Critical Communications towards 6G

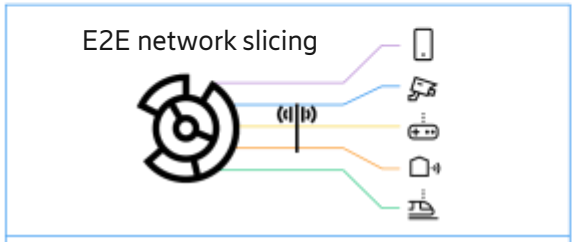
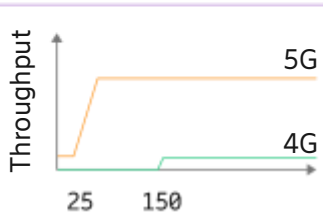
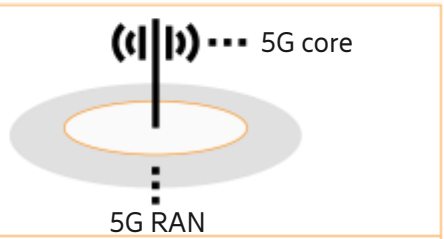
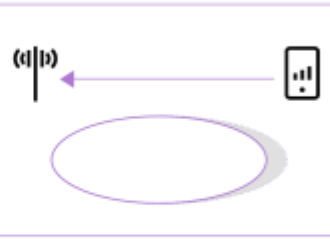
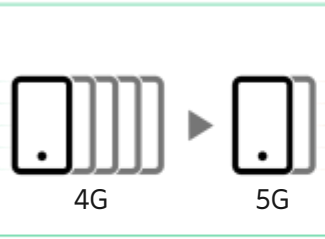
Csaba Novák, Ericsson

Networks Pre-Sales Lead

5G SA

Selection of 5G SA key benefits

Selection of 5G SA key benefits*

New business opportunities	Enhanced end-user experience	Network efficiency	Less complexity
 New services, new market segments, new 5G core	 Get instant access to 5G	 Extend 5G coverage	 Network simplicity
 Time-critical communications	 Better uplink coverage	 LTE offload	 Device simplicity

* Examples of other benefits include: enhanced security (advanced encryption and identity protection), simplified operations and service agility.

5G SA Network Slicing

A Network Slice can span across Radio, Core and Transport to match with specific customer needs

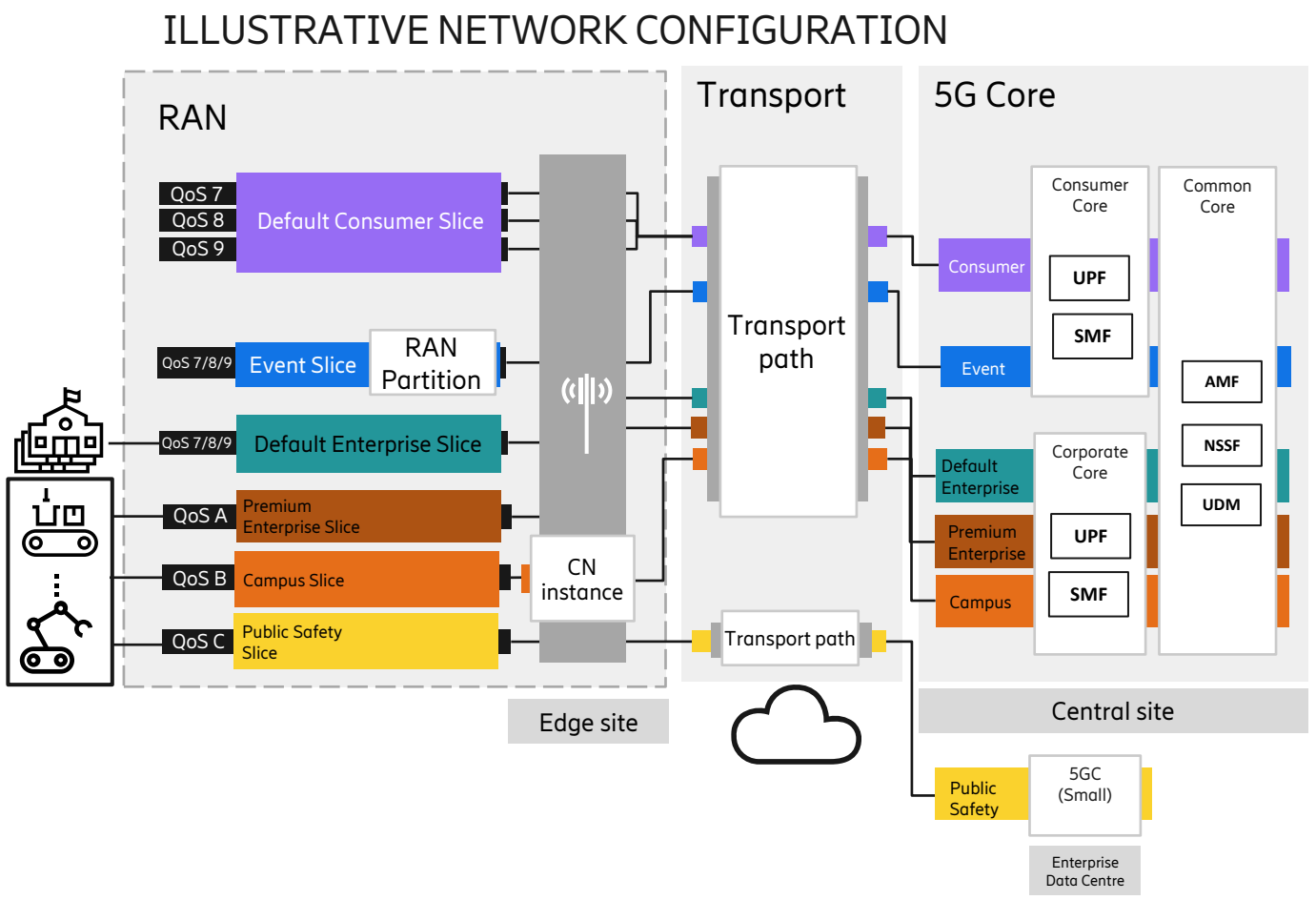
Network slicing is a toolbox to allocate and isolate network resources

Slices are allocated within the boundaries the network capacity

S-NSSAI (Single Network Slice Selection Assistance Information) to identify a Slice

Slices can be limited to geographic area or defined across the whole network

Slices can be mapped to Quality of Service and Radio Resource Partition



Next-generation Mission Critical networks

Accelerating digital transformation for governments and critical industries

Saving lives, protecting property and enabling a safer society

Delivering next-gen smart grids, for operational excellence

Driving greater utilization and productivity from rail networks

Maximizing effectiveness in data rich operating environments

Unlocking new business opportunities in the sky

Enable seamless cross-domain collaboration | Improve situational awareness | Accelerate response through accurate decision-making

Access to a standardized communications service that provides secure, reliable, intelligent and predictable connectivity demanded by professional end users

Far EasTone 5G SA Smart Ambulance with Network Slicing

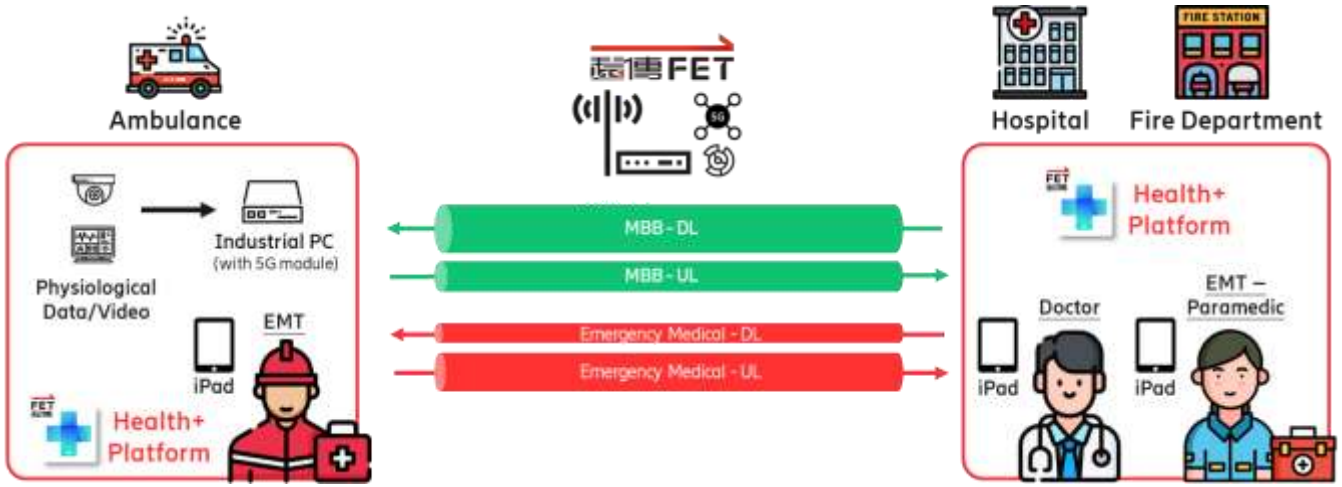
Advanced Emergency Rescuer

"From Mission Critical to Life Critical"

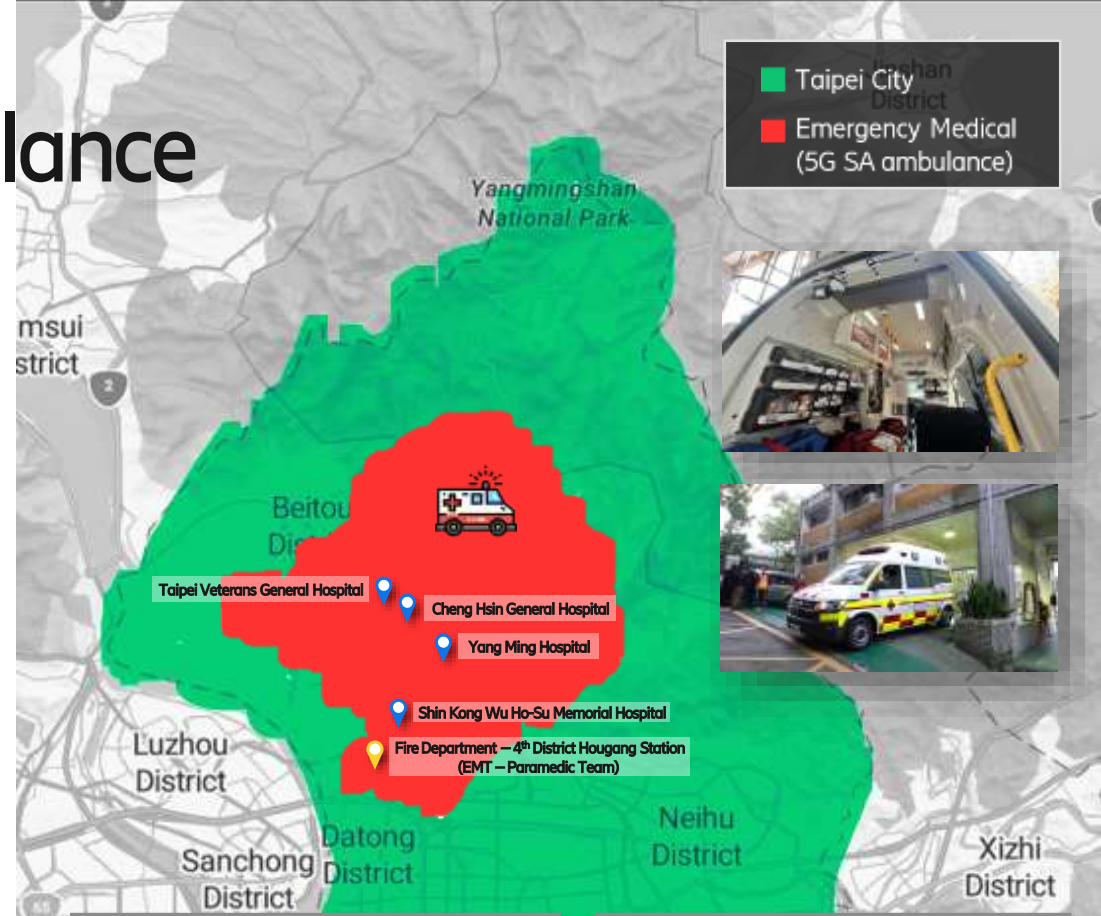
“Life is Critical” – 5G SA Smart Ambulance

Emergency Medical Services

- Soft-launch in 20% of the Taipei city area to show the ability to sustain performance levels for mission critical functions while passing video and critical data over a network slice in a live 5G SA environment.
- Demonstrate the capabilities of end-to-end, dynamic network resource provisioning on a 5G SA network to enhance situational monitoring/awareness/response for emergency medical services between smart ambulance, emergency medical technician & doctor.



Transmit the critical data timely to Emergency Medical Technician – Paramedic team & Hospital



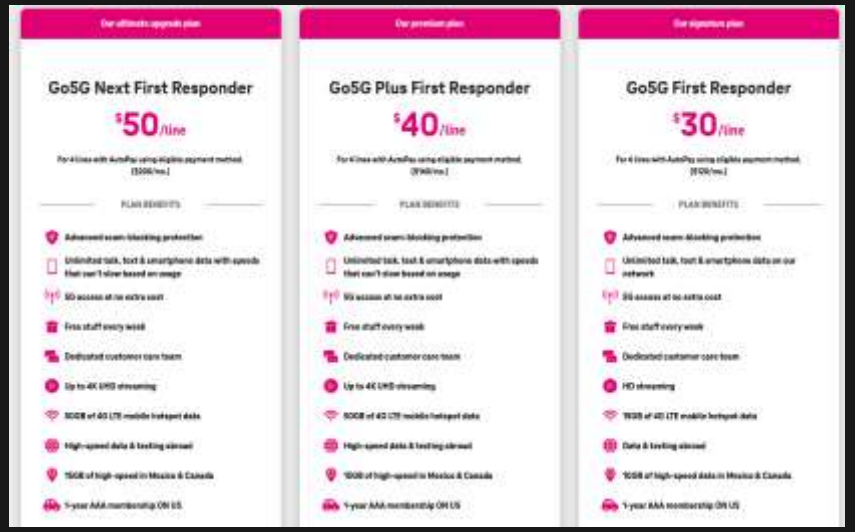
Requirements:

- Latency – <30ms for video/image and data transmission
- UL/DL – 6Mpbs for real-time streaming (1080p)
- UL/DL – 3Mpbs for iPad & equipment
- Availability – 99.999%
- Coverage – Location (Shilin/Beitou district in Taipei)
- Security – Data Protection

Results:

- Improve quality and efficiency of emergency medical service
- Solve the communication bottleneck of situational monitoring/awareness/response between ambulance, EMT & hospital
- Improve treatment rate of critical injured patients
- Increase success rate of CPR

Mission Critical Slice. Network Slice for First Responders



The world's first network slice for first responders

first responders get lower latency and faster 5G speeds more consistently as well as highest priority across every single 5G band, even in times of extreme congestion.

Best-in-class partners

T-Priority comes with the latest technological solutions from top industry partners (Ericsson, Motorola Solutions and 3rd-Eye Technologies)

Offer includes

3 tiers including 4 lines per subscription ($50/line , $40/line , $30/line) with a wide range of compatible devices (initially it was Motorola only).

Source: t-mobile.com T-Mobile CMD September 2024 https://www.t-mobile.com/cell-phone-plans/first-responder-discounts T-Priority: Device Compatibility | T-Mobile for Business TMUS Q4 earnings call

5G SA – Time Critical Communications

Completing the 5G vision

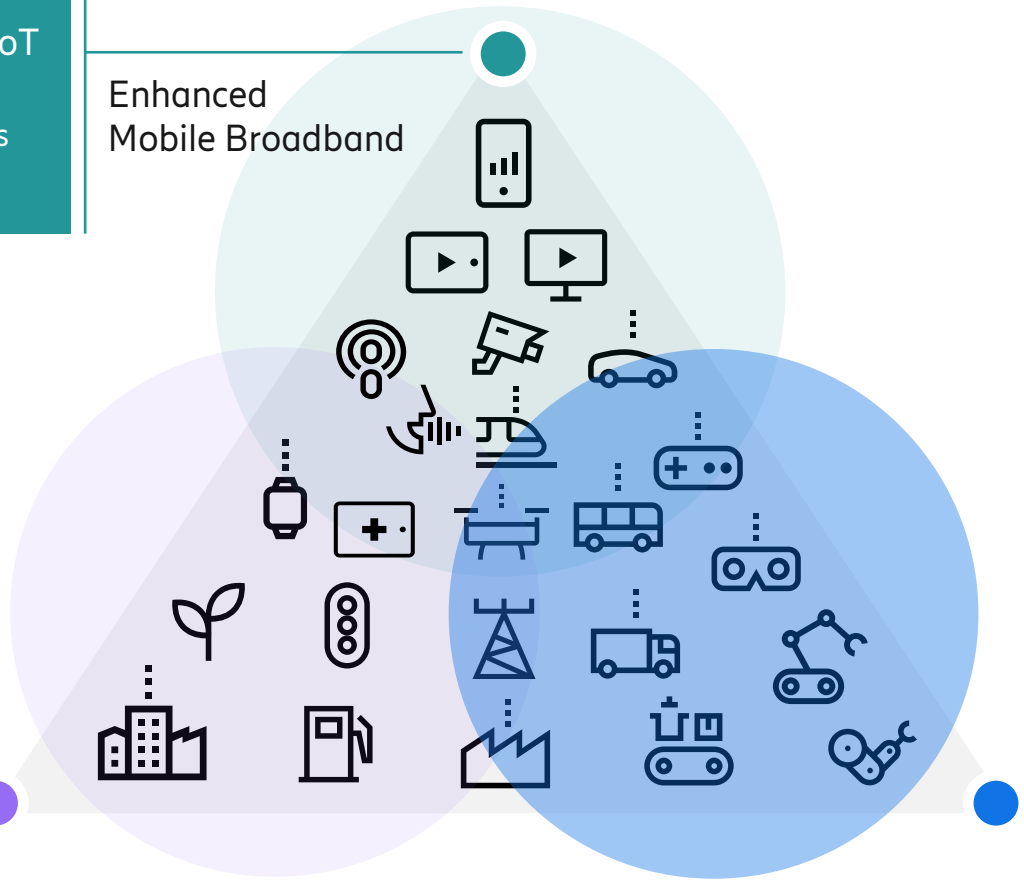
ERICSSON

eMBB/Broaband IoT
- Extreme data rates
- Large data volumes
- Best effort latency

Enhanced Mobile Broadband

Massive IoT
- Low cost devices
- Extreme coverage
- Long device battery life

Massive machine type communications



Critical IoT including Time-Critical Communication
- Consistent latency (low to ultra-low)
- High reliability
- High availability

Ultra-Reliable and Low Latency Communication

Based on: ITU's vision for IMT 2020 & beyond

Note: Critical IoT is a prerequisite for Industrial Automation IoT and demanding Industrial use cases

Time Critical Communication Use cases

Predicted steps for consumers and enterprises

2023 — 2024 — 2025 — 2026 — 2027 →

Industrial Control
- Process monitoring
- Smart grid control
- Closed-loop process control
- PLC to robot controller
- Machine vision for robotics

Mobility Automation
- Cooperative AGVs
- Automated Container transport
- C-ITS/Advanced Driver Assistance Systems
- Automated train control
- Collaborative mobile robots

Remote Control
- Remote control with video/audio
- Remote control with AR overlay
- Remote control with haptic feedback

Realtime Media
- Cloud gaming
- Cloud VR
- Cloud-assisted AR
- Advanced media production
- Cloud-rendered AR

←——— ~50ms – 10ms ———→ ←——— < 10ms ———→ E2E bounded latency (one way)

L4S: Latency-critical E2E rate & congestion control

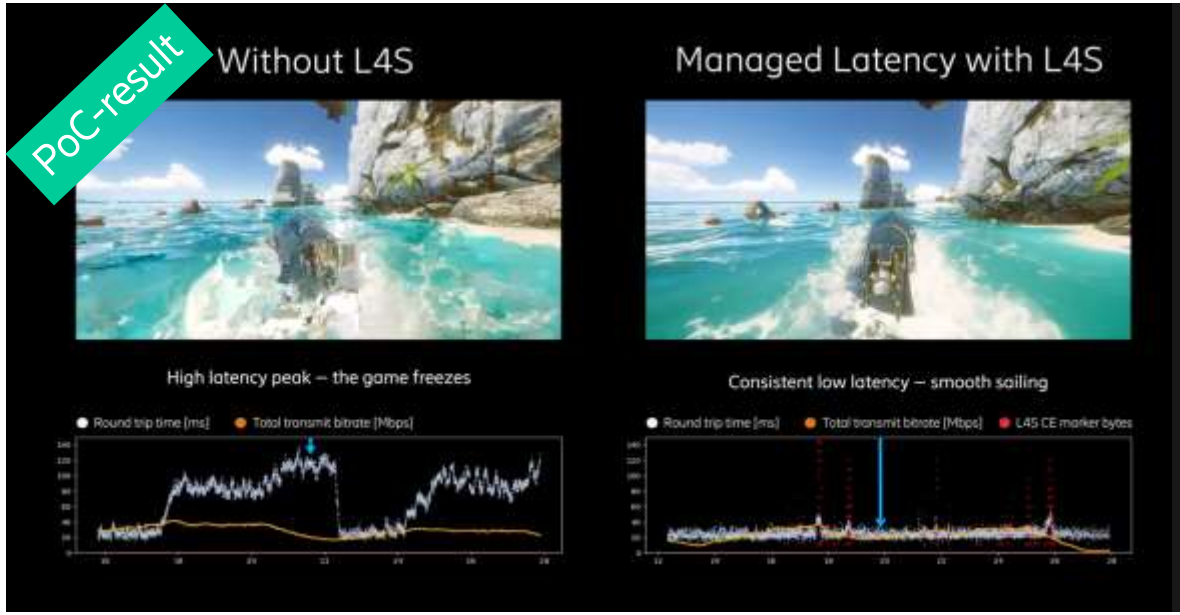
ERICSSON

Challenge:

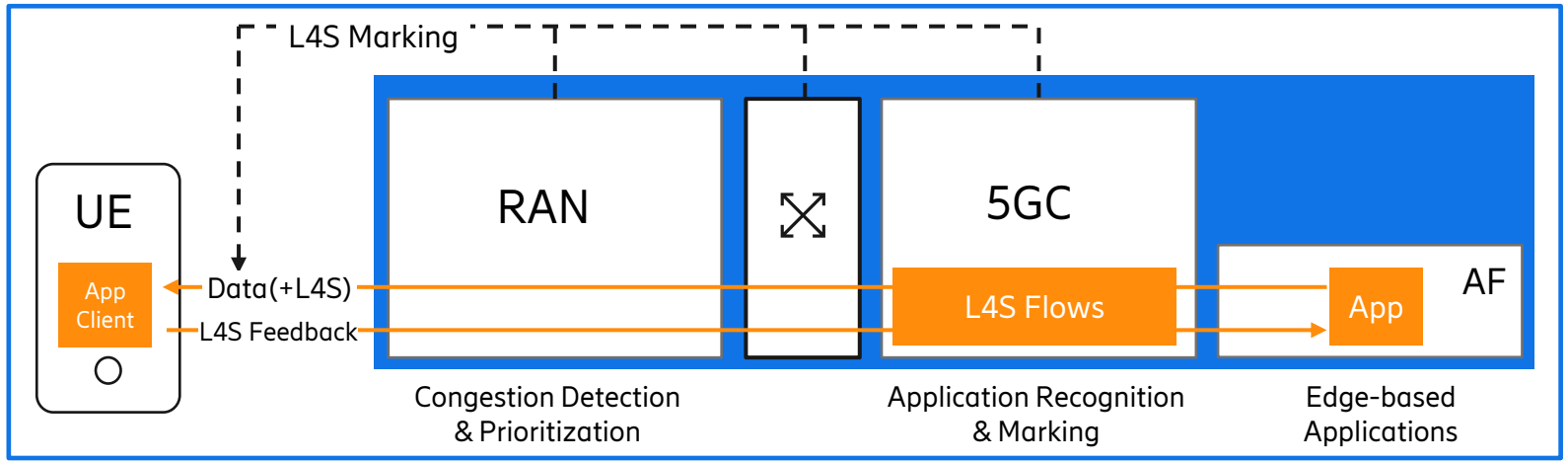
- New type of use cases (AR/VR, Cloud Gaming, remotely controlled vehicles/machines) demanding bounded latency
- OTT solutions (BBRv2, SCReAM, etc), lack fast & accurate reactions

Solution:

- L4S-based Rate Adaption (L4S: Low Latency Low Loss Scalable Throughput, IETF)
- Dedicated L4S QoS flow
- Inband packet marking (ECN bits) for fast congestion discovery
- Outband feedback via E2E protocols (Rate recommendation)

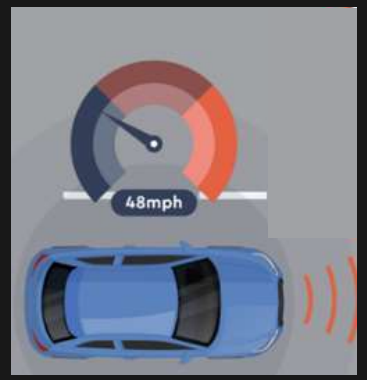


L4S-based rate-adaption significantly improves the performance of time-critical, high-rate applications on 5G networks

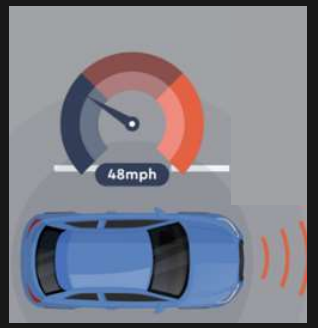


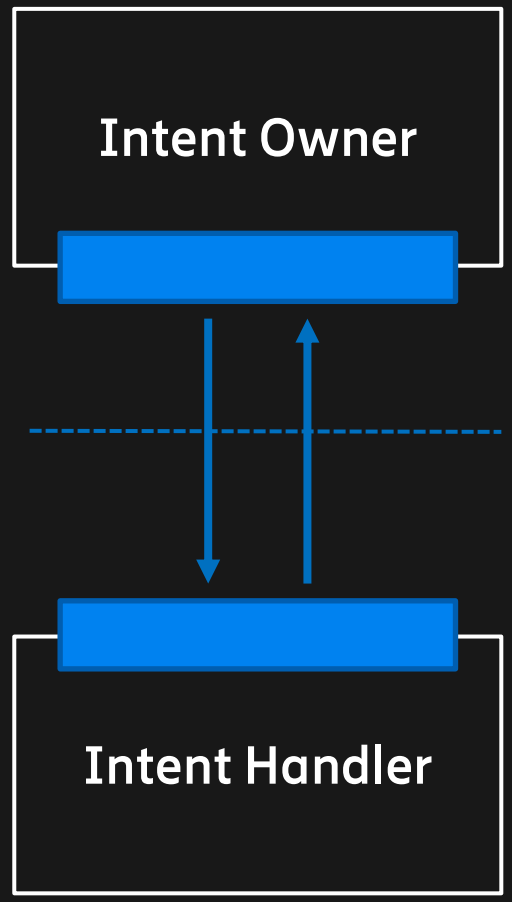
5G Advanced

Intent-based networking

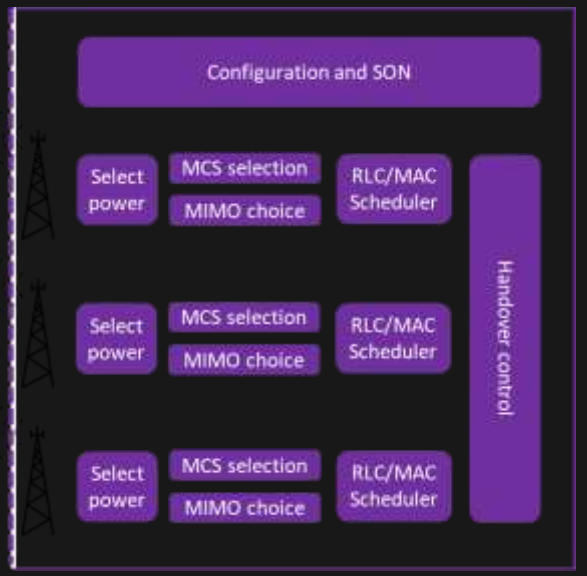


90m





Intent API



High Performing Programmable Networks

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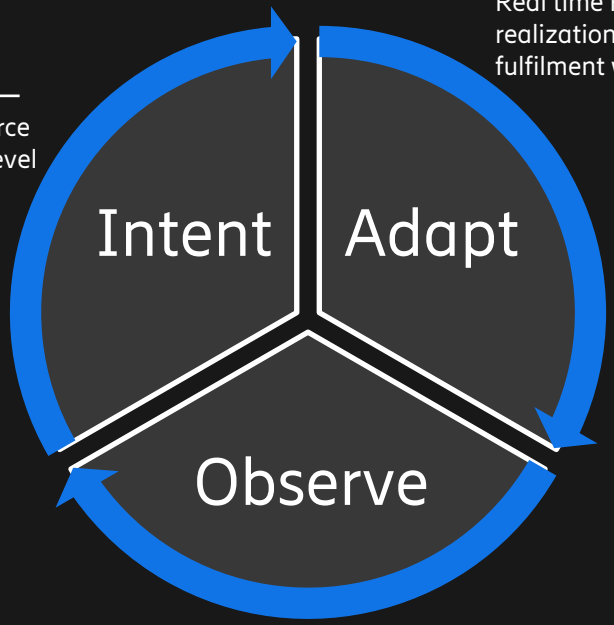
Service-aware RAN

Real time RAN closed-loop realization for service intent fulfilment with automation

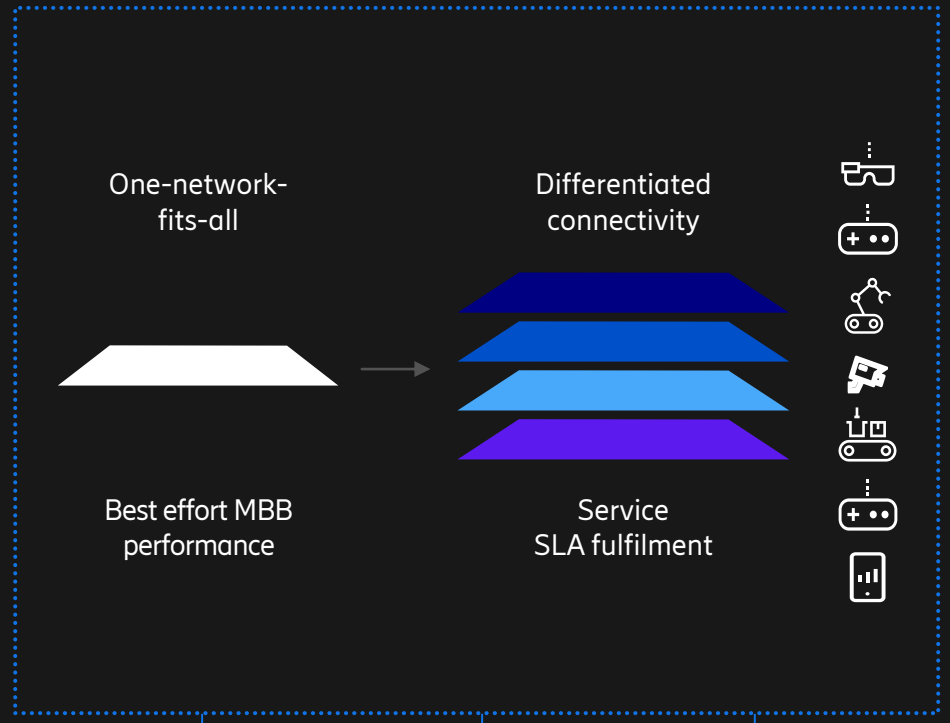
Business intent

Service characteristics, resource priority and wanted service level agreement



Expose RAN metrics for service intent fulfillment

Service performance loops: throughput, active users, and latency

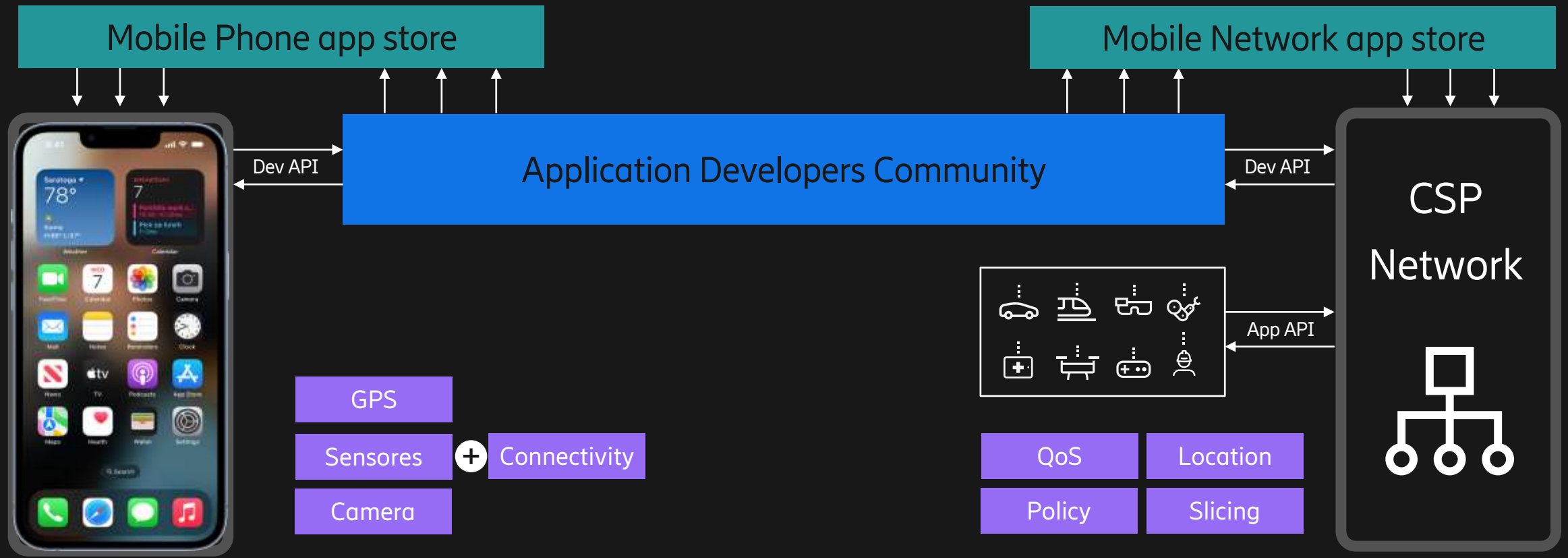


Customer satisfaction for new services

Faster TTM: orchestration, automation

New revenue stream for 5G monetization

How to evolve from Services based on Network to capabilities to Intent-based Network?



5G Advanced – today and tomorrow

Video conferencing

Cloud gaming

Cloud AR/VR

Mobile cameras

Integrated sensing and communication

Unmanned aerial vehicles

Advanced driving assistance system

Autonomous mobile robots

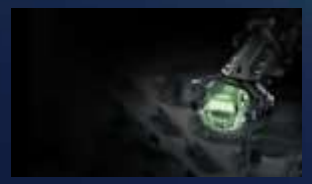
RedCap

Remotely controlled driving and transport

Remote operations for ports

Remotely controlled drones

Remotely controlled machines



Non-terrestrial networks

Security

Uplink heavy use cases

Live broadcast

Localization-based services

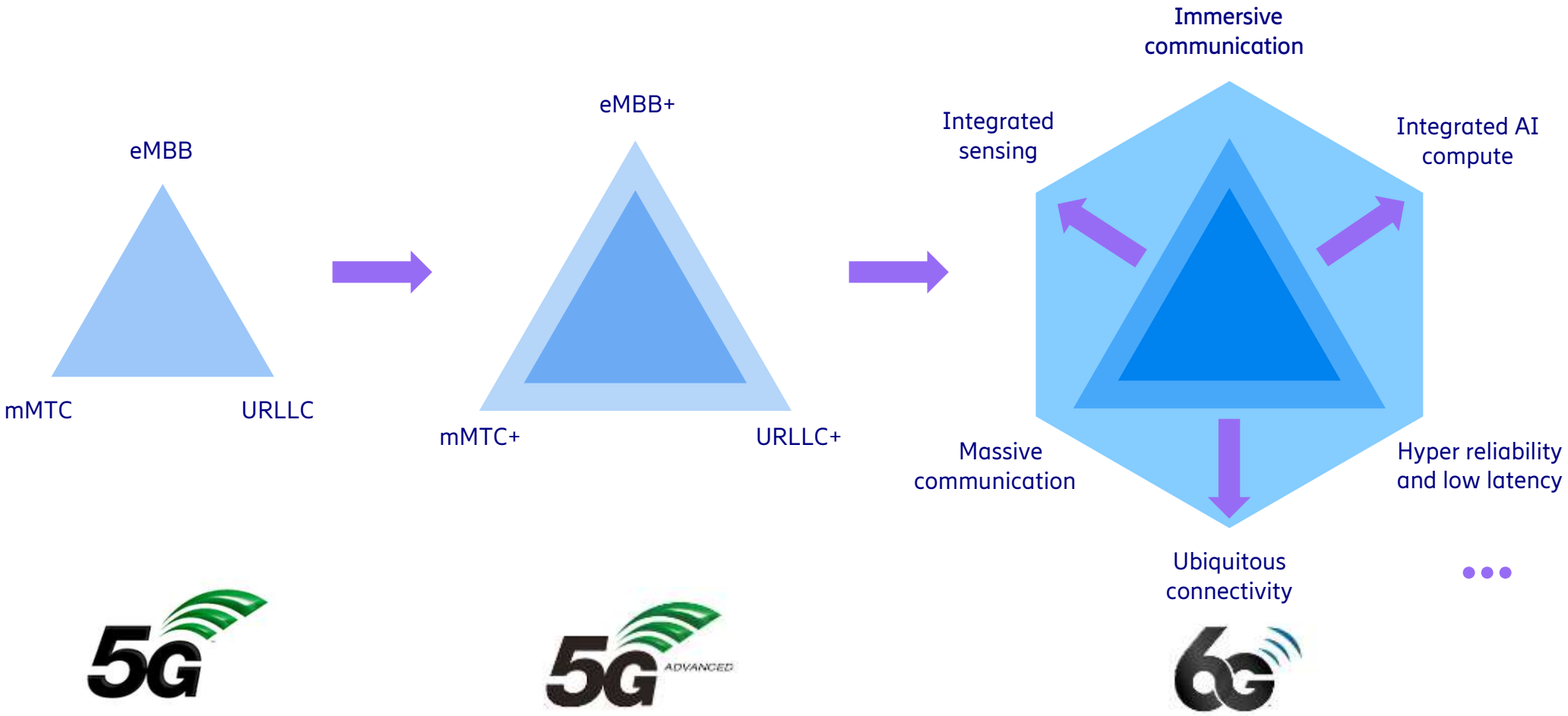
Public safety services

Enhanced connectivity over rail

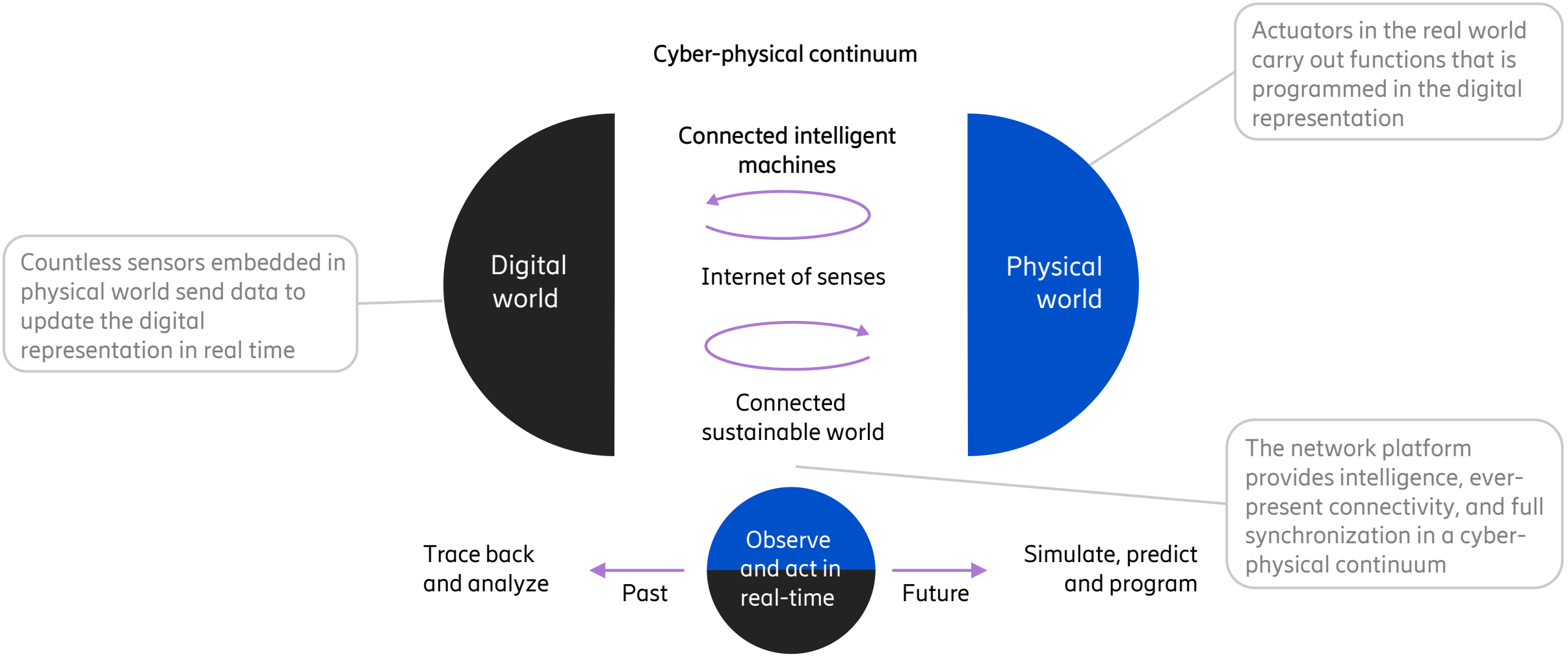
High-load scenario performance gain

6G

Service evolution



Connecting a cyber-physical world



What's in the cyber-physical continuum?

Merged reality

- New ways of meeting and interacting with other people
- New possibilities to work from anywhere
- New ways to experience culture and scenes far away

Massive digital twins

- Connecting all equipment and tracking material
- Using the network as a platform for many ecosystems
- Allowing accurate predictions and detailed control

Situational awareness

- Sensing surroundings and locating objects
- Guiding robots and vehicles with digital maps
- Interacting with collaborative robots

Ericsson in TCCA 6G

Partners supporting TCCA 6G position include:

PSRG
Public Safety Radio Communication Group

eena
EUROPEAN EMERGENCY NUMBER ASSOCIATION

BRITISH APCO

The PSBN Innovation Alliance **(PIA)**

ericsson.com/mission-critical-communications