The evolution of 5G

Paul Challoner

VP Network Product Solutions

5G transforming life & industry

Venues & entertainment



Healthcare



Transportation



Manufacturing







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A 5G connected world goes beyond the phone



Economic impacts powered by 5G



Big Drivers Healthcare \$305B Annual cost savings Transportation

, \$450B Annual cost savings

Smart Cities \$160B Annual cost savings

5G adoption rate higher than previous G's

Global Mobile subscriptions (millions)



Source: Ericsson Mobility Report Q4 2022 Update

Maturity of 5G Networks still has ways to go

North America Tier 1 5G progress report: Q123



Key benefits of 5G Standalone



FWA connections and ambitions



Different types of CPEs



Indoor CPE

Combined LTE/NR modem including residential gateway

Omni (or directional) antenna	Wi-Fi modem	SIP client for VoIP
LTE/NR modem & baseband	Router functionality	Power



Outdoor CPE



Government connectivity initiatives

USA

Broadband Equity, Access, and Deployment (BEAD) Program Affordable Connectivity Program (ACP)

Europe

Path to the Digital Decade

Recovery and Resilience Facility

Norway

District development model

Australia

National broadband network



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Bridging the digital divide

Use case: FWA connecting >20K homes

Challenge

Rural Appalachian region of Ohio, 32 of 88 counties with limited access to broadband

• Miles between homes makes running fiber economically unfeasible

Solution

High-performance wireless connectivity without line-of-sight restrictions

- 3.5 GHz Citizens Broadband Radio Service (CBRS) spectrum
- 3 sector, 60 MHz per sector solution

Results

- ✓ Reliable & predictable performance with rapid deployment (30 days)
- ✓ High capacity, broad coverage with no line-of-sight issues (100 Mbps achieved)
- ✓ Future-proof, 5G-ready fixed wireless solution
- \checkmark Lower total cost of ownership with lower cost per megabit, faster ROI



Photo: Leonard Hayhurst/Tribune

"Since we've gone to OhioTT, internet service is much faster and more efficient. It's a very workable solution for our farm & our whole family."

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Bridging the digital divide Use case: FWA connecting a Texas school district

50% of teachers say their students spend 1-4 hours a day using Ed Tech



9%

Schools in the U.S. without broadband internet



🕮 268M

Hours per week

GPA How many unconnected in the world



Your Internet speed is **370** Mbps

RAN evolution towards open architectures

Key elements of Open RAN

Cloudification



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Intelligence & automation





Open RAN platform ecosystem evolution



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Cloud RAN hardware acceleration options



O-RAN open fronthaul (LLS) progress

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Centralized RAN increases fiber needs





Uplink capacity demand

- Ericsson is the #2 contributor, helping to create a high-performance fronthaul interface
- Next Gen Fronthaul interface ULPI aims to mitigate the challenges



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Climate change is an existential threat for humankind and our industry is part of the problem

2013-2021

Warmest years on record since 1880

13.7M tons

Annual operational carbon footprint of Tier 1 MANA MNOs

Undeniable

Human activity and fossil fuels cause global warming

16M acres

US forest needed to absorb these annual emissions

Sustainability challenges



of CO2 emissions from operators come from electricity to power its networks



of all network opex comes from energy consumption



Annual energy cost of running mobile networks globally



rApps for sustainability

Cloud RAN and Purpose-built

RAN Energy Cockpit rApp

O&M Tool with AI and automation to visualize and solve energy inefficiencies



Save energy while improving network performance

RAN Energy Control rApp

Close Loop with AI predictive model25% Energy savings0% Performance impact



North America R&D growth for open systems

"Trudeau and Ericsson Launch \$470M 5G, 6G, and Quantum Computing R&D Partnership"



Quantum Zeitgeist May 6th , 2022

US + Canada - Existing

- 22 Labs
- 36 university partners

Canada - New

- New \$470M R&D in 5G, 6G
- New Quantum Hub

Ericsson North America 11,000 employees

Evolve through new open interfaces





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Indoor 5G. 97B+ sq foot opportunity

90% of our time is spent indoors





Industrial ~16B sq ft



80% of data consumed indoors







Offices ~15B sq ft

5G enhancing the Aviation industry

Key growth barriers faced by the U.S. aviation industry

Turnaround delay costs up \$33B per year

Operational inefficiency degrading margins: -3.1% YoY



Additional 630K maintenance technicians by 2030



1% increase in customer satisfaction yields +1.5% revenue



Managing increasing security and screening protocols

Use case: Purdue Airport, "lab to life"

Private 5G network will enable new use cases & efficiencies:

- ✓ Security platform for airport operations
- ✓ Sensors for aircraft tracking
- ✓ Enhancing passenger safety & experience



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Source: Ericsson consulting. Connected Aviation report, July 2022

Venues are seeing 67% growth in data usage YoY

+7x

more 5G radios compared to Super Bowl LVI

492 Mbps

Median DL speed

40%

5G data traffic

\$229B Infrastructure spending

533TB

Mobile data traffic (48 game)

136TB Wi-Fi usage

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2030 scenarios



Key insights for a successful 5G evolution



Resilient

Critical, secure, reliable networks enable innovation

Open

Continuous evolution of global standards towards Cloudification & automation

Sustainable

Networks must be sustainable but also enable society's sustainability goals.

Intelligent

AI in networks must be able to handle increasing complexity to ensure efficiency & enable new applications



Ericsson.com/imaginepossible