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ICT FORUM COSTA RICA 2023

Expandiendo el universo de la inteligencia, la conectividad y el conocimiento

ORGANIZA:

LATAM RED

Technology Vision 2030
Industrial Metaverse

Cesar Augusto Vasquez
Business Development Manager LAT

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A clear vision of metaverse opportunities

Concepts of ‘Human Augmentation’ and ‘Digital-Physical Fusion’ frame this vision

Metaverse enablers

	Human Augmentation	Digital-Physical Fusion
~ today	Handhelds VR HMDs Tethered AR glasses Haptic-enabled remote control	Basic, organization-level digital twins Smart sensor networks Persistent virtual worlds & objects
~ 2030	Connected bio-medical implants Industrial exoskeletons Ergonomic, untethered XR glasses XR interoperability	Complex, enterprise-wide digital twins Ecosystem interoperability Interactive 3D digital twins 6G network sensing

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The metaverse value chain

Collaborative actors building interoperability across the network and carving out early leadership in key control points

Infrastructure & connectivity

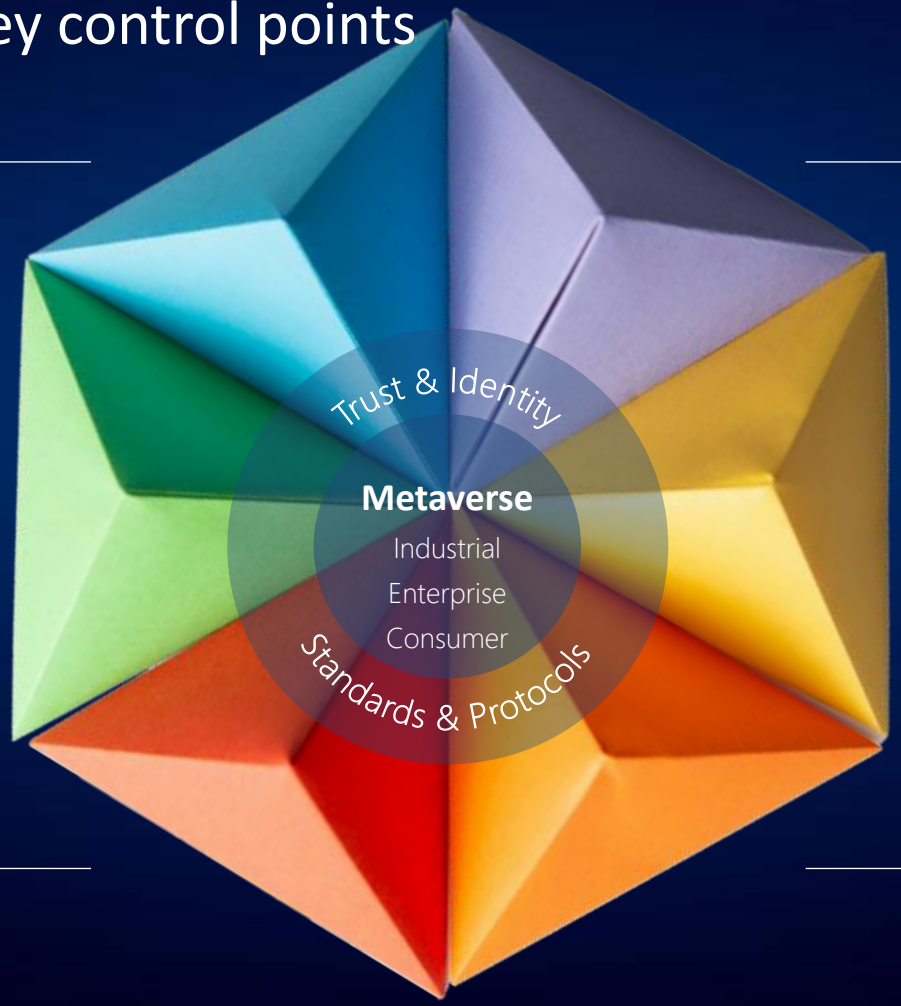
Semiconductors
Edge compute
Storage
Connectivity
Cloud infrastructure

Platform tools

Artificial intelligence
Data & digital asset mgmt.
Content services
Software integrations

Creator & dev tools

Engines and SDKs
Low-code/no-code app
Web3



Devices

XR headsets
Smartphones & tablets
Wearables
Robots, AMRs & cobots
Sensors

Interfaces & apps

Natural language processing
Computer vision
Digital (AI) humans
Human-brain interface

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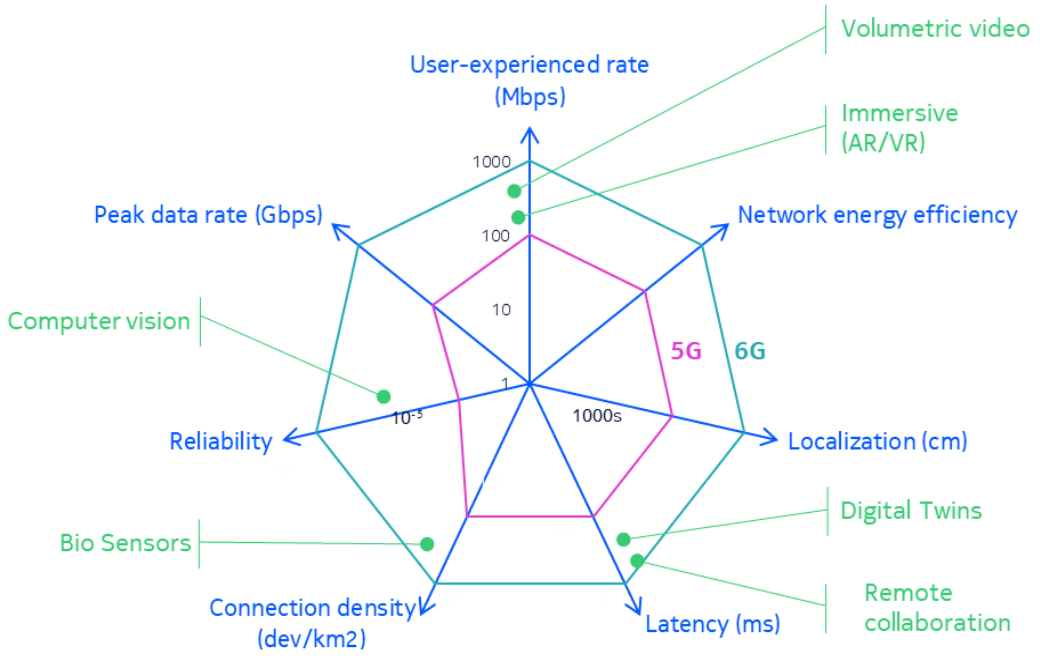
The network will be key to realizing these opportunities

… requiring transformed capabilities and versatile integrations



New service needs

New network capabilities

Metaverse evolution will drive network capacity demand

Industrial Metaverse

- XR*-enabled workforces
- Digital twin enhanced production & condition monitoring

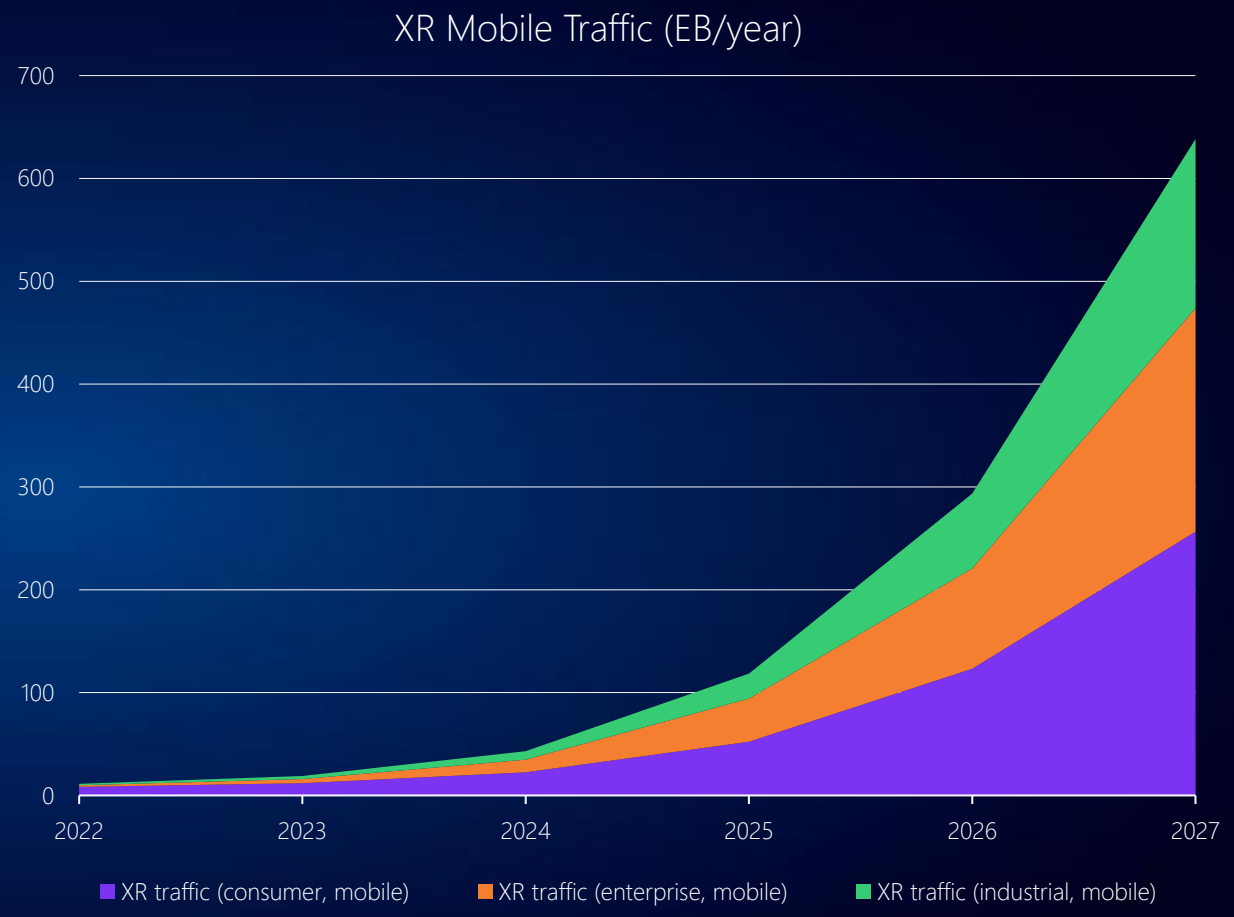
Enterprise Metaverse

- Immersive team collaboration
- Digital co-design
- XR-based training & learning

Consumer Metaverse

- Immersive gaming
- XR-enhanced social & retail interaction
- Virtual tourism

*XR: Extended Reality (incl. augmented & virtual reality)



Source: Bell Labs Consulting, Nokia 2023

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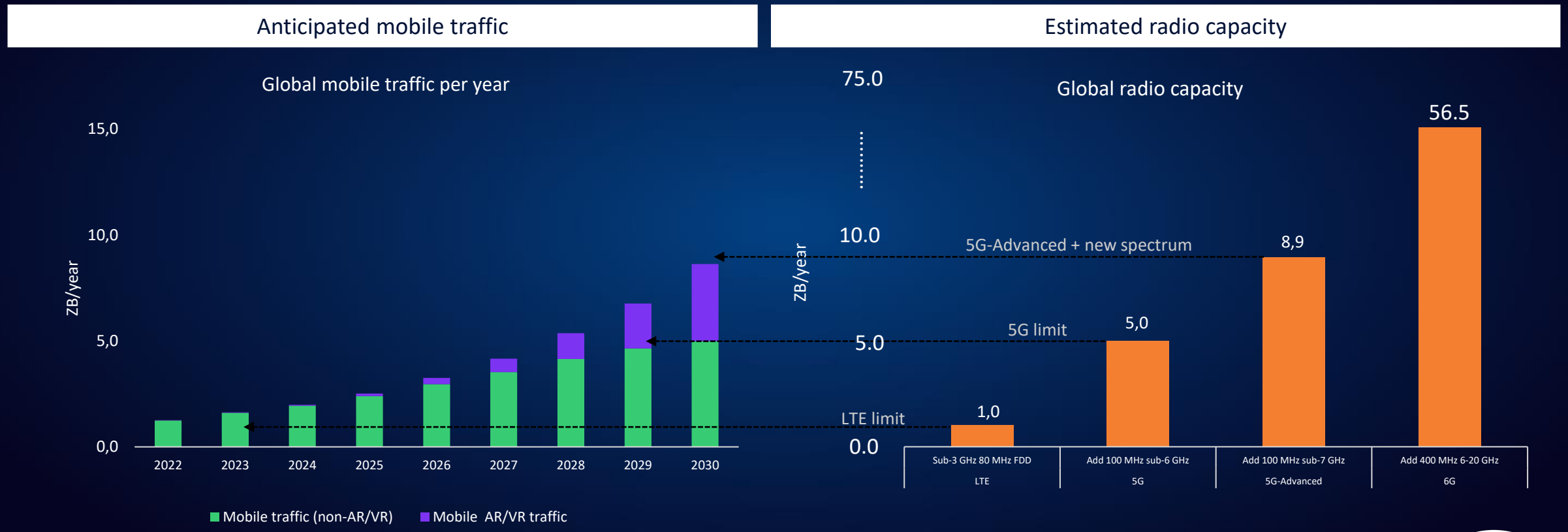
Expected mobile traffic vs radio capacity

More spectrum and technology improvements are needed by 2028-29



Monetization: solutions determine value – ecosystem partnerships unlock opportunities

Potential CSP metaverse focus areas (CSP opportunity varies depending on the use case)		
Application Solutions	(e.g. via partnerships): • Analytics & visualisation (e.g. digital twin-based monitoring & simulation) • XR-enhanced working, collaboration, learning, healthcare & shopping • Virtual places, spaces & events • Immersive gaming and streaming	**End-to-end solution** Solution orchestration, integration, offering
Application Enablement	• Intent-based network APIs (Network-as-Code) • Developer ecosystem enablement • PaaS & application hosting • Network analytics	
Connectivity	• XR-optimised connectivity (solution-tailored) • MEC & Edge Cloud • Industry-specialised private networks • Managed (sliced) NaaS	
Devices	• OEM partnerships: Embedded connectivity • Device resale/bundling • Home gateways (solution-tailored)	

CSP example approaches

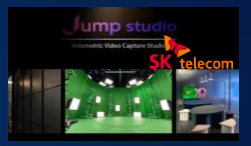
Application Solutions

SKT Launches ifland in Global Markets

e& universe

NTT QONOQ

Application Enablement



wayra
Telefónica Innovation
Open2Metaverse

Connectivity

Devices

"CSPs that can orchestrate such a complex web of relationships will be capable of capturing a greater share of the market. Taking the ecosystem route means CSPs will not be relegated to being one of many connectivity providers competing solely on price." Evan Kirchheimer, Omdia

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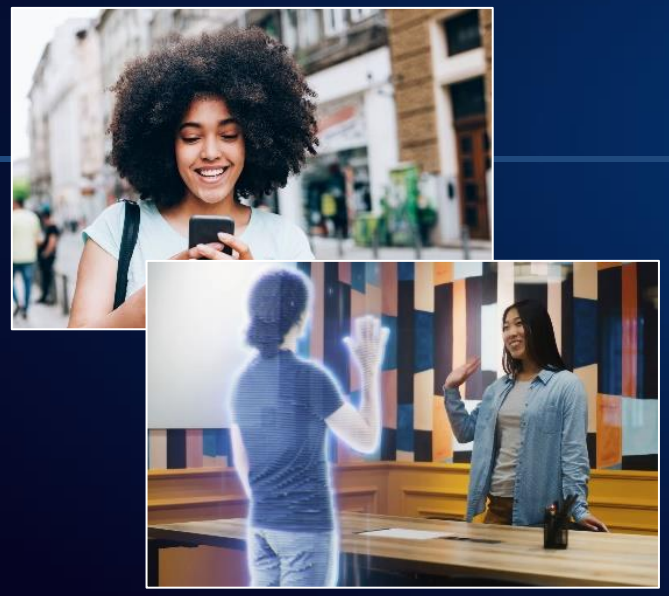
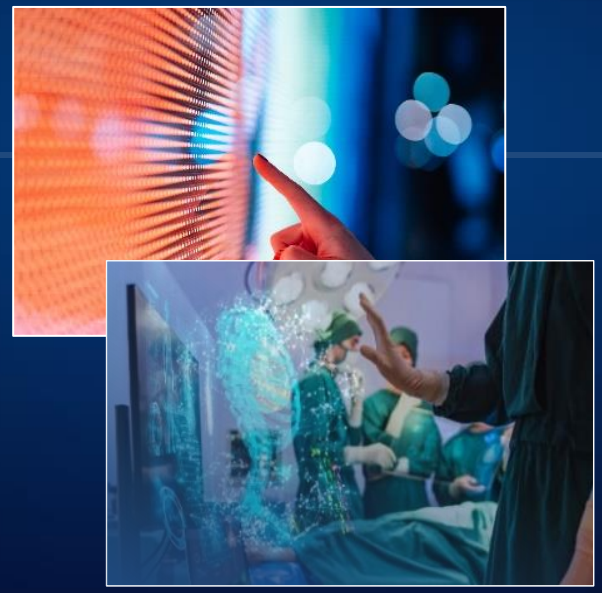
2030: Transforming what a network can do

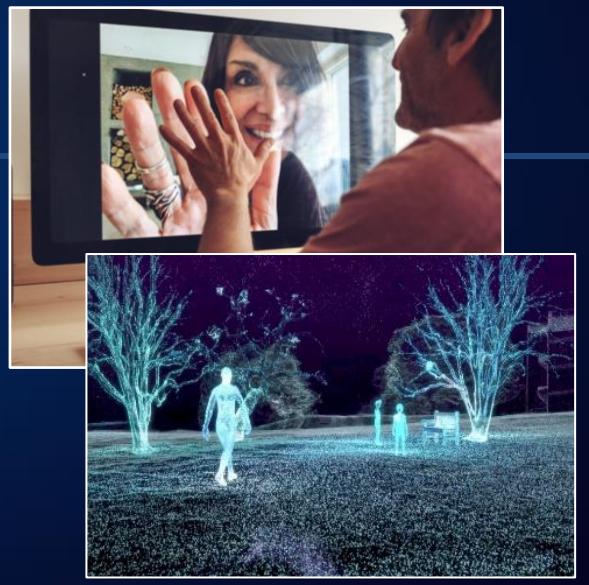
From connectedness to **togetherness**



From information to **knowledge**



From communication to **sensing**



How do we start today?

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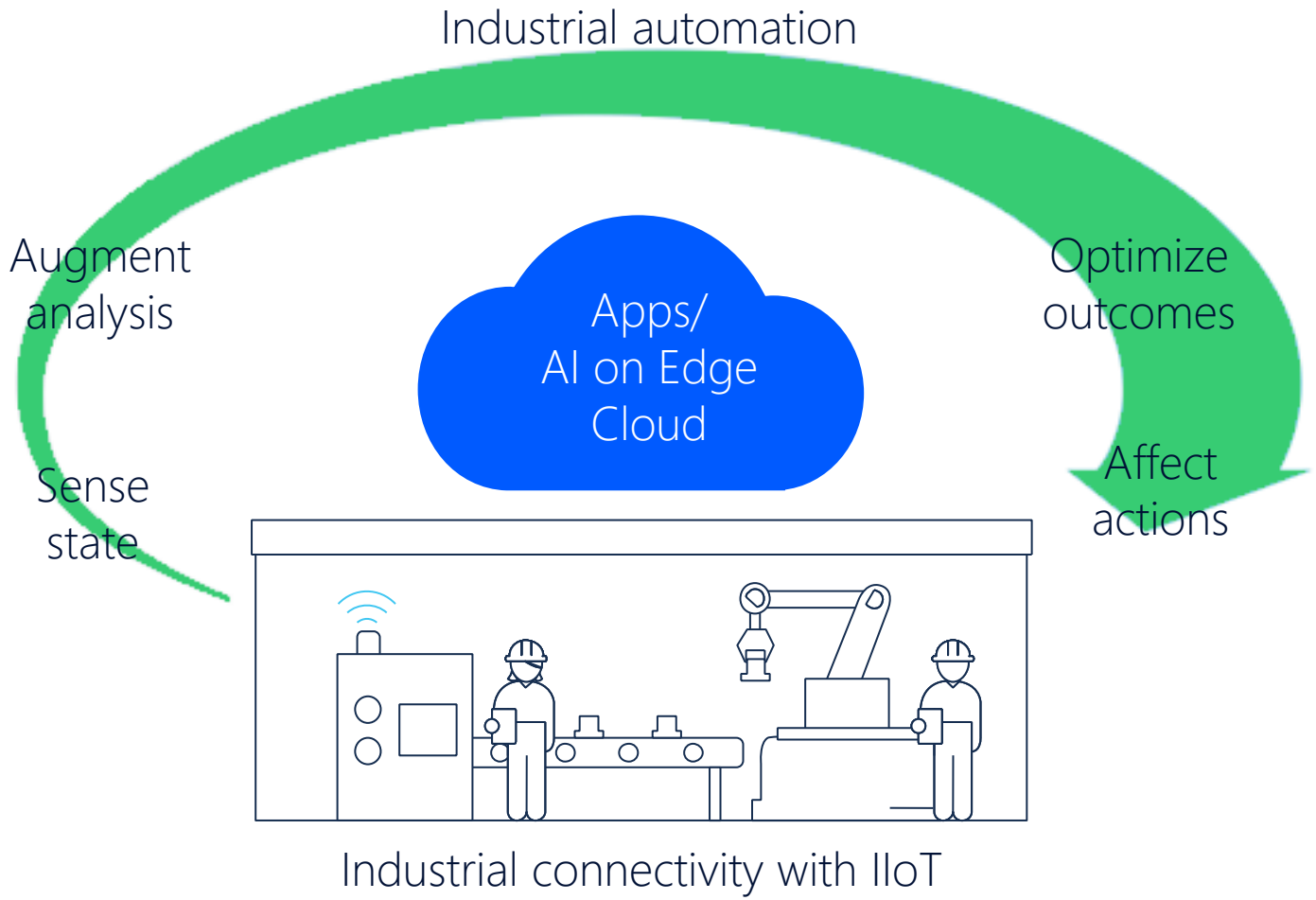
Industry 4.0 in production TODAY

The Edge cloud will drive automation across OT environment



75%

of all enterprise generated data will be processed at the Edge

The Edge Cloud:

- Places computing resources closer to the source of data
- Enables real-time collaboration between cyber-physical systems
- Drives actionable intelligence for industrial automation, situational awareness and worker safety

Source : Gartner Edge Computing in support of the Internet of Things

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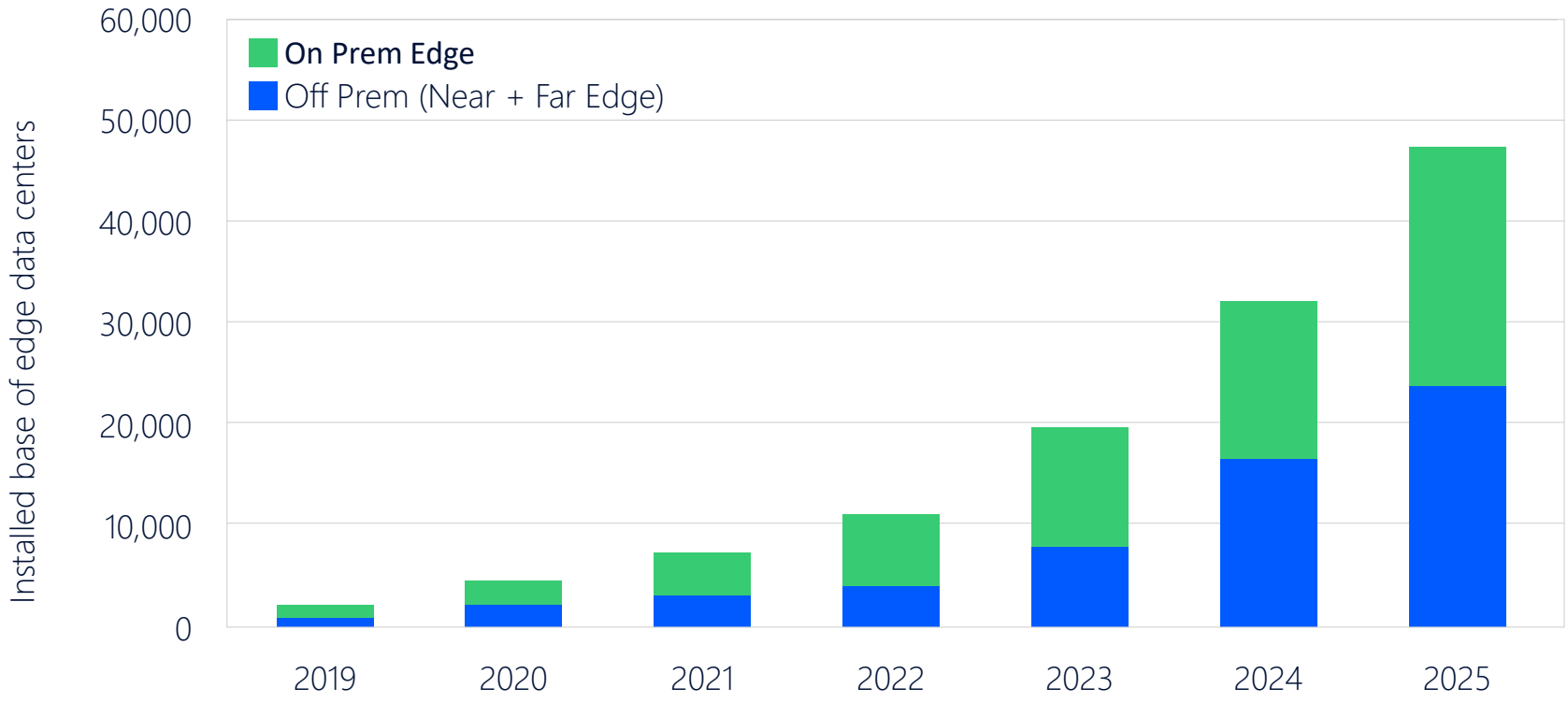
21000 enterprises will have edge data centers on-premises by 2025

Data sovereignty and low latency needs drive on-prem Edge



Source : Mobile Experts Edge Computing 2020

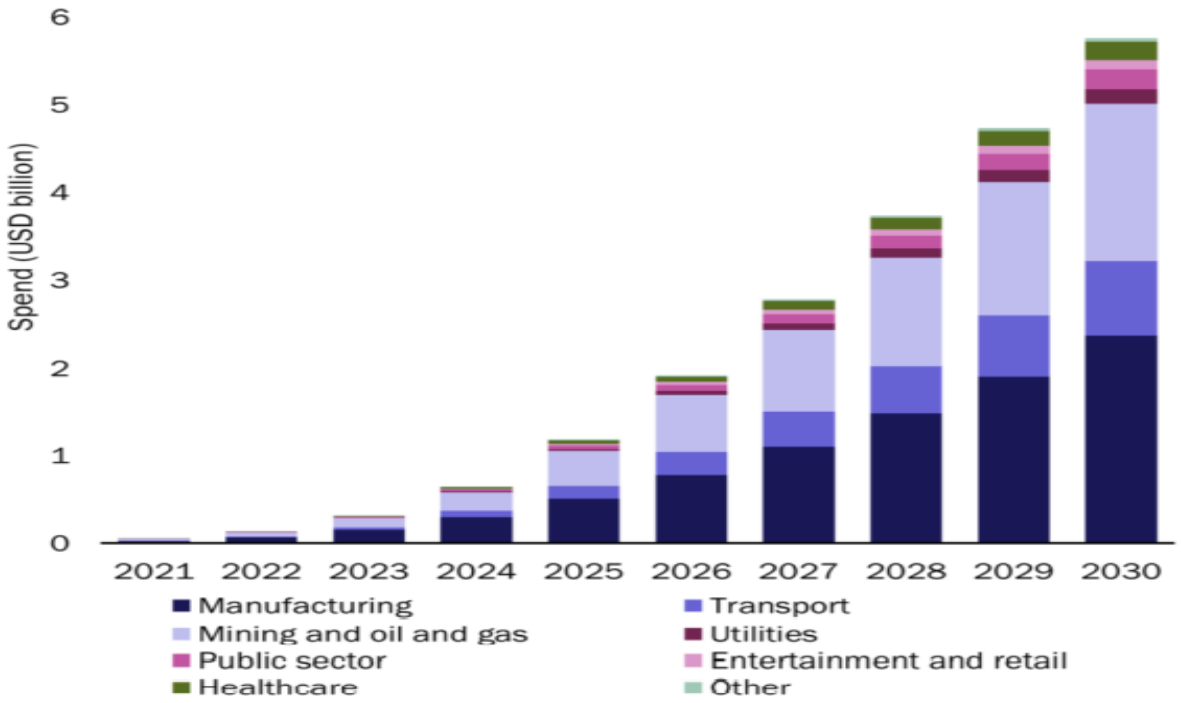
Industries

14M

Global industrial sites

- Transport venues
- Military bases
- Warehouses
- Industrial and manufacturing
- Oil and gas
- Power generation
- Mining
- Water utility plants
- Hospitals and labs

Enterprises’ spend on applications for private LTE/5G networks will increase rapidly



Source : Analysis Mason: : worldwide forecast 2021–2030

Enterprises’ spend applications for private LTE/5G networks by 2030

6Bn$

Manufacturing: 40%

Oil&Gas: 30%

Transport: 15%

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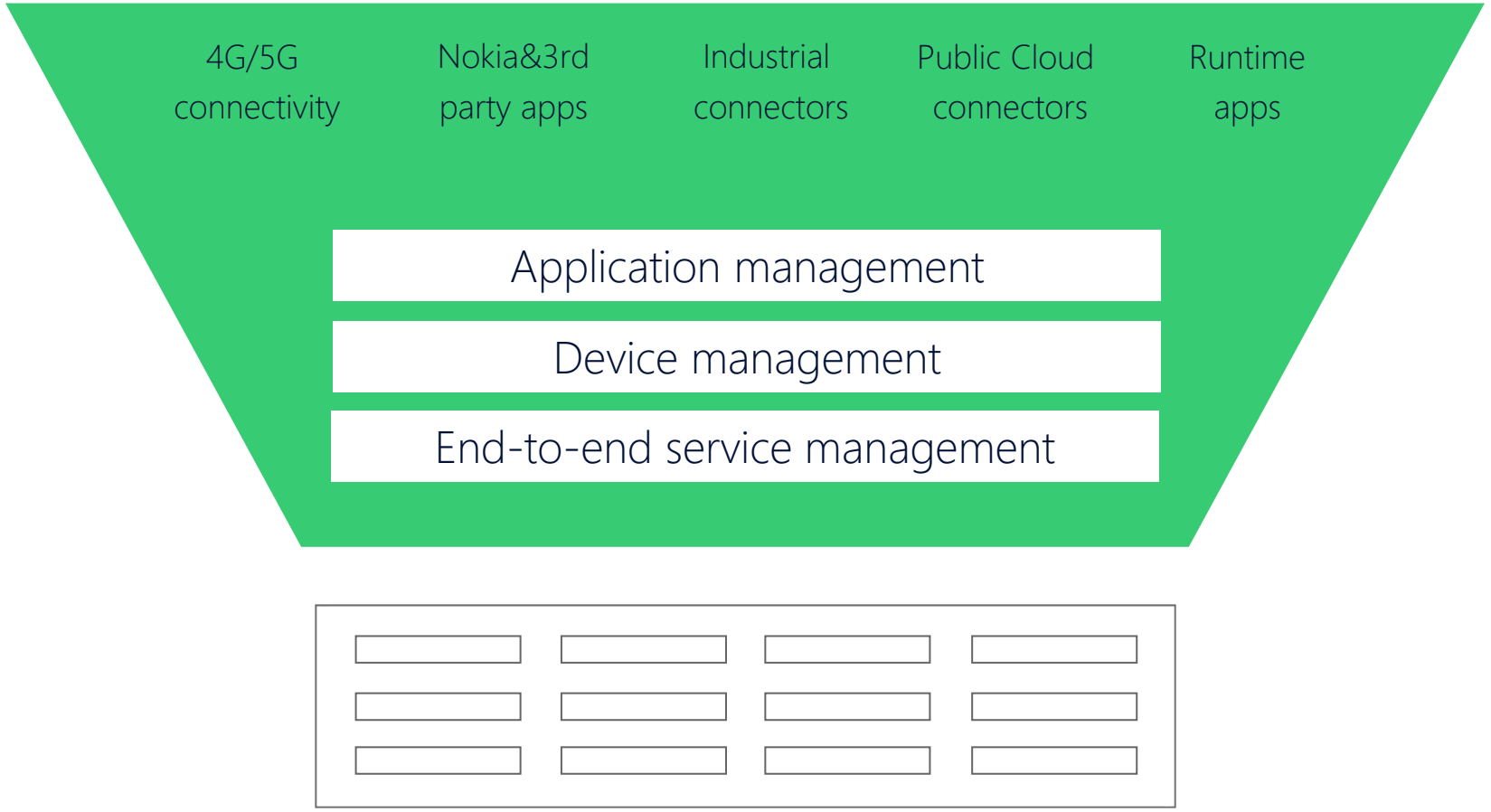
Accelerate time to business value

One fully integrated edge to accelerate your OT digitalization



Speed up time to business value with a fully integrated edge solution

Industrial private wireless embedded for resilient OT connectivity

Device management and application enablement capabilities for IIoT

Application catalog of OT digitalization enablers

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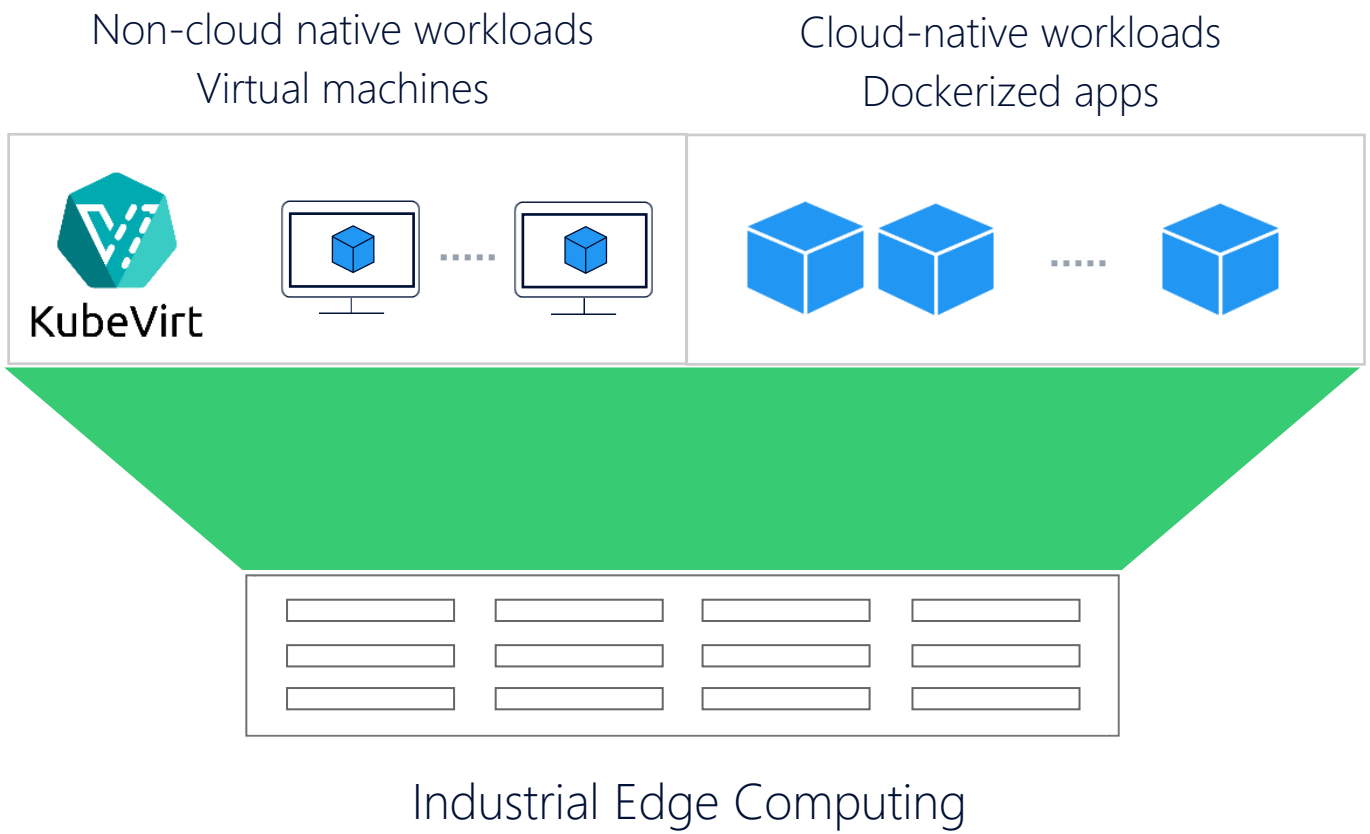
Non-cloud native applications using VMs



Legacy industrial applications and workloads are often running on bare-metal or in virtualized environments

True plug and play deployment of non-kubernetes based applications

The deployed virtual machines in a safe and controlled environment (KubeVirt) alongside the containerized apps

A huge variety of applications available in different ecosystems like Microsoft or Linux

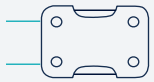
Rich set of digitalization enablers

Wireless Connectivity

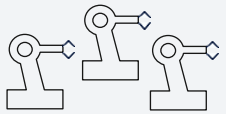
Communications

Solution O&M

Video Analytics



Tracking and Positioning



Robotics, mechatronics

Connected worker & XR

Enterprise security

Industrial connectivity

IIoT & Digital Twin

Video enabler

Cloud connectivity

Industrial applications accessed from a Industrial Application Catalog

Automated provisioning

Automated application lifecycle management

Includes own and 3rd applications – offering growing

Applications brewing within many categories such as Security, IIoT and digital twin and Robotics, mechatronics

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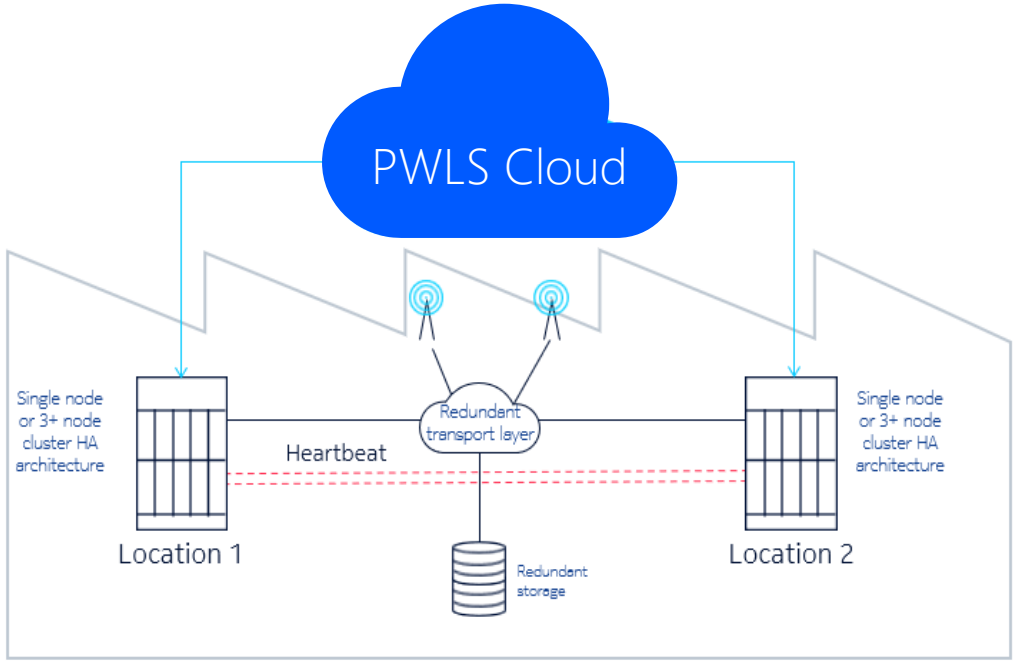
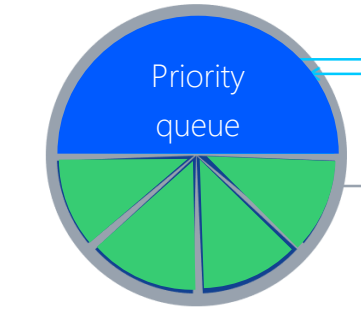
Assure mission critical performance, security and resilience

Essential requirements for industrial OT



Mission critical pWireless prioritization

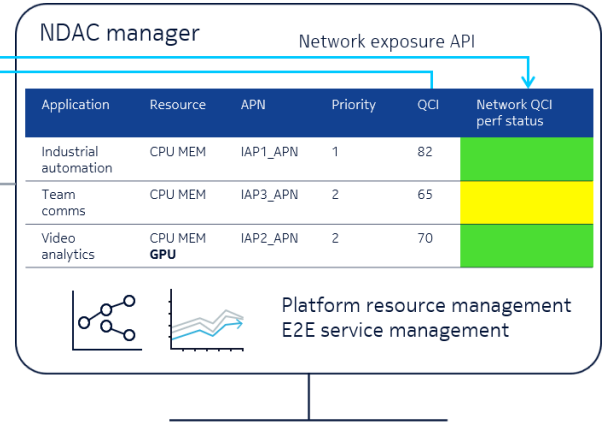


Guaranteed bit rate (GBR)
(QCI 82, 65, discrete automation, MCPTT)

Non-guaranteed bit rate (Non-GBR)
(QCI 6-9, 70, 80, low latency MC/Non-MC eMBB apps/AR)

Example QoS class identifiers (QCI)

Application performance management



End-to-end identifiers

End to end redundant solution architecture

High availability and GR feature support

End to end service performance management

TLS secured application communication

Application to application data isolation

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Gracías

Cesar Vasquez