Towards a connected intelligent future
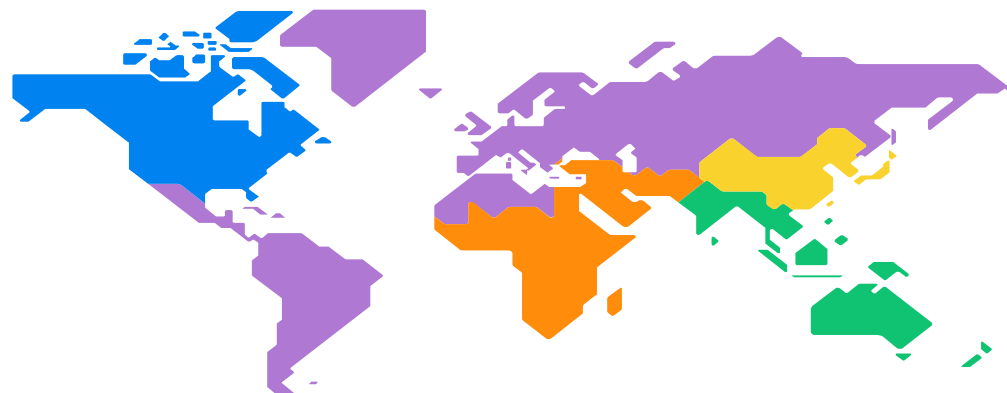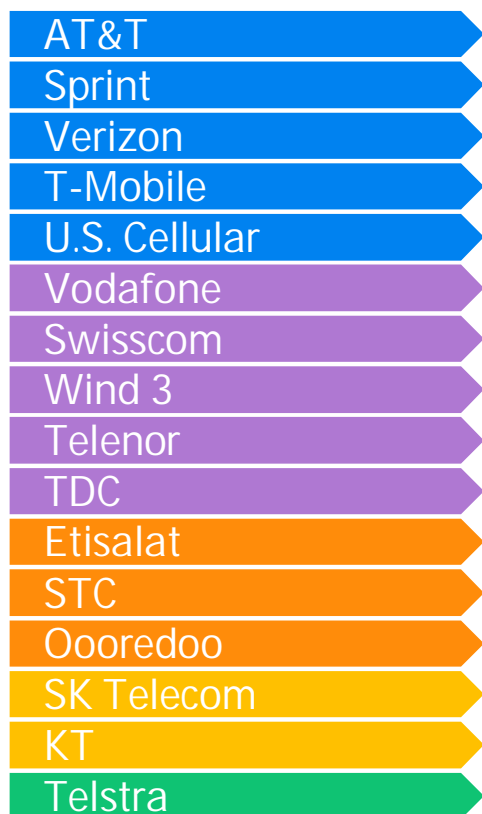
Dr. Magnus Frodigh
Head of Ericsson Research, VP

Ericsson 5G network deployments
publicly announced together with customers

AT&T
Sprint
Verizon
T-Mobile
U.S. Cellular
Vodafone
Swisscom
Wind 3
Telenor
TDC
Etisalat
STC
Oooredoo
SK Telecom
KT
Telstra

Fixed Wireless Access

Enhanced Mobile Broadband

All main 5G NR frequency bands

Interoperability with all key device chipsets partners
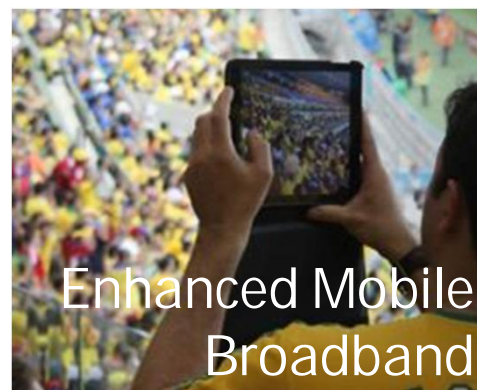
First Smartphone - form factor device NR interoperability

Massive IoT networks deployed

NB-IoT | LTE-M
NB-IoT & LTE-M

Robot control using URLLC and edge cloud

Massive collaboration

— control of 18 individual servos moved to edge cloud, over 5G

Modularity

— taking flexible personalized production to an extreme

— quickly (re-)configure and customize the robot/production line that you need

Enabled by 5G URLLC + real-time edge cloud

— mobile robots, even more mobile than AGVs

Evolving 5G

New use cases
Manufacturing and industrial IoT
Automotive and ITS
XR (AR/VR/mixed reality/...)
Fixed wireless access

Radio access
Higher frequencies
Integrated access and backhaul
New topologies and mesh

Networking
Encryption compatible network optimizations/Collaborative
Artificial Intelligence / Machine Learning

Devices & Hardware
Co-operative transmission
Zero energy
Zero cost

Implementation
Cloud based
Service based
AI
Open source
Network service mesh

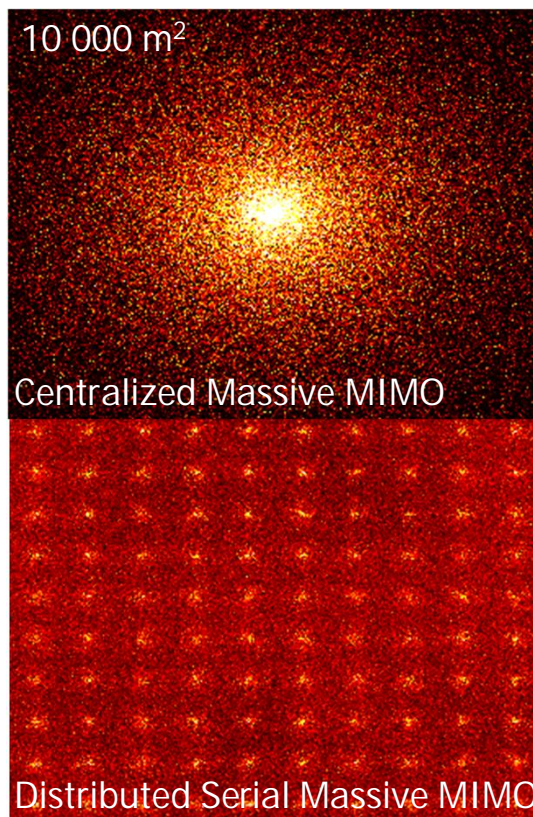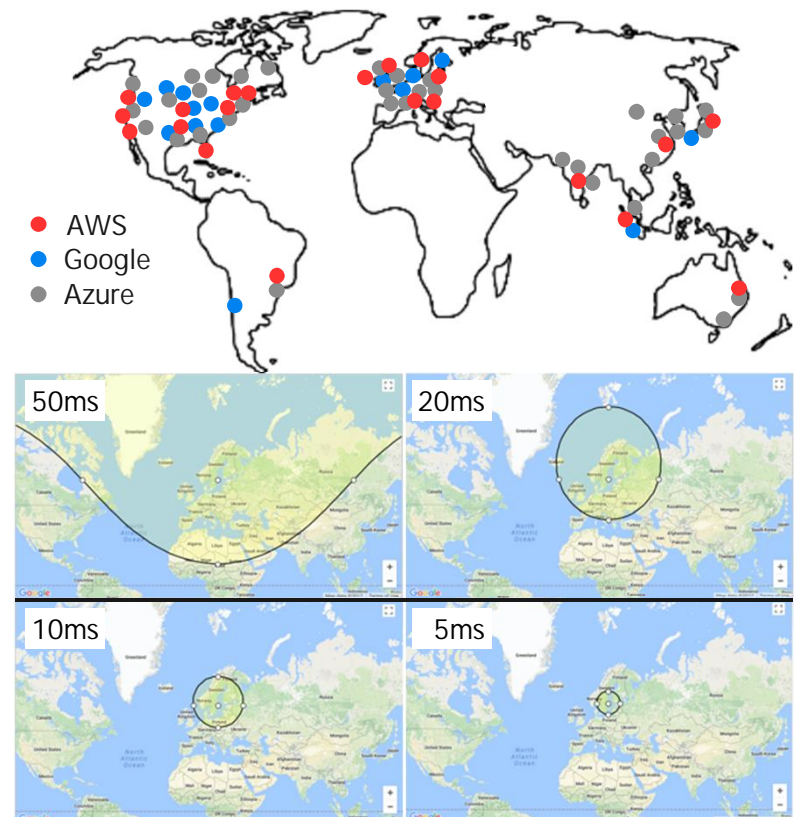### Integrated connectivity and edge compute

Zero-touch

Trusted networking

Radio stripes
Downlink rate [bits/s/Hz/user]

10 000 m²

Centralized Massive MIMO

Distributed Serial Massive MIMO

>14
12
10
8
6
4
2

Edge cloud with latency as driver

Public cloud service providers' cloud

Public cloud latency	Optimal game latency	Public CDN latency		
<1k Data centers	<1k Data centers	<1k Data centers	10k sites	

\# of compute sites/Data centers

Operators' distributed cloud

Human perception	5G radio latency	
>100k sites	Billions devices	

Control loops

VR → VR/AR/MR

Remote operations

CDN / streaming

Web / app rendering — IoT data

Big data — cold storage

100ms	75ms	50ms	20ms	10ms	2ms	<2ms

Latency, including compute

- AWS
- Google
- Azure

50ms   20ms   10ms   5ms

Artificial Intelligence everywhere

Real-time AI
— Intelligent decision making on live data

— Real-time predictions and online learning

Distributed AI
— Data center, network edge, device
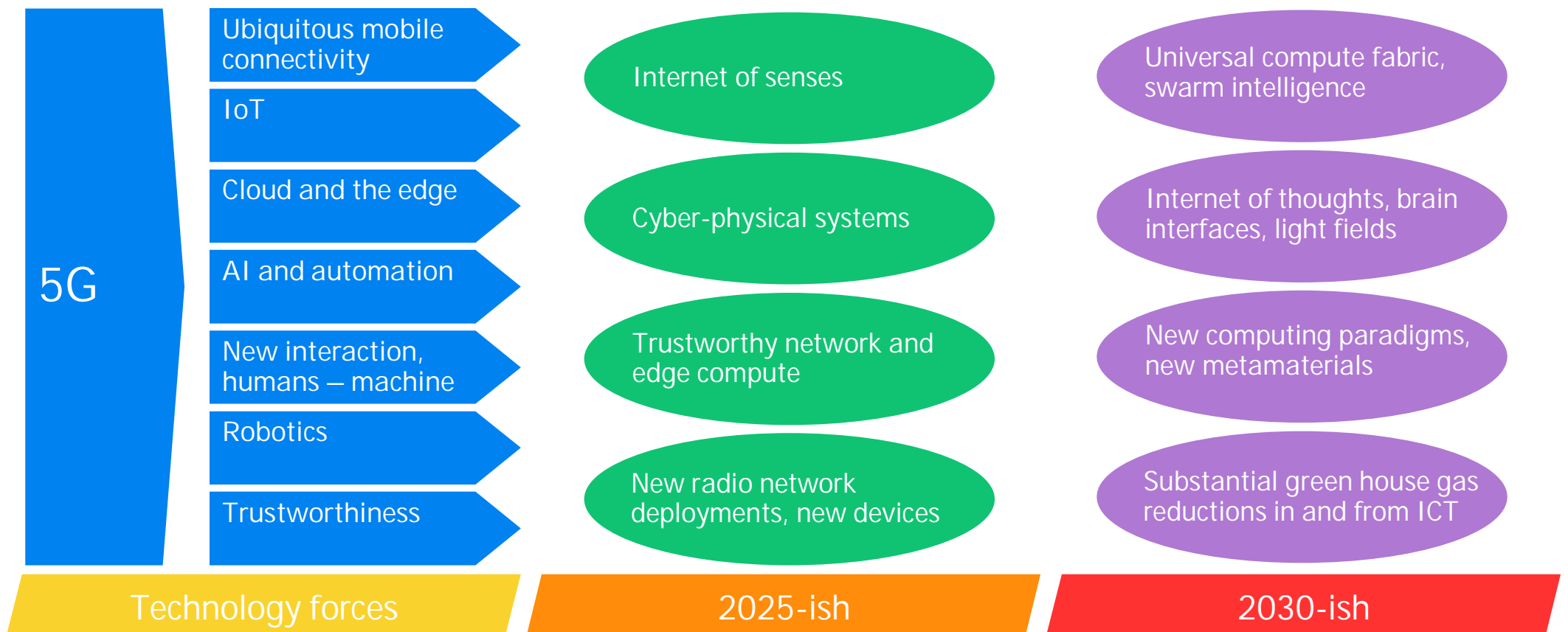
— Global vs. local decision making

Responsible AI
— Safety and trust guarantees

— Transparency

Technology forces — unleashing unprecedented growth from their combinatorial effects

5G

- Ubiquitous mobile connectivity
- IoT
- Cloud and the edge
- AI and automation
- New interaction, humans — machine
- Robotics
- Trustworthiness

2025-ish

- Internet of senses
- Cyber-physical systems
- Trustworthy network and edge compute
- New radio network deployments, new devices

2030-ish

- Universal compute fabric, swarm intelligence
- Internet of thoughts, brain interfaces, light fields
- New computing paradigms, new metamaterials
- Substantial green house gas reductions in and from ICT

Technology forces	2025-ish	2030-ish

Magnus Frodigh | 2019-03-26 | © Ericsson

Summary

— 5G is launched and expanding rapidly

— 5G will continue to evolve for many years

— Time to explore and research technologies relevant ten years from now

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