5G and beyond

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Content

5G - so where are we at the moment

Importance of Innovation and Differentiation

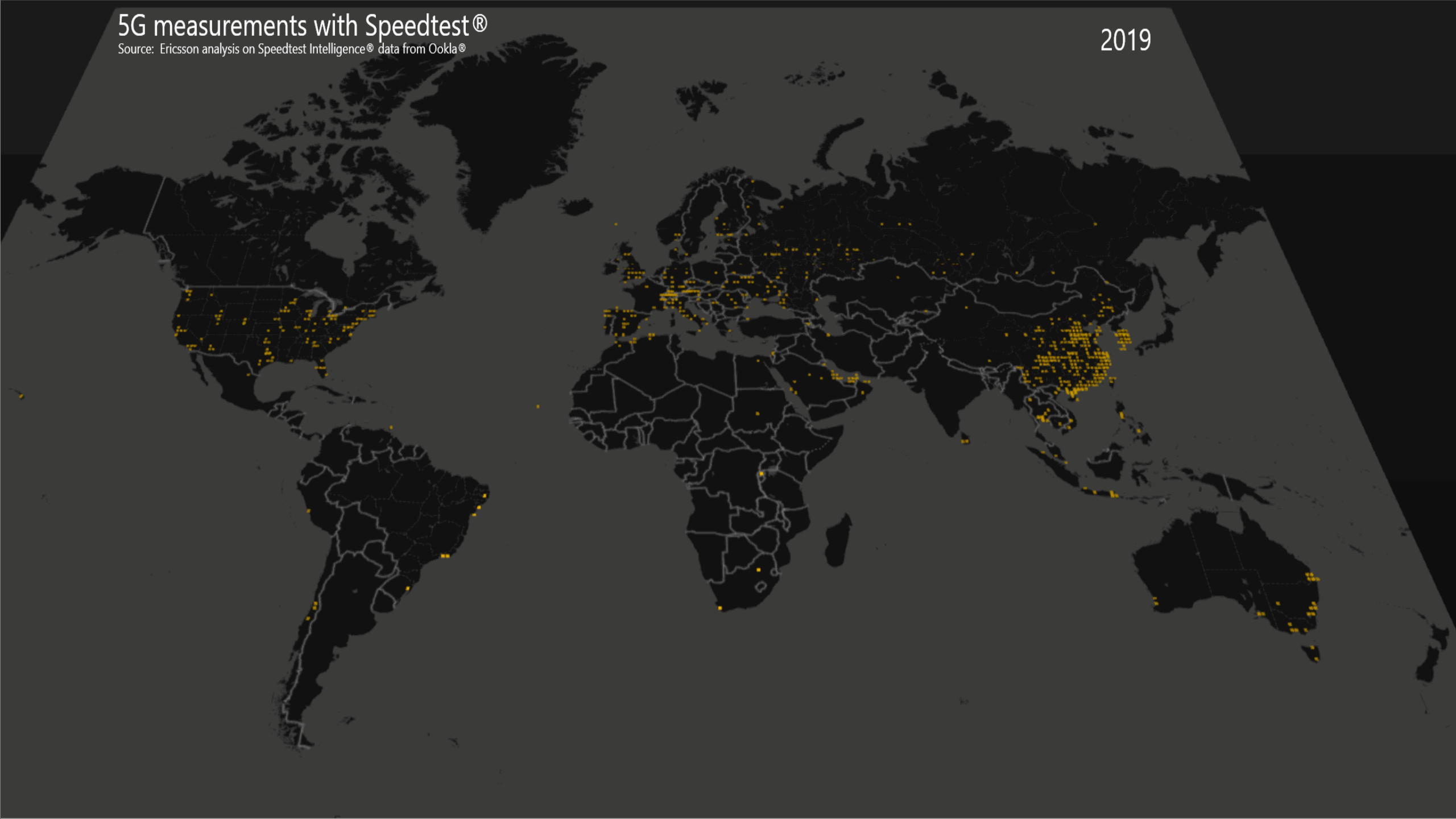
What has happened so far

What could be next

What do we need to do to be successful

5G measurements with Speedtest®

Source: Ericsson analysis on Speedtest Intelligence® data from Ookla®



5G in numbers

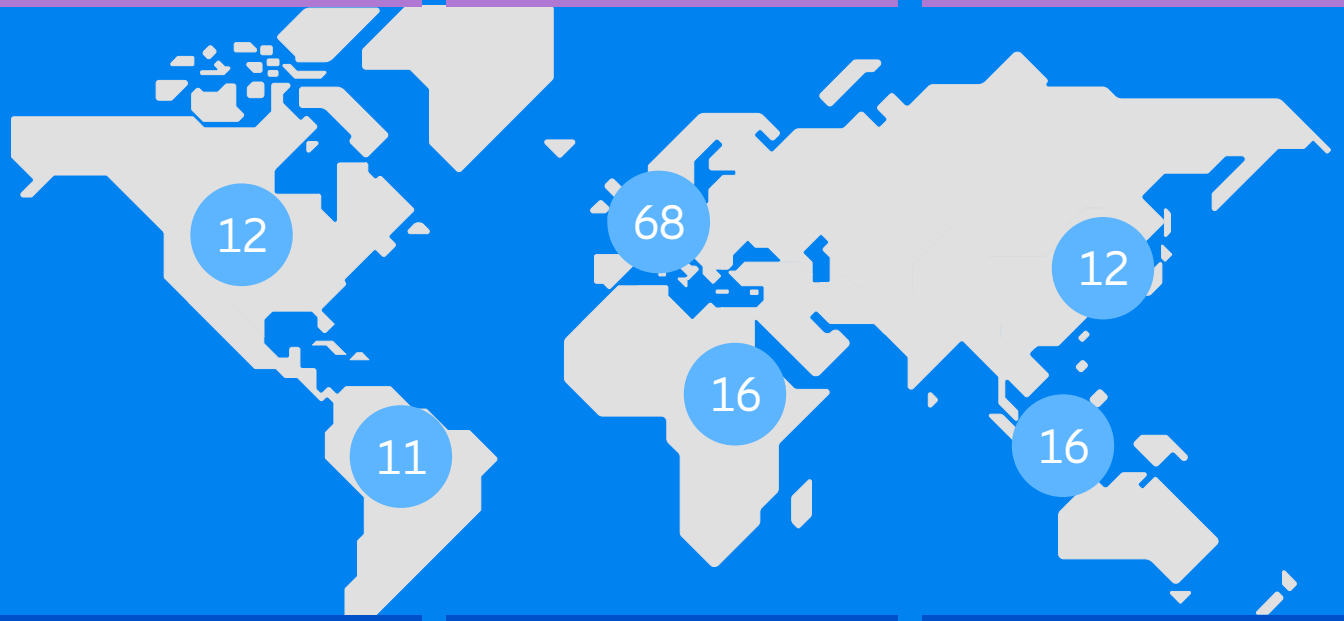
228
Live 5G networks
(GSA Sep 2022)

35
Live or deployed 5G standalone networks
(GSA Sep 2022)

35%
Population coverage by the end of 2022
(Ericsson Jun 2022)

28GB
Monthly mobile data traffic per sub
South Korea (Aug 2022)

73%
Of traffic on 5G network
South Korea (Aug 2022)



Global Figures
Ericsson Figures
Ericsson live networks

134
Ericsson live 5G networks

59
5G countries

20
Ericsson live 5G standalone networks

63
Ericsson live 5G FWA networks

9 M
5G-ready radios shipped

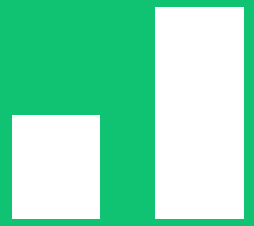
*As of October 2022

Key 5G messages

>1 Billion

Connections by the end of 2022

Demand



doubled in the last two years

New forms of connecting

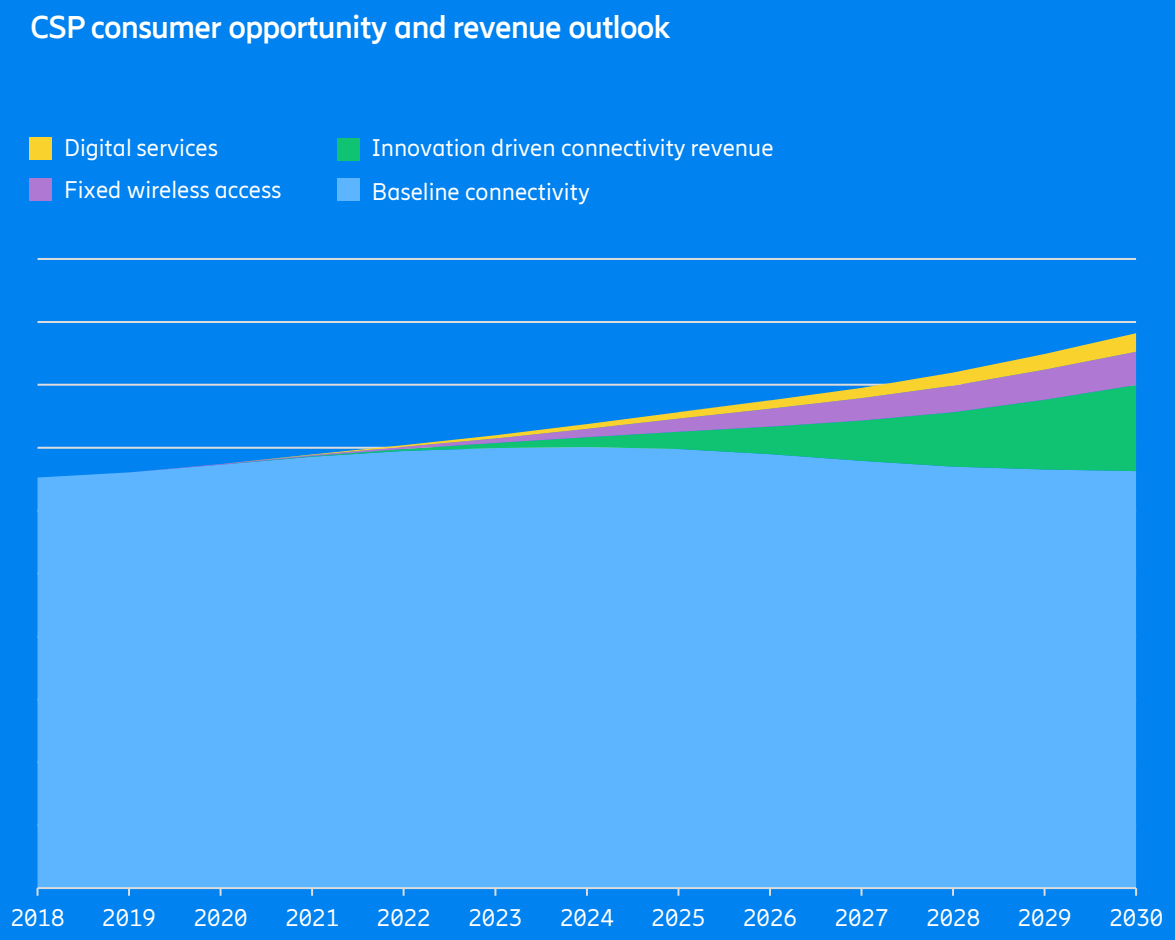
Estimated to be 20% by end of 2022

Devices

Use of new generation sensors/monitors to be larger than legacy systems by 2023

5G is **growing at an incredible rate** and accelerating the introduction of new services and applications

Connectivity fueled by innovation important to maximise benefits of 5G



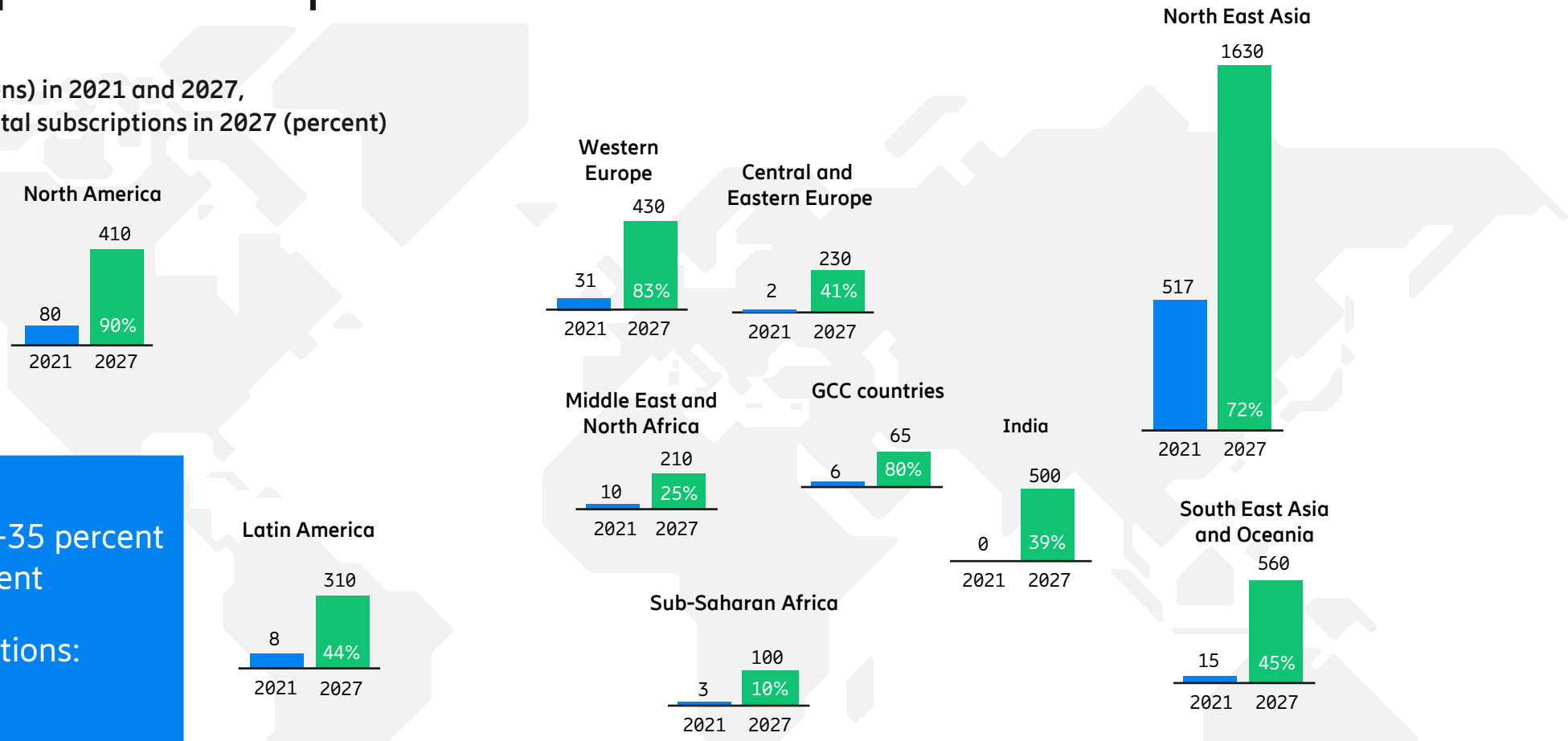
In 2030, 25 percent of revenue opportunities are related to service innovation:

- Digital services
- Fixed wireless access
- Innovation-driven connectivity

Source: Ericsson and Omdia research, 2020
*CSP: Communication Service Provider; FWA: Fixed wireless access

North-East Asia leads 5G subscription adoption

5G mobile subscriptions (millions) in 2021 and 2027, and 5G adoption as share of total subscriptions in 2027 (percent)



5G adoption, 2021:
China, South Korea: 25-35 percent
Rest of world: <10 percent

Worldwide 5G subscriptions:
2020: 274 million
2021: 660 million
2027: 4.39 billion

GCC: Gulf Cooperation Council
Sources: Ericsson Mobility Report, November 2021

South Korea – differentiate from 4G through innovative 5G rich media services

Baseball game broadcast

One of the most popular sports. Each game demands 4–5GB for watching, leading to higher data consumption.

Wide view

- Panoramic of the stadium in 12K UHD quality with three 4K cameras
- Users can expand the areas that they want without reducing image quality

Motion tracking

- Shows the movement of baseball and batter with four field-tracking cameras
- Users can check trajectory, restraint, rotation, direction.

VR headset immersive experience

With 5G latency as low as 1ms, VR motion sickness is no longer an issue. All South Korean CSPs are trying to take a lead by investing in AR and VR.

Idol Live

- User can focus on an individual idol and enjoy the stage as if they were sitting in a real theater

Social VR

- Multiple users can watch sports and movies together in a VR environment
- Users can gather in the same VR space to watch video content as if they are right next to each other

Gaming 5G "killer content"

South Korean CSPs have struck partnerships with global game developers and content providers to offer "killer content" for 5G smartphones.

eSports Live

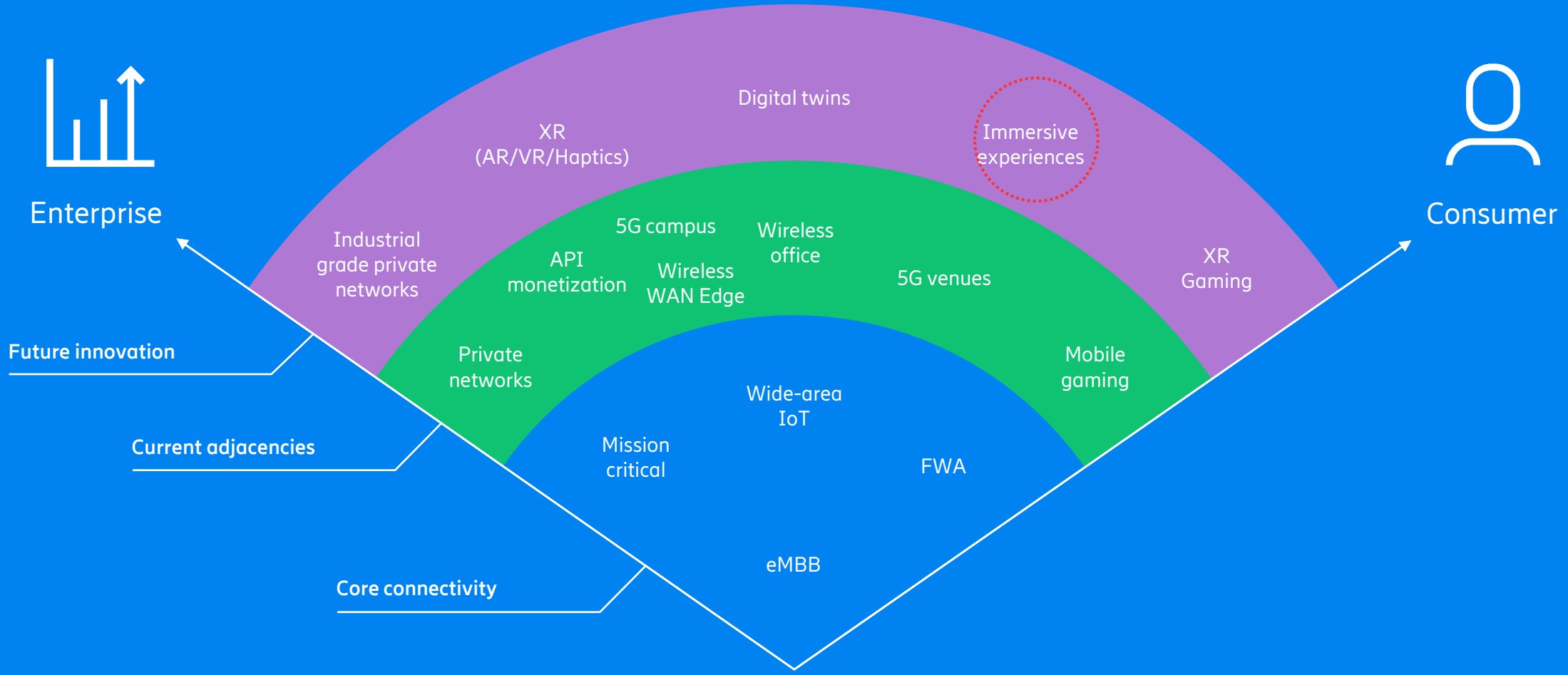
- Live streaming app of eSports competitions
- Users can watch up to five game screens simultaneously

Cloud gaming

- With a mobile device connected to the internet everyone can play masterpieces anytime and anywhere, just like playing a current web game

CSP: Communication Service Provider
Source: OMDIA; South Korean CSPs

Current opportunities for 5G value creation

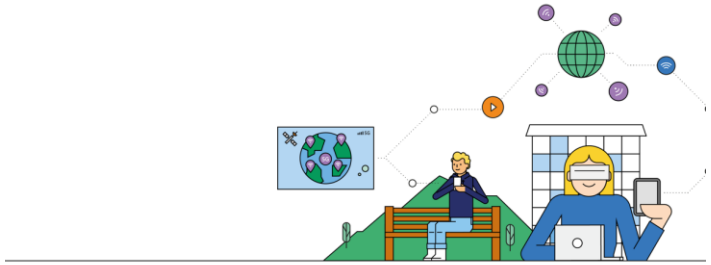


Source: 5G value creation executive deck sprint deliverable March 2022

6 key trends towards the next wave of 5G

1. Consumer 5G adoption to be inflation-resilient

2. 5G is being adopted by a new wave of users with higher expectations

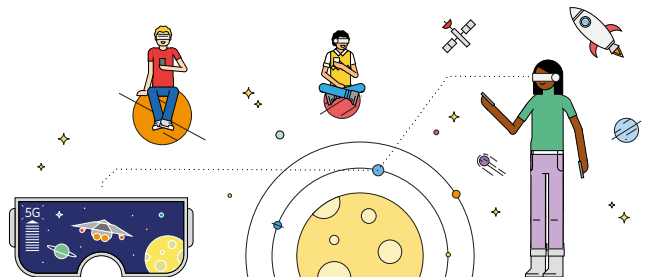


3. Perceived 5G availability is emerging as the new satisfaction benchmark

4. 5G is pushing up usage of enhanced video and augmented reality (AR)

5. 5G monetization models are expected to evolve

6. 5G adoption is paving the path to the metaverse



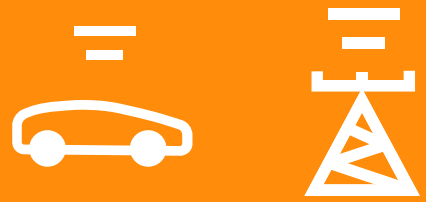
Source: Ericsson ConsumerLab, 5G: The next wave, 2022

5G links to everything we do and can do

Massive IoT

Broadband IoT

Critical IoT



Industry Automation IoT

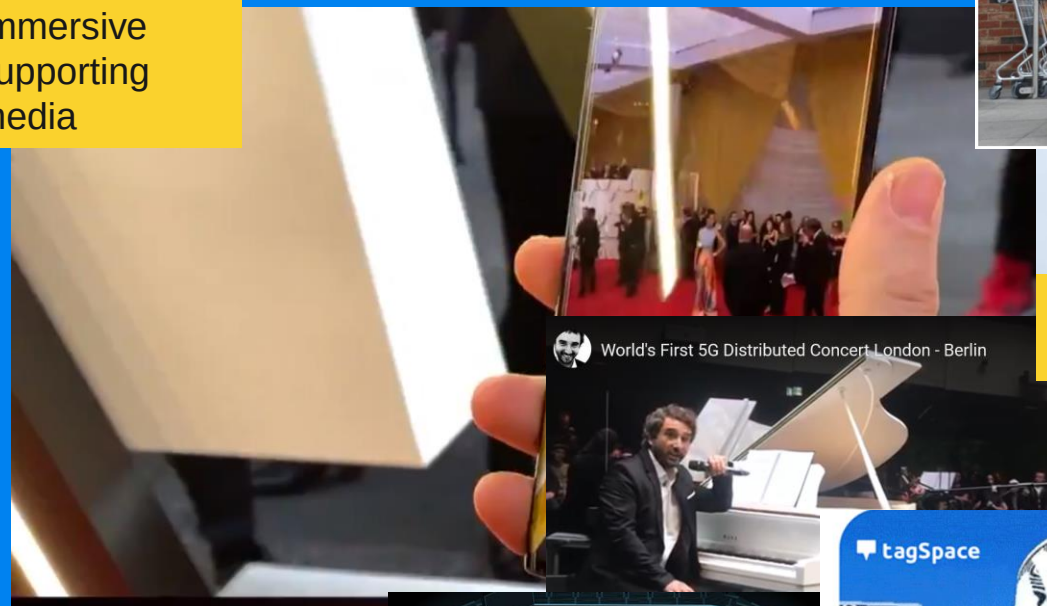
Enhanced Mobile Broadband

Fixed Wireless Access

New Experiences 5G

Enhanced Mobile Broadband

Immersive supporting media

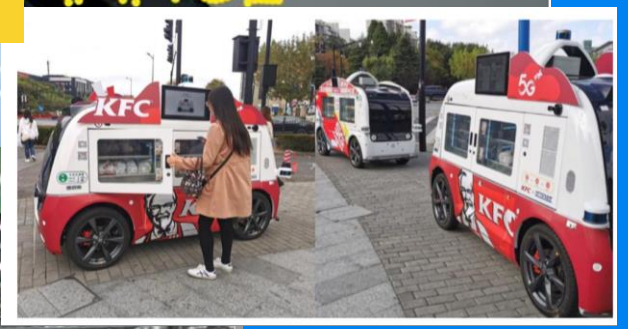


Autonomous solutions

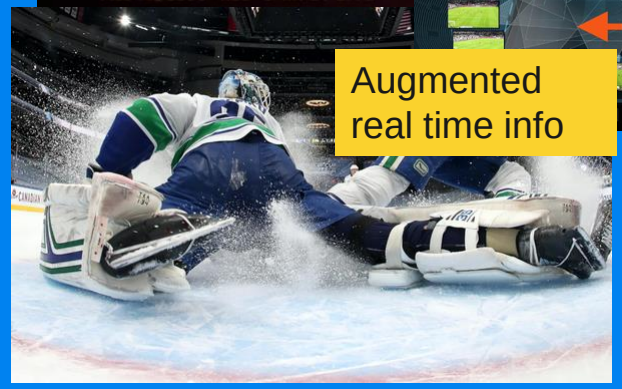
New communities

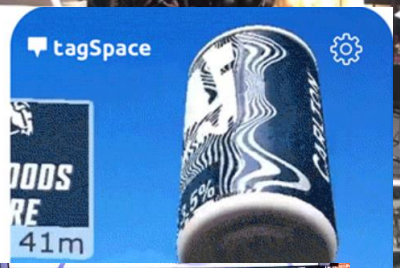
Events without barriers

Educational Immersive AR



Augmented real time info





Location based advertising

Gamification

tagSpace

VISION FOR THE STADIUM

VIP FOR FANS CREATE STICKINESS

GAME/TEAM INFORMATION

IN-SEAT FOOD ORDERS

GAMES AND GAMIFICATION

REAL-TIME STATISTICS

EXCLUSIVE EXPERIENCE TO 5G-NETWORK USERS

INTERACTIVE NAVIGATION

REAL-TIME INSTANT REPLAY

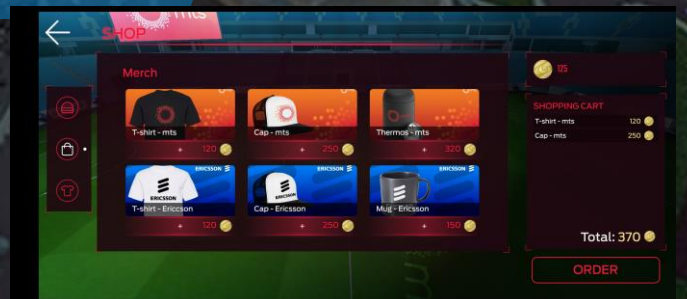
FRIEND FINDER

APP-SHARING TO SOCIAL MEDIA

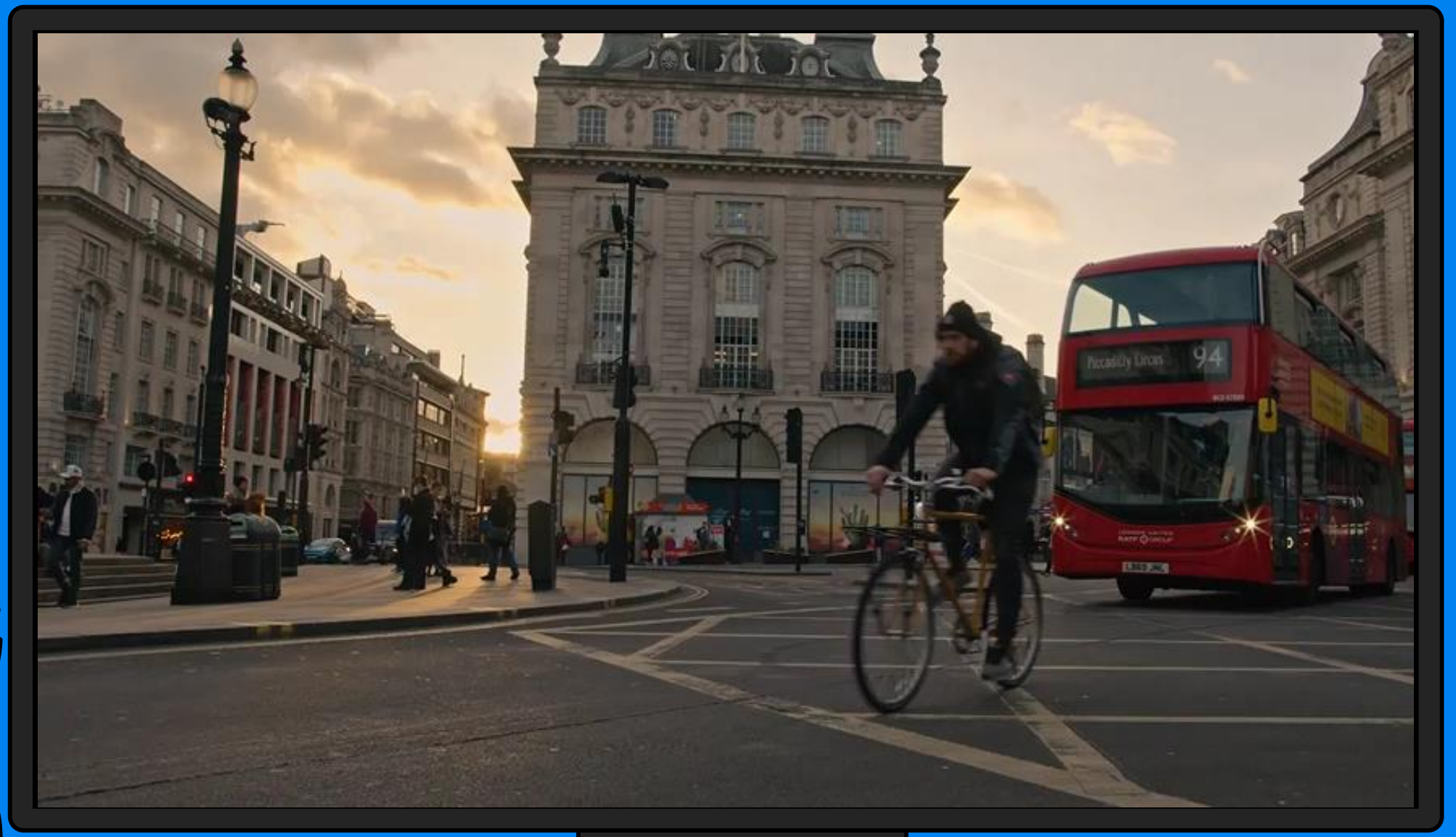
FAN SHOP INTERACTIONS AND DISCOUNTS

REAL-TIME MULTI-CAMERA SELECTION

FOOD AND DRINK OFFERS



Green Planet



Factory of the future

Massive IoT | Broadband IoT | Critical IoT | Industry Automation IoT

Real-time automation

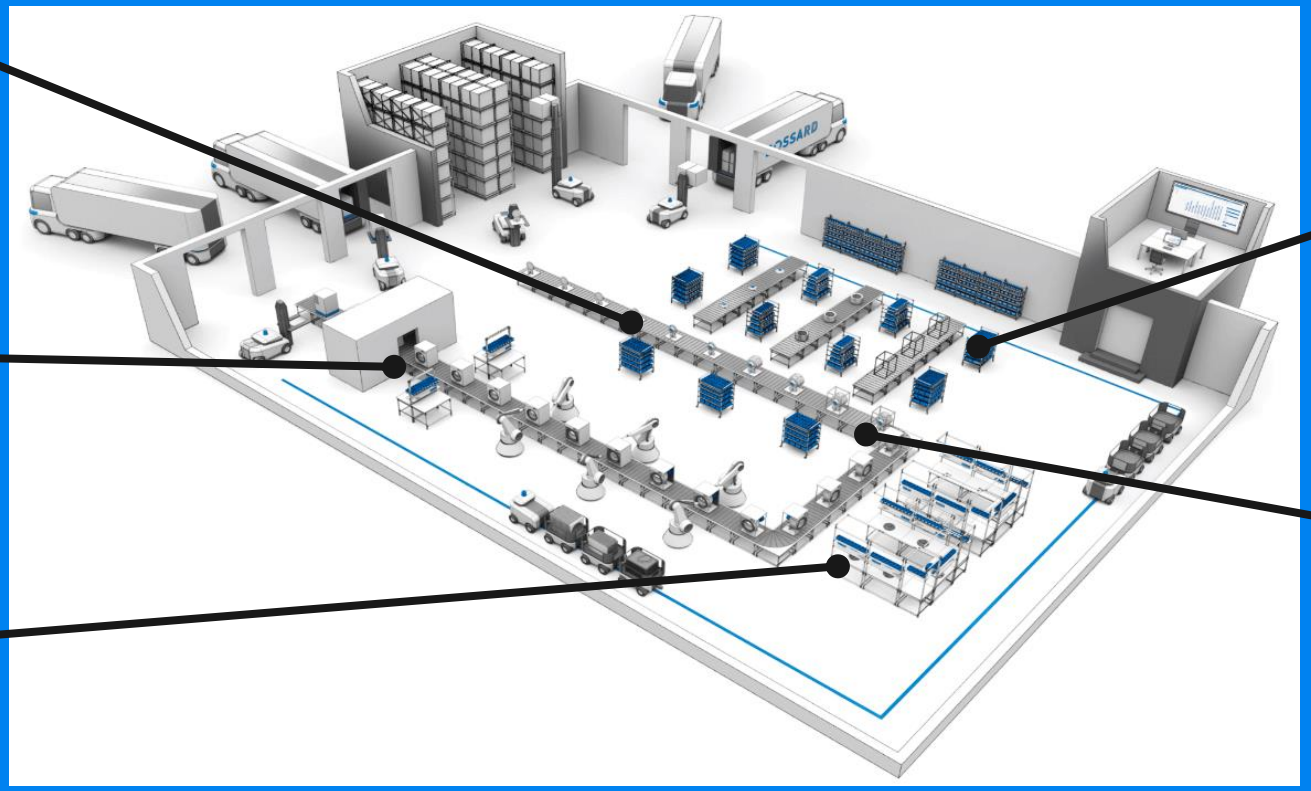
Real-time production chain automation with autonomous mobile robots(eGo)

Autonomous robotics

Collaborative robots

Augmented reality

AR asset diagnostics



Monitoring and tracking

Asset condition monitoring

Enhanced video services

Digital twin for remote operations

Benefits of 5G already being realized in various areas across the world

Manufacturing

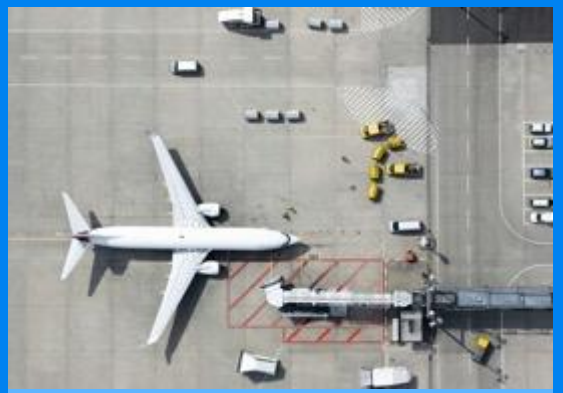
Processing industries

Ports

Mining

Offshore

Power utilities



Airport

5G in an Ericsson Factory

Automated manufacturing

More efficient production

Increased quality


5G Drone inventory counting – No.1

5G Cloud AGV


5G surveillance camera


5G AR training


5G industrial computer


5G AR remote assist

US 5G Factory Use Case Summary

Energy monitoring and management

Augmented reality for remote support

Drones for inspection rounds

Digital adherence for safety and quality

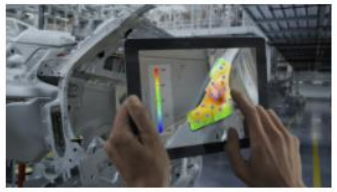
Environmental monitoring within the factory

End-to-end digital thread for radio production

Alerting and escalation using wearable devices

Digital material tracking and visualization within the factory

Digital performance management



Machine learning based visual inspection

Automated unpacking process

Control tower to showcase plant dashboards

Large percentage of use cases within the US Factory can/could be reused elsewhere

USD 100m	>200	300,000	>200
investment	new jobs created	sq. ft.	robots in operation

Factory Facts

25%	17%	40,000	Up to 5x
more energy-efficient than baseline	of power required is produced by onsite solar panels	gallon tanks to collect and reuse rainwater	reduction in shipping distance

Sustainable manufacturing

Industry 4.0 is a journey, not an endpoint

Short Term Use Cases

Connected machines with real-time OEE tracking & mobile alerting

Paperless operations including scheduling, workflows & work instructions

Repetitive tasks are automated on the shop floor

Live material tracking across the facility

Medium Term Use Cases

Optimized production planning, resource scheduling and workflows

Real-time modeling and simulation of plant processes

Augmented reality for training and production

Real-time performance benchmarking across the network

Long Term Use Cases

Automated planning of daily production based on artificial intelligence algorithms

Self-tuning equipment leveraging machine learning to drive quality

Predictive analytics to prevent machine failure

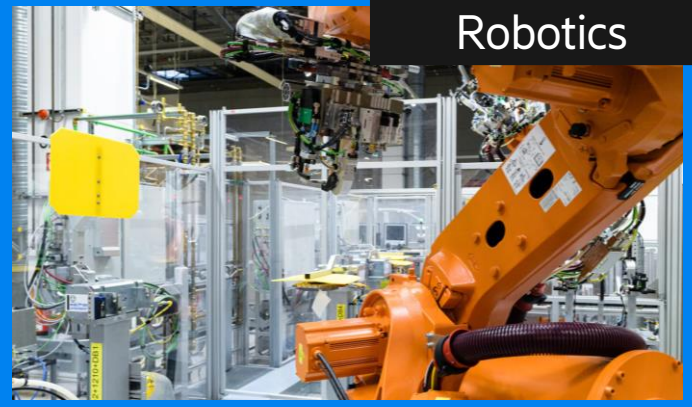
Intelligent routing of material across the entire network

5G is constantly evolving

➡ *important to create a long-term goal which is built on a series of steps to get there*

Recent Manufacturing Use Case Examples

Robotics



Porsche

First deployment of a private 5G network at any of Porsche's production complexes, heralding in a new remote production era for the high-performance car manufacturer

Enable the control of robotics in real time without cables and transmission of massive amounts of data between other on-site machines, production workers and vehicles in real time.

Augmented Support

5G Steel

4G/5G connectivity at ArcelorMittal's industrial sites in France over the next three years.

Objective is also to enable the digital transformation of the French value chain ecosystem for industrial use cases

Includes autonomous rail vehicles in Dunkirk and Florange, autonomous road vehicles, remote maintenance with feedback from the field, virtual or augmented reality and safety devices are also relevant use cases

Remote collaboration

5G VR and Automotive *

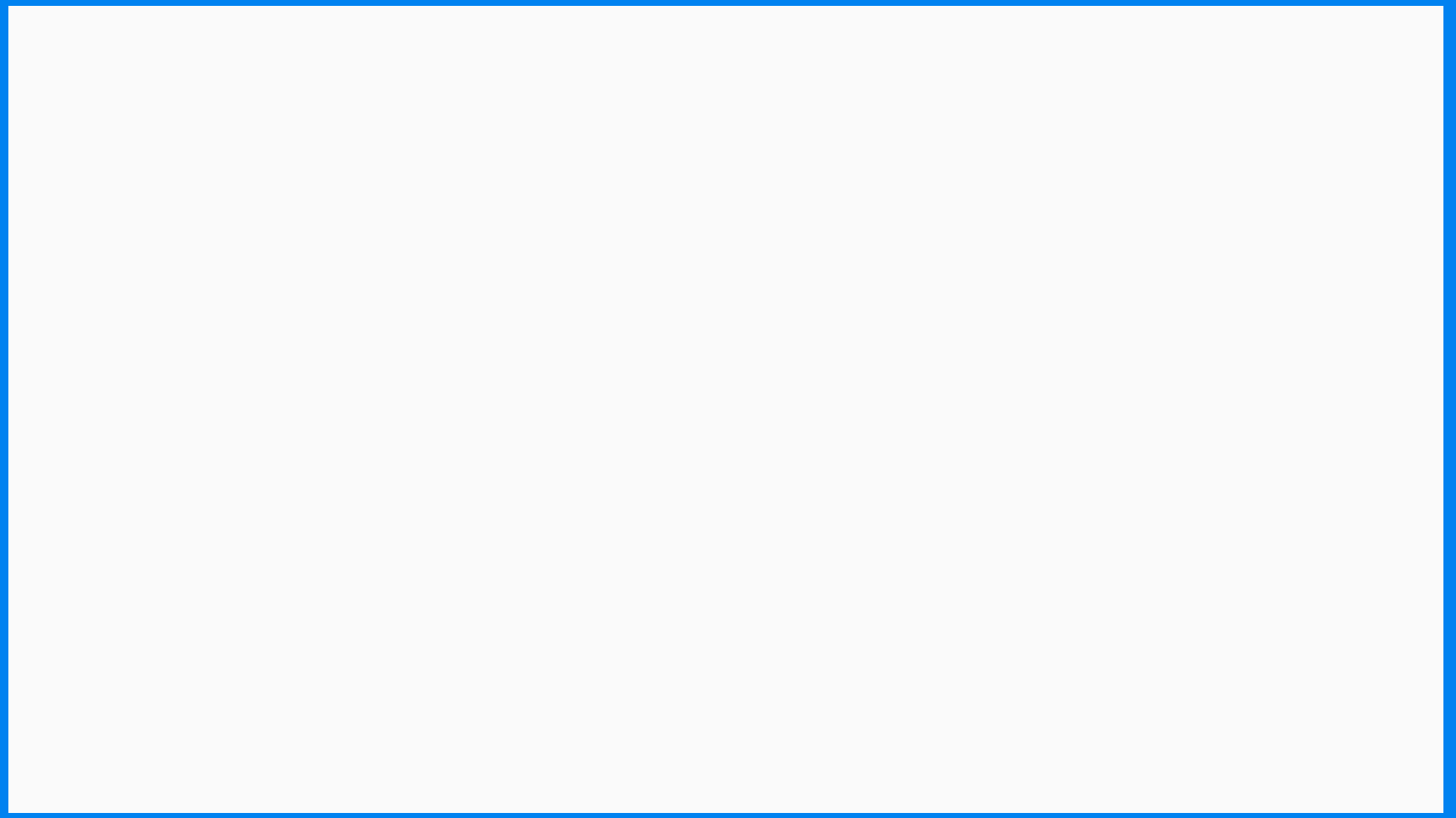
Primary objective is to simultaneously working on the same complex product with colleagues in multiple distant locations while everyone sees the result of the work right before their eyes

Simultaneously working on the same complex product with colleagues in multiple distant locations while everyone sees the result of the work right before their eyes

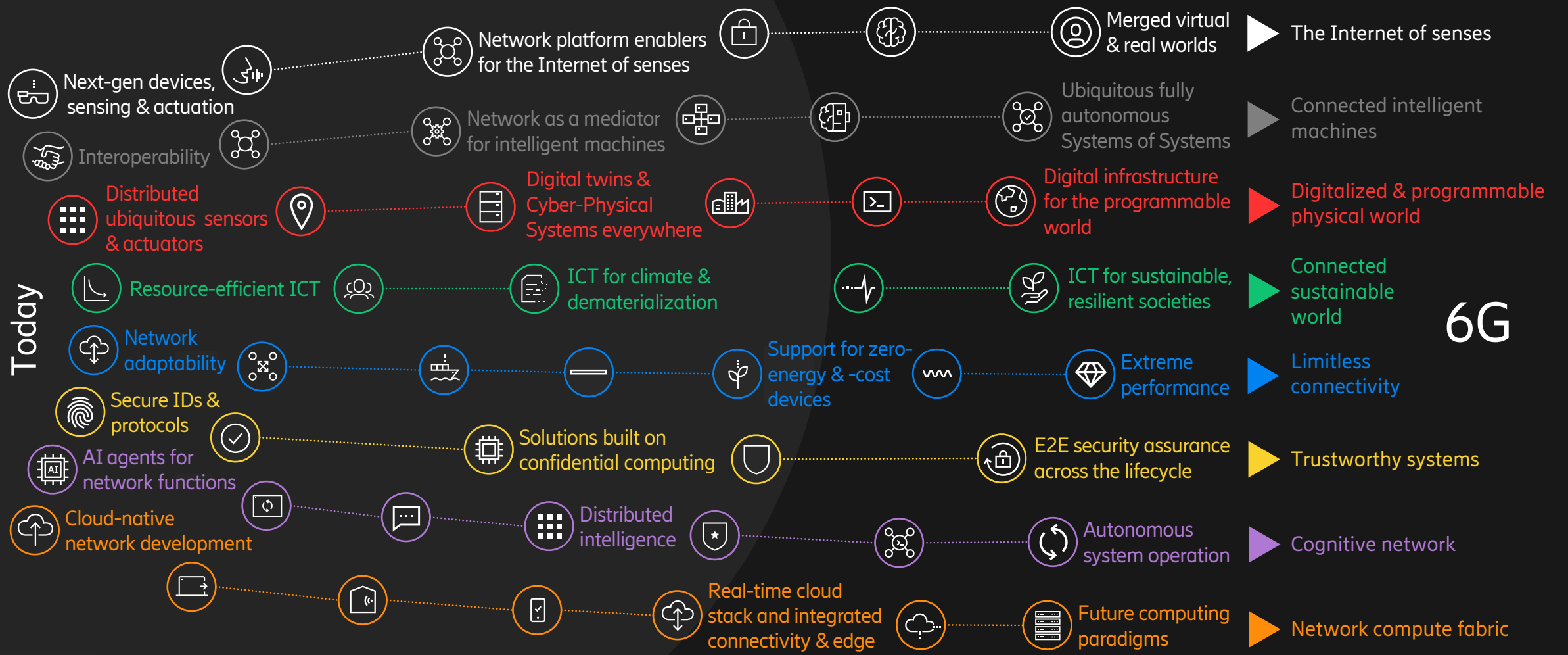
* Image courtesy of Masters of Pie

But it doesn’t stop there…..

Imagine a seamless reality
- a world of limitless connectivity



Technology journeys towards 6G

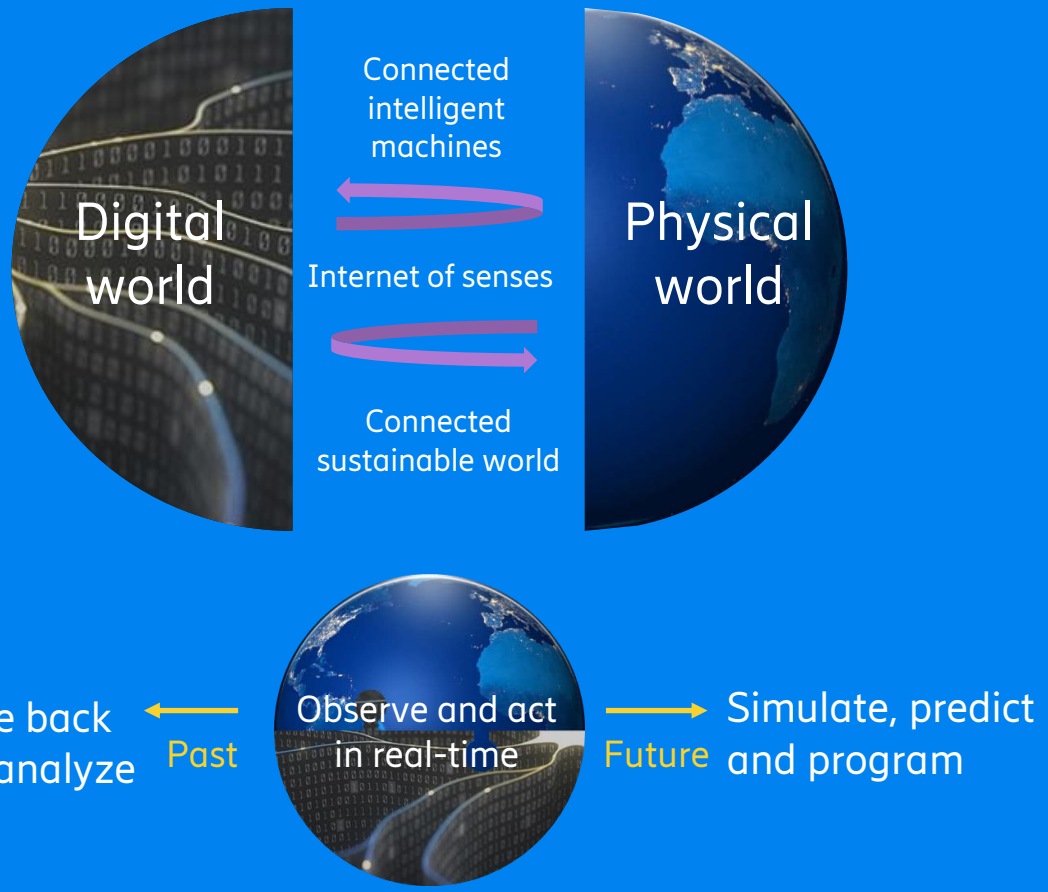


Connectivity: 6G Cyber-Physical Continuum

Programmable digital representation of the physical world

The network provides intelligence, limitless connectivity, and full synchronization of the physical and digital worlds

Cyber-physical continuum



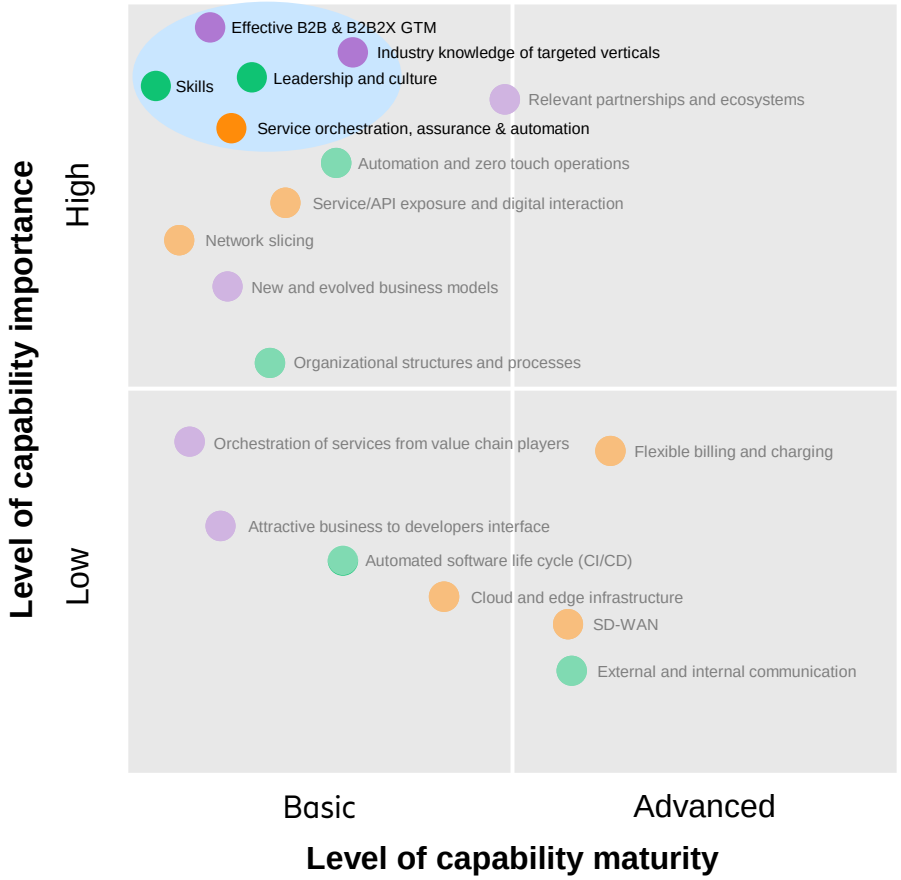
The physical world of sensing, action, and experience

Vast amounts of sensors embedded in the physical world send data to update the digital representation in real time

Actuators in the real world carry out functions that are programmed in its digital representation

Technology is taken for granted by many operators and customers to be successful

Assessment of the importance and maturity of capabilities



Top 5 critical capabilities ● Business ● Technical ● Operational

Learnings and insights

- **Business capabilities as the most important group of capabilities** to build to reach strategic ambition
- **Operational capabilities are seen as enablers** of business and technical capabilities
- Many operators consider themselves to be **relatively mature in building technical capabilities** – and rather **emphasizes the sense of urgency to build business and operational capabilities**

Source: Ericsson - Strategic Customer Engagements

What have we learnt to get the most out of what is possible with 5G

No longer a customer and supplier relationship

What is possible with connectivity requires first hand experience and imagination

Many requirements will reuse the same capabilities, platform and ecosystem

Its multidimensional and iterative

Creative mindset and co-creation vital

Inclusive ways of working, develop once and deploy many to scale quickly

In a world of limitless connectivity the reality of what is needed to get the most from this technology is VERY different to the days of 4G and what came before it

Key takeaways

1	Significant momentum during the first years of 5G – now a desire for scale !
2	5G provides an incredible toolbox to create new opportunities
3	Culture Shift required to get the most out of 5G
4	Growing interest from broad portfolio of different industry segments and geographies
5	Significant benefits already shown through collaborative use cases – importance of ecosystems

ericsson.com/5g