-on AI, physical AI, and agent-to-agent communication demand a new kind of network

PHYSICAL AI USE CASES



Autonomous Robotics

Warehouse, logistics, manufacturing



Autonomous Vehicles

V2X, fleet coordination



Drone Operations

Inspection, delivery, surveillance



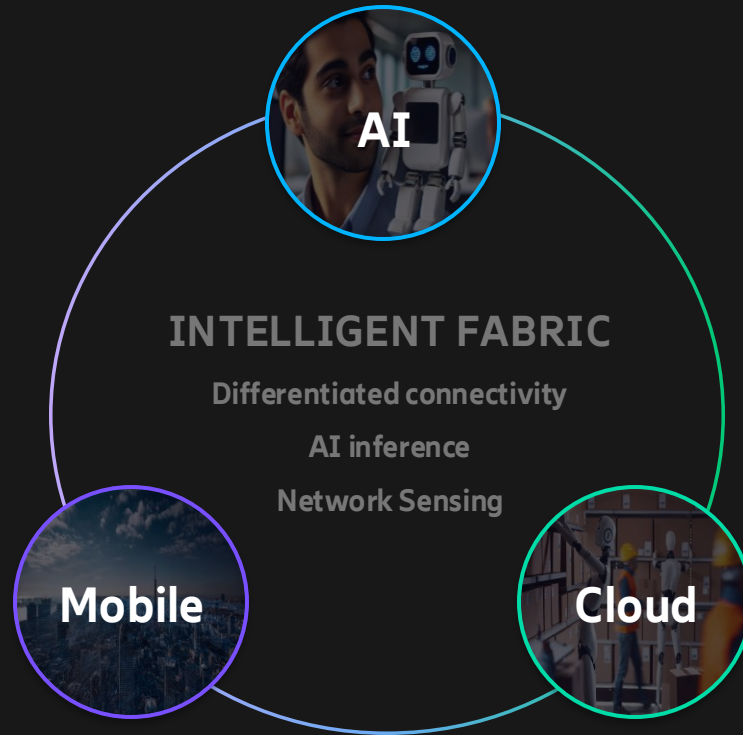
Industrial Automation

Digital twins, predictive control



AI / AR Glasses

Always-on AI, spatial computing



BEST NETWORK FOR AI

Uplink Throughput

Multi-sensor fusion & video streaming

Mbps

Deterministic Latency

Time to first token for safety-critical & real-time control loops

10-100 ms

Ultra-Reliability

Mission-critical — failure not an option

99.999%

Ubiquitous Coverage

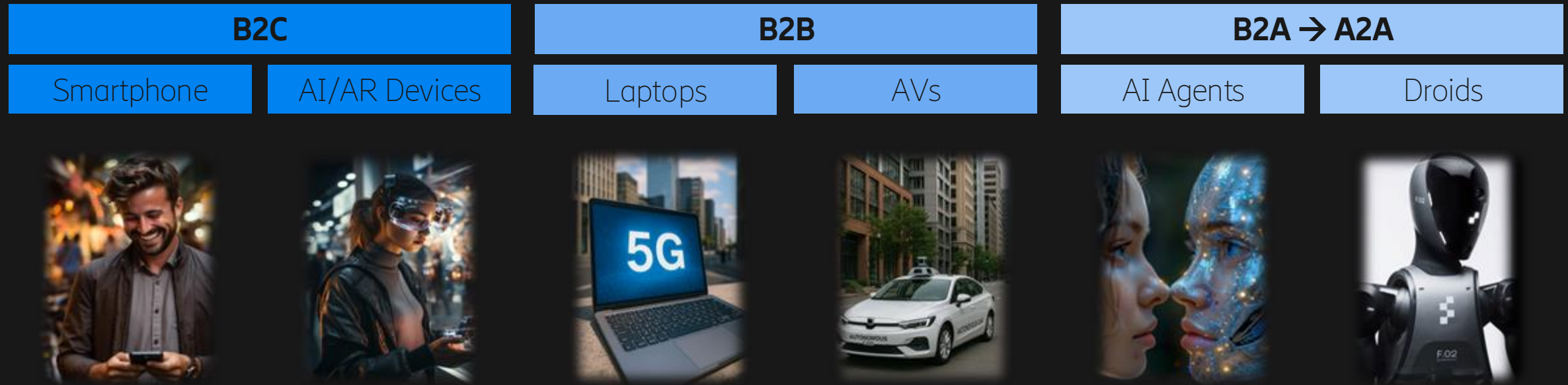
Seamless connectivity for mobile autonomy

100%

The network becomes the intelligent fabric powering physical AI

New use cases and form factors

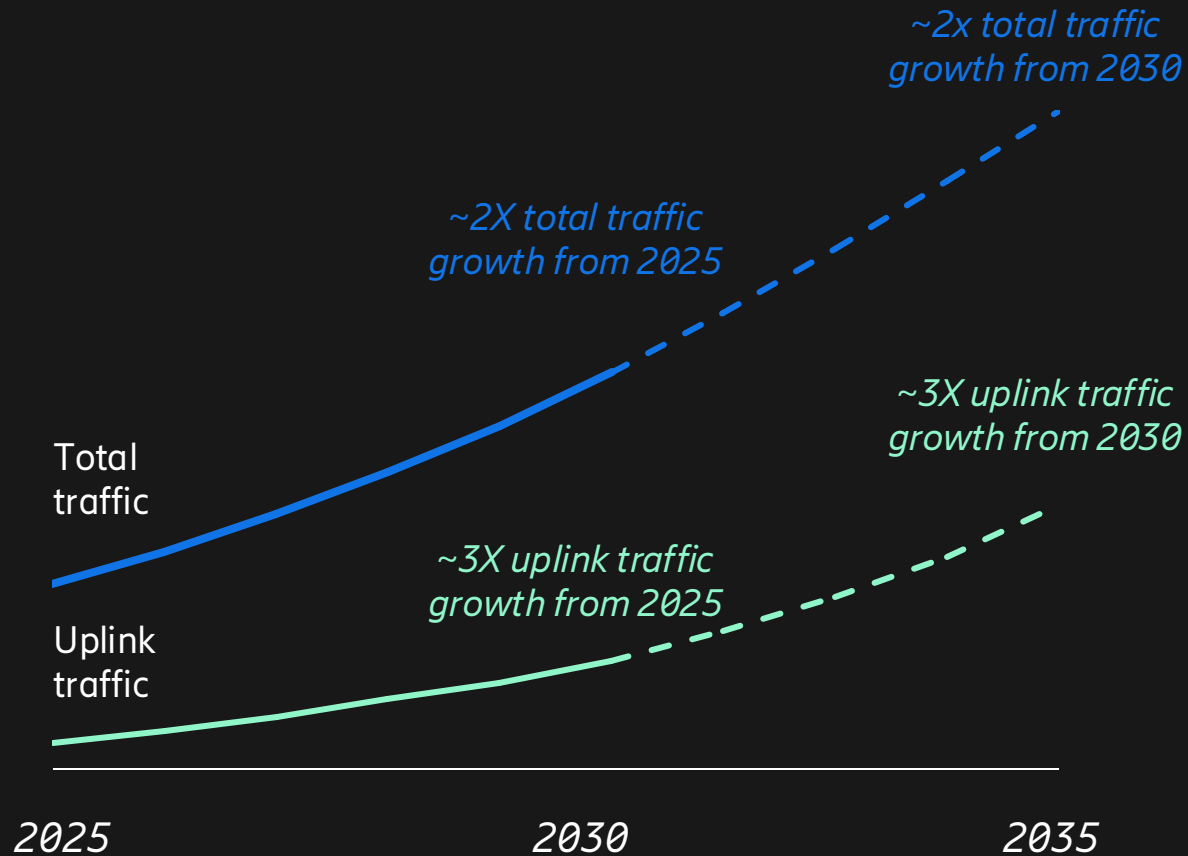
driving the need for **assured connectivity**



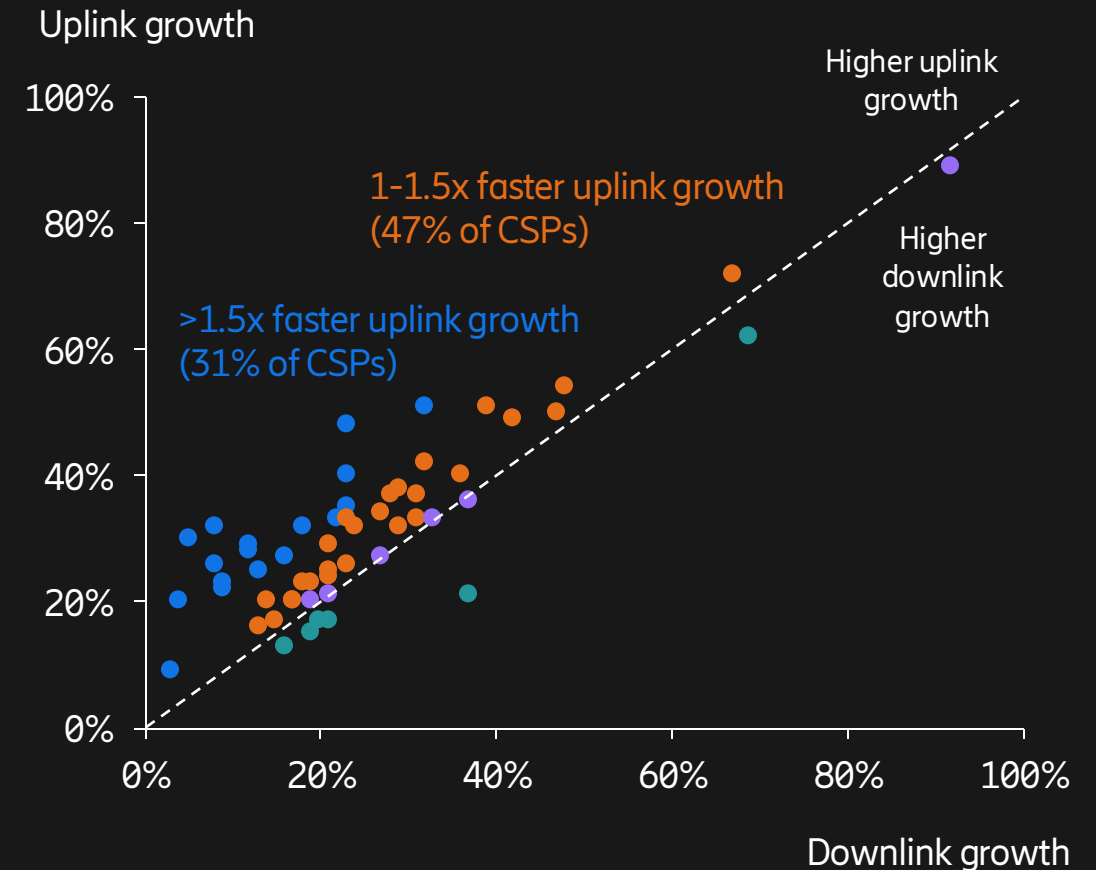
Chatty AI agents, offload from robots and new form factors capturing reality - all need **assured connectivity** — bounded latency, guaranteed performance, uplink heavy, e2e orchestration and SLAs on token level.

Uplink growth projected 3x every 5 years – already growing faster than DL in 4/5 networks

Mobile data traffic scenario



12-month traffic growth: Uplink vs. downlink across 55 operators globally



CSP's AI Compute — where to place workloads?

Opportunity to add AI inference to biz model: bits/s/W + network capability + tokens/s/W



Device/sensor



MIMO Radio



RAN Compute



Breakout Core



Enterprise on-prem



CSP Core



Public Datacenter



	User equipment 1,000,000X	Radio and RAN-site 10,000X	Edge and Core-site 10X	Cloud and AI DC 1X
Latency	Ultra low	Very low	Low	Medium
Compute power	1-15 W	0.5-2 kW	10 kW-10 MW	100 MW – 1 GW
Rationale	Local data/privacy with ultra-low latency	Sovereignty with very low latency and reduced data movement	Sovereignty with low latency and reduced data movement	Global availability at high economies of scale
Examples	Tiny/small AI models On-device assistants/ agents, speech processing	Tiny/Small/Medium AI models RAN, e.g., link adaptation. Specialized AI services in hubs or enterprises	Small/Medium/Large AI models Enterprise AI services and CSP high-volume AI services, e.g. video search, language translation & summarization	Large AI models Training and inferencing at scale

Driving mobile networks for new waves of innovation

Three columns

100×

Data speed increase every 10 years

1,000,000×

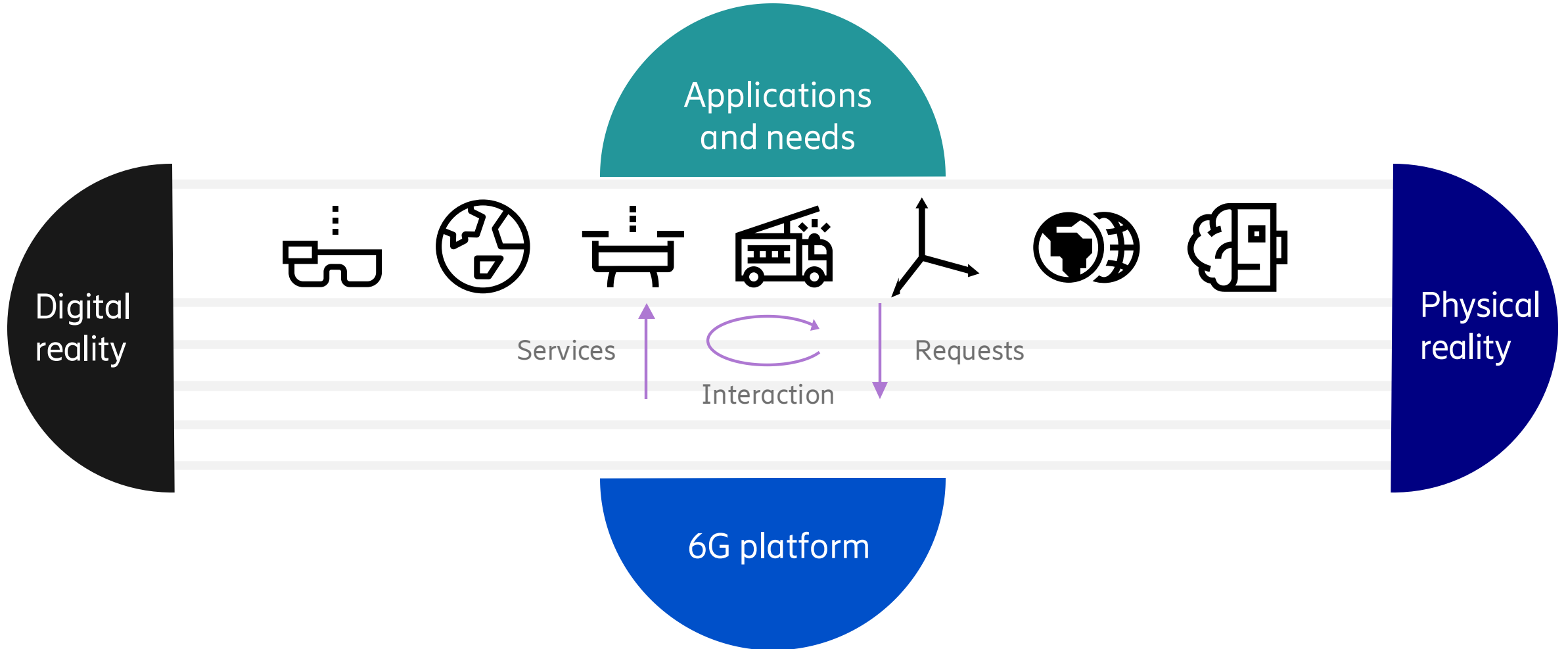
Data speed increase in 30 years

Faster than Moore's law

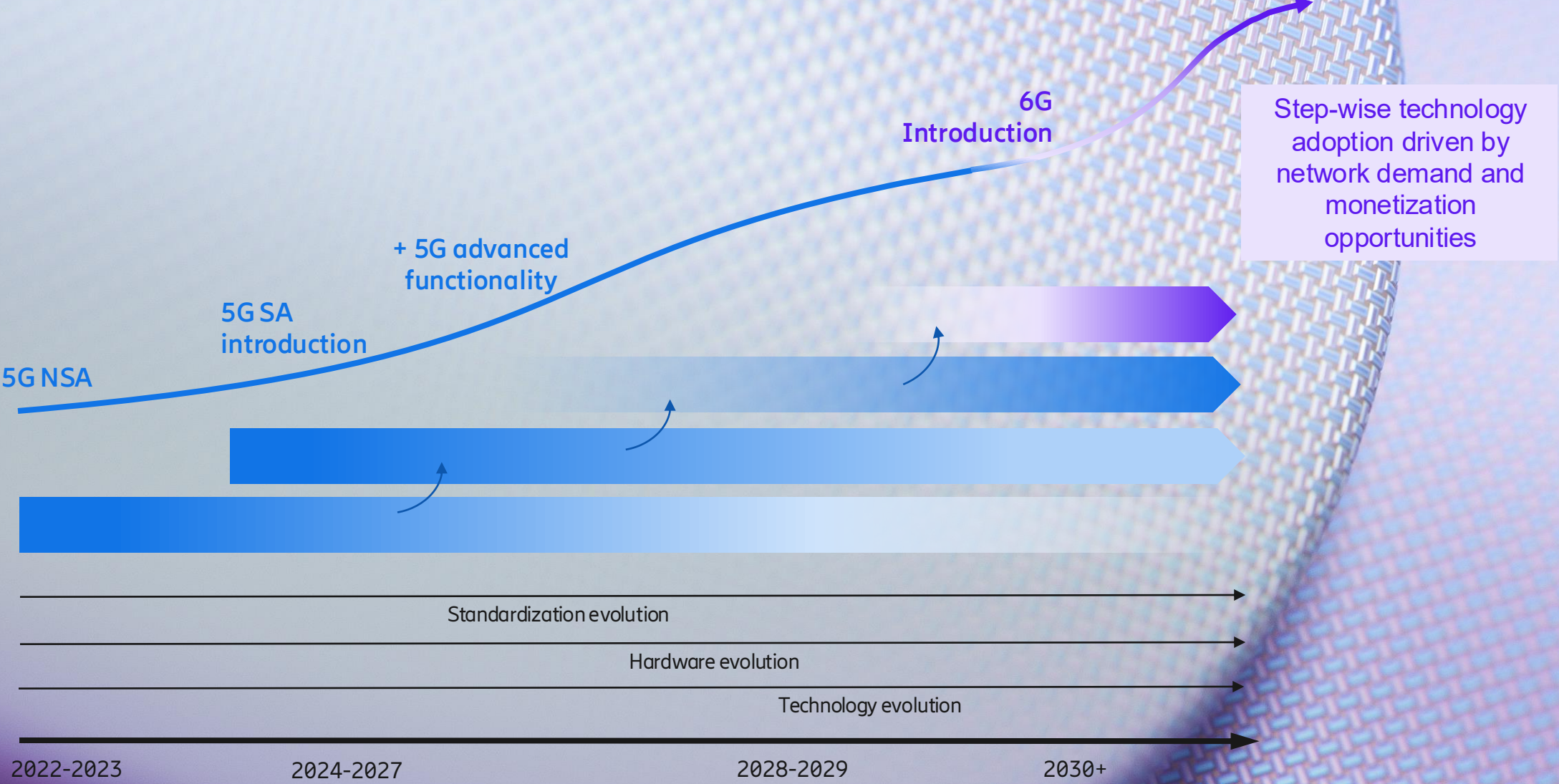


Co-creating a cyber-physical world

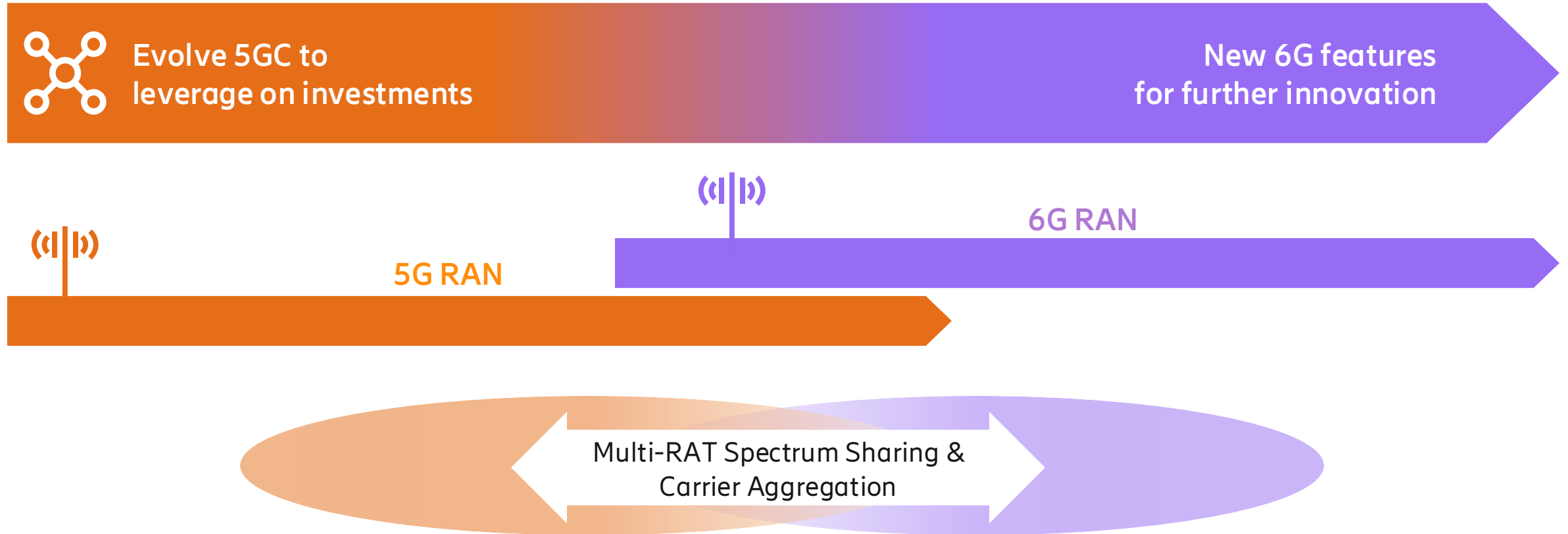
With the 6G network platform



Network evolution



5G to 6G architecture evolution and coexistence



Intelligent multi-layer co-ordination in 2030+

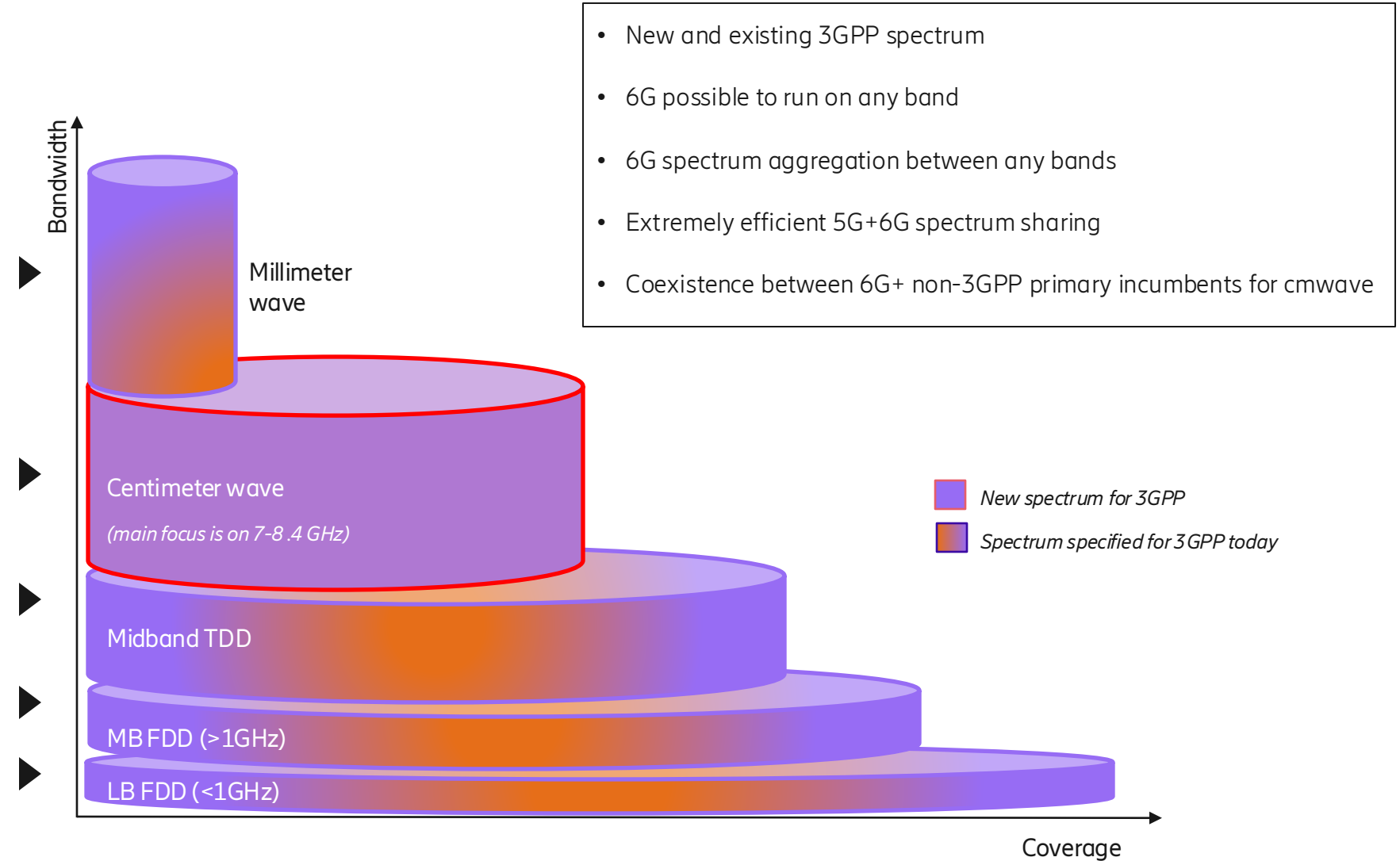
mmWave (24...47 GHz) : High-speed, very low latency in localized areas

cmWave (7...15GHz) : Good coverage, good capacity (the lower the spectrum, the better)

Midband TDD (2.3...<7 GHz) : Wide area coverage and good capacity

Midband FDD (1.. 2.7 GHz) : Nationwide coverage

Lowband FDD (<1 GHz) : Nationwide coverage and deep indoor penetration



6G extending the 5G network platform



Network APIs for differentiated communication services



Network APIs for information, compute & AI services



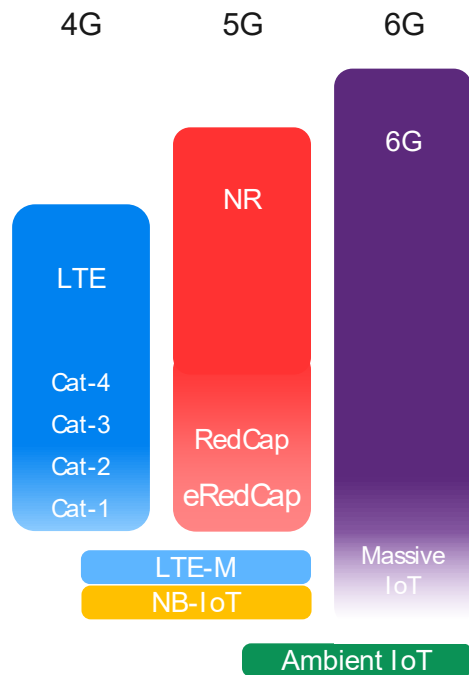
Transport data for anything,
anywhere

Process & store data

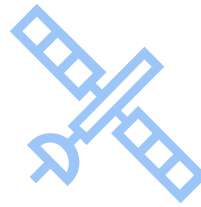
Be a source of data

Scalable 6G RAT for all device types

Scalable 6G RAT for all device types



NTN integrated in 6G



Fixed wireless access large traffic volumes



Sensing and positioning Reuse 6G sites and HW for sensing

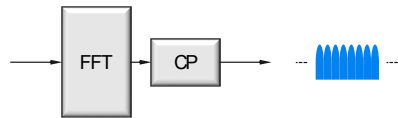


...and more!

Examples of key technology areas

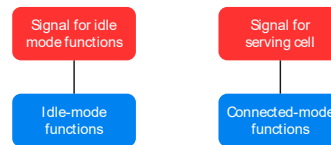
Keep basics of 5G PHY

OFDM, LDPC coding



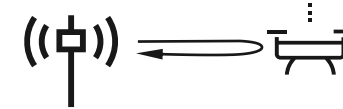
Energy efficiency

separate signals for idle and connected mode



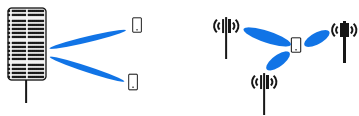
Integrated Sensing and Communication (ISAC)

Detect/Locate/Track *passive* objects



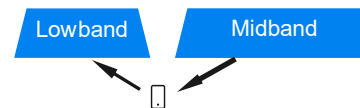
MIMO

Extremely massive MIMO
Interference-aware D-MIMO



UL-DL decoupling and CA

Best DL band might not be best UL band



Spectrum aggregation

Fast CA



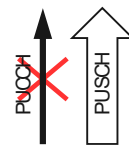
AI/ML

as a tool for many RAN applications



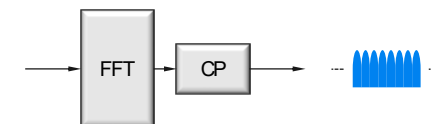
Unified uplink reporting

Asynchronous reports
Minimize scheduling restrictions

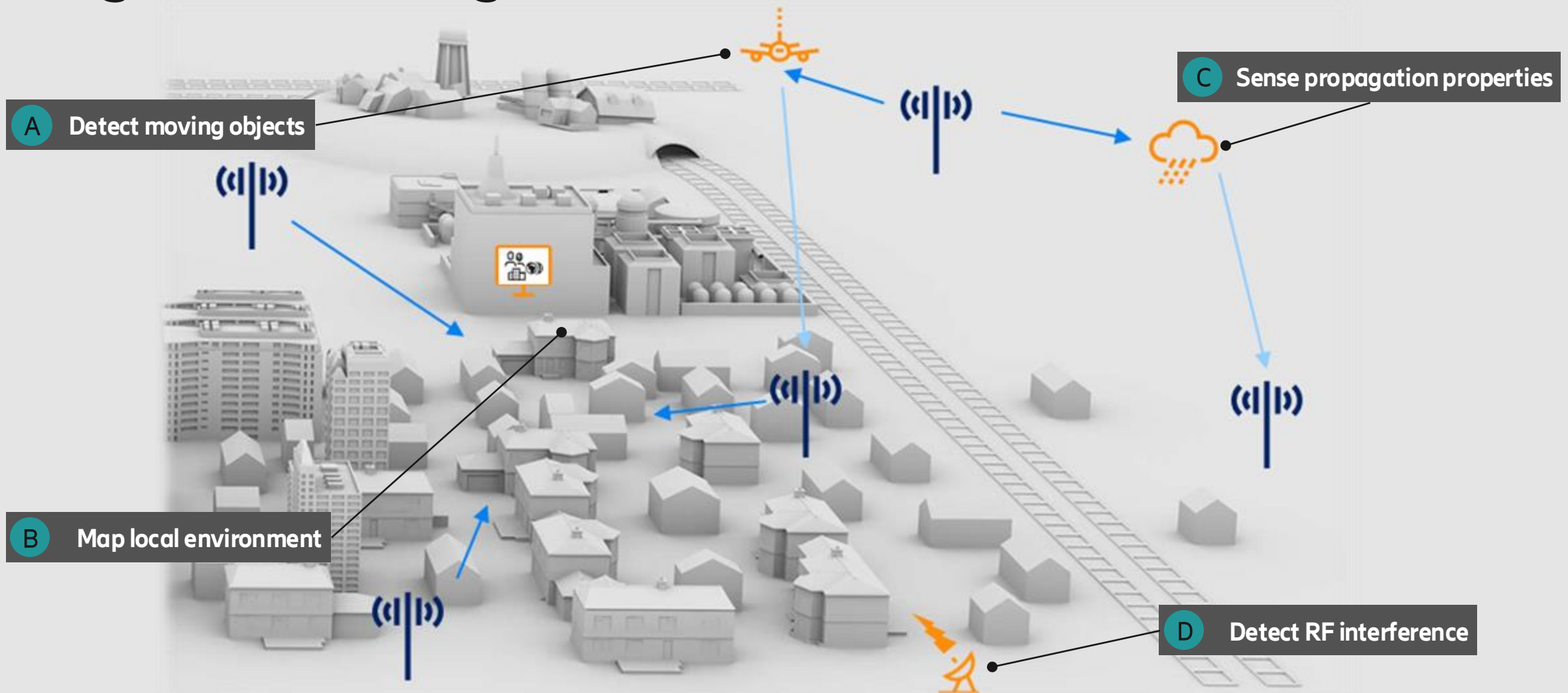


Time-critical communications

The right packet at the right time

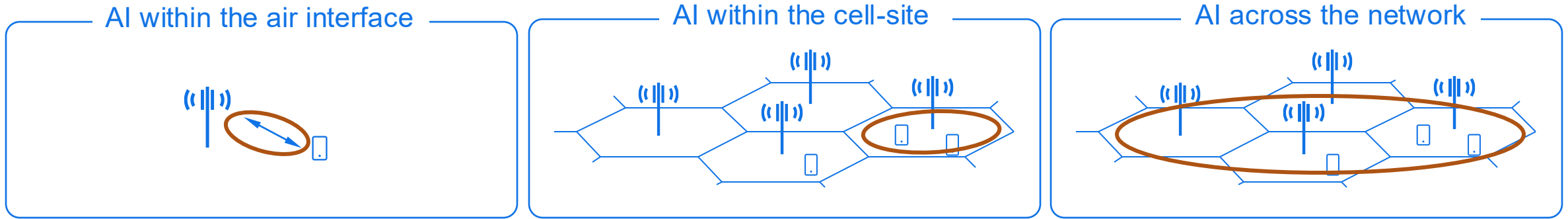


Integrated Sensing and Communication (ISAC)

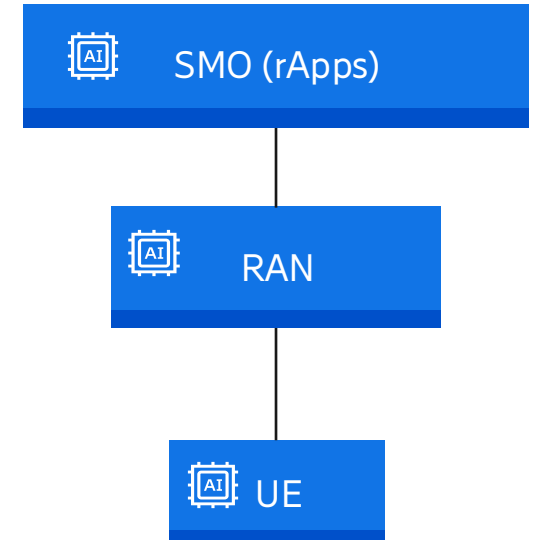


ISAC use cases to be phased in time due to increasing technical challenges

AI in 6G RAN

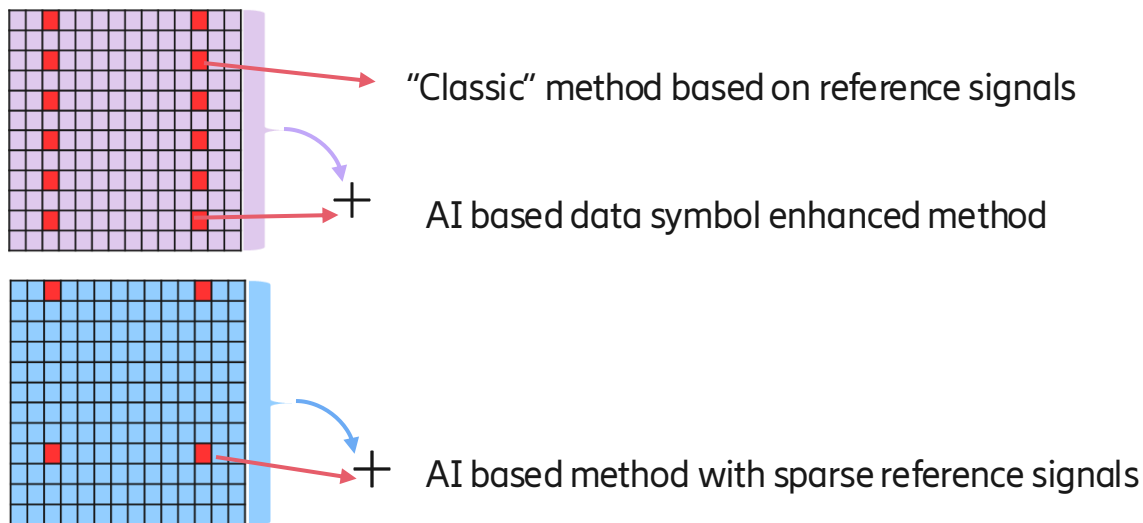


- All areas above are being studied for 6G
 - Incl. L1, L2 scheduling, L2/L3 UP and RRM, automation
- Solution will build on and improve upon work ongoing in 5G standardization (3GPP, O-RAN), implementation and deployment
- AI inferences will be primarily performed in the RAN functions, UEs and SMO(rApps)
 - Meeting latency requirements, and avoiding excessive data transport
- Data collection, localized / centralized training, data driven development, AI LCM, ...

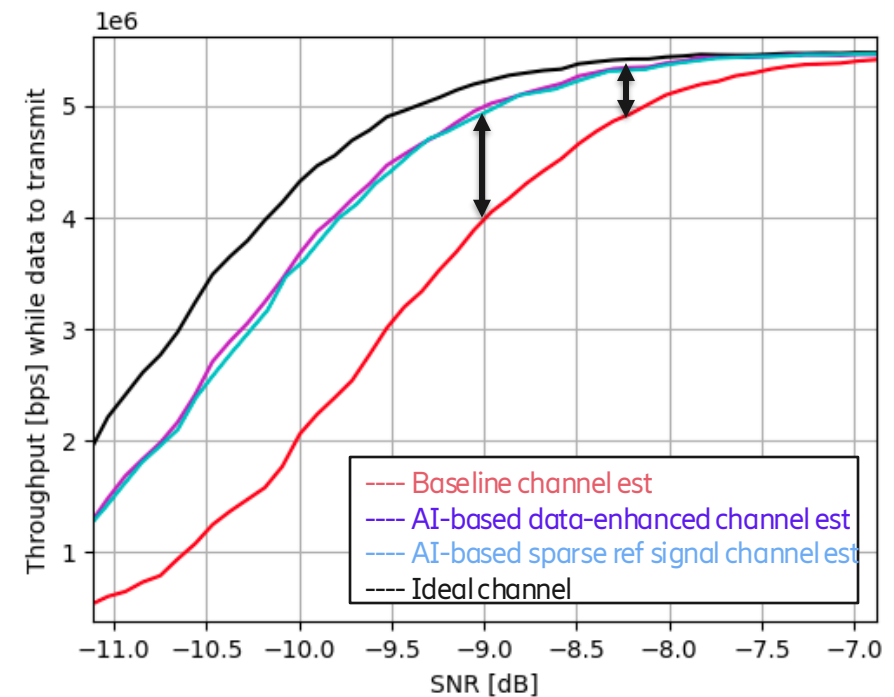


Example AI gain: Improved channel estimation

- AI uses a combination of data and reference signals
- AI provides higher accuracy
- AI requires less reference signals and thus less overhead



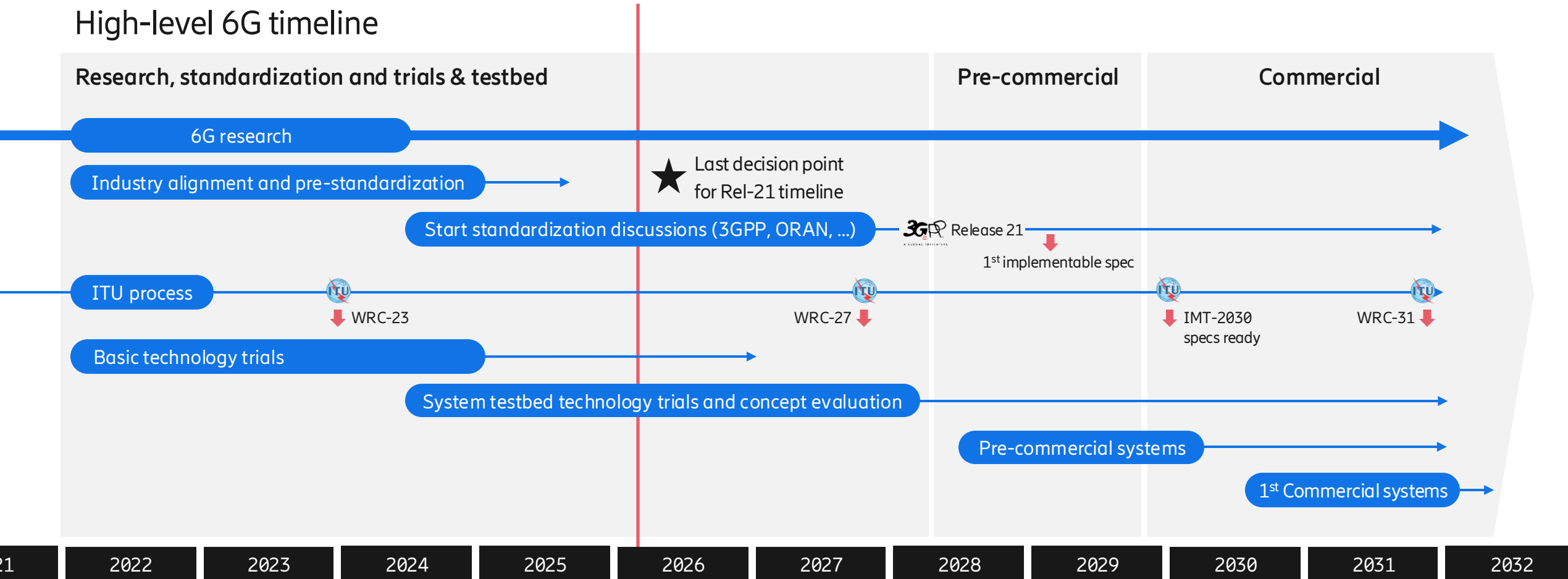
+10-25% uplink throughput
(+ overhead reduction +~5%)



Industry 6G timeline

Key milestones and phases

High-level 6G timeline



Network and device eco system preparations for 6G: MWC demos

6G cm-wave for future devices



- With Qualcomm
- How we jointly evaluate our radio development fast tracking 3GPP decisions (e.g. 30 kHz CS at 7 GHz bands)
- Plus 6G requirements from device and AI evolution

Data call on 6G cm-wave



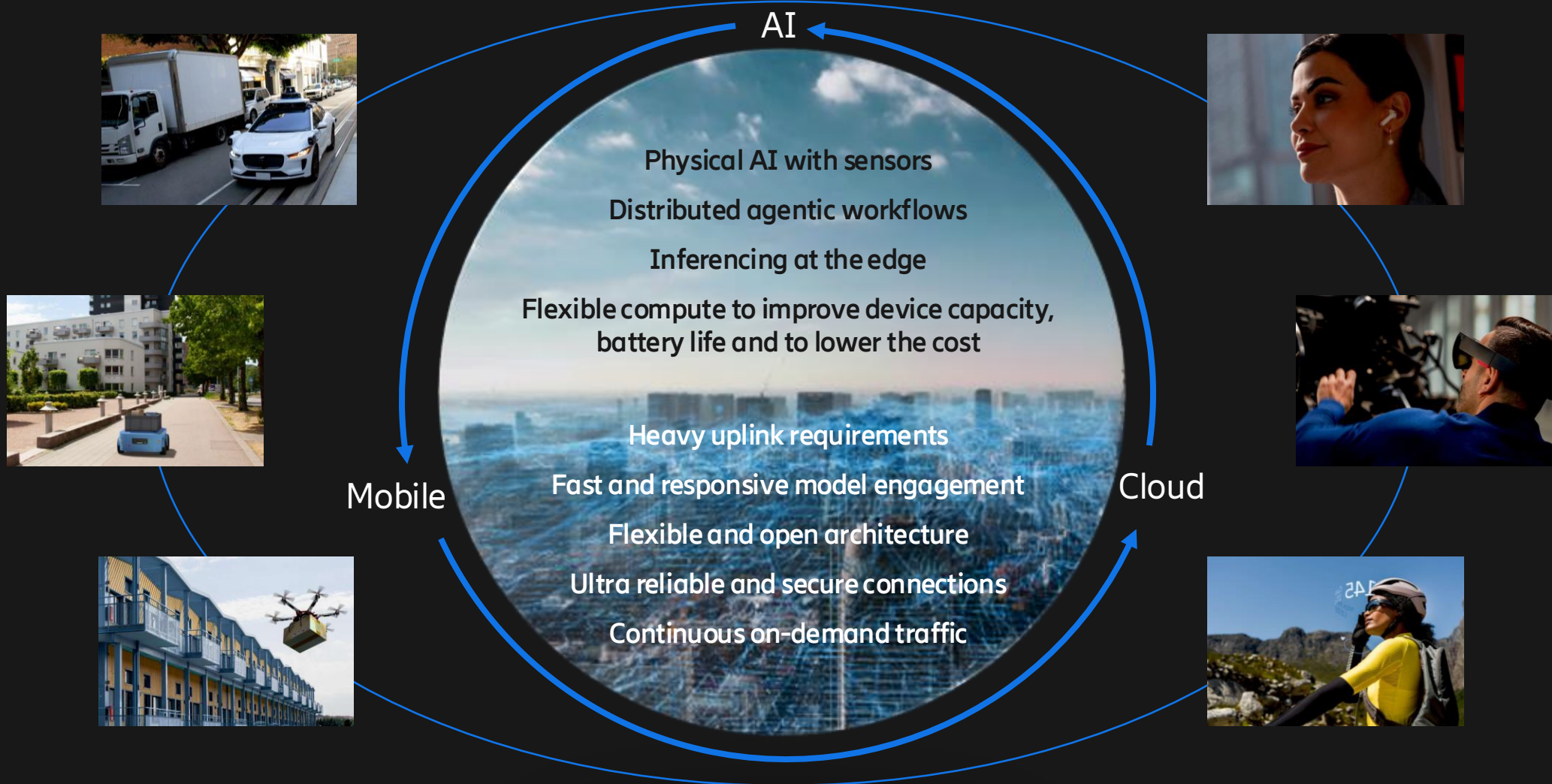
- With MediaTek
- How we jointly evaluate new candidate features (here focus on contention based uplink)
- Live operating system on site, radio + baseband

Smooth migration to 6G



- With Apple
- Live prototype demonstration of Multi-RAT Spectrum Sharing (MRSS) for smooth 5G to 6G migration

The intelligent fabric





ERICSSON

ericsson.com/6g