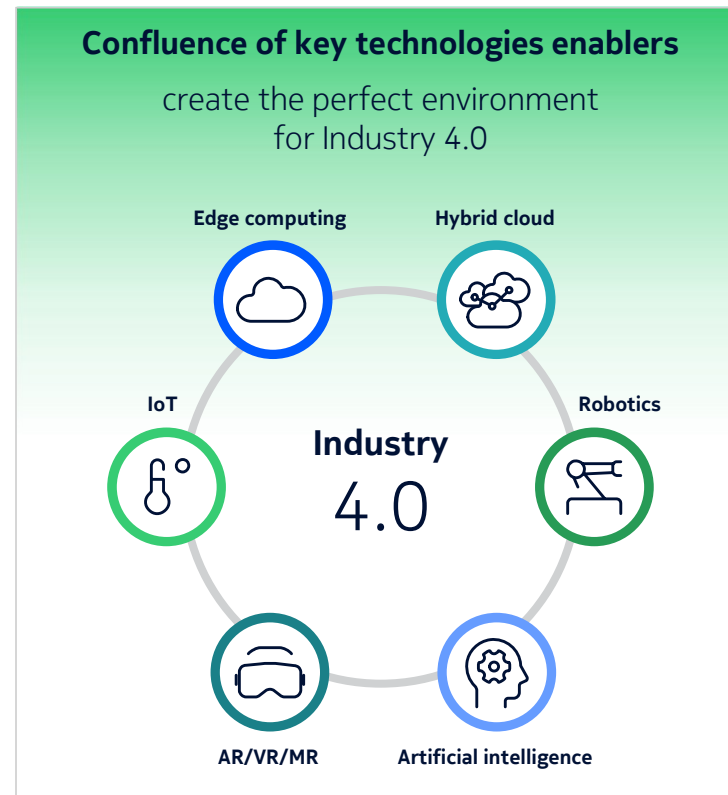
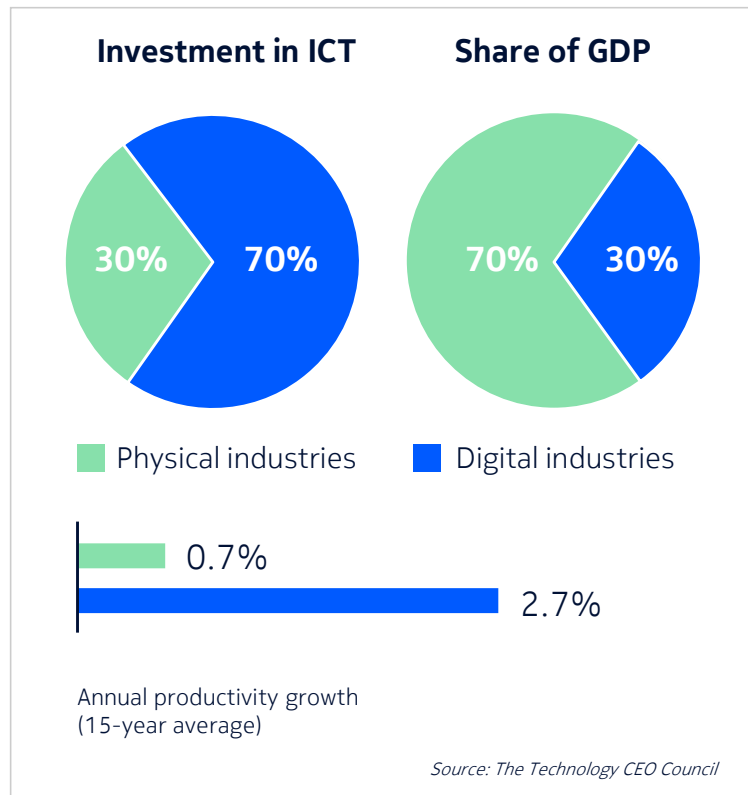


Boost value in digitalization with private wireless 5G

Manolis Katsaragakis

NOKIA

Digital transformation is crucial to boost productivity



>70%

Enterprise are investing in IoT today

<https://www.pwc.pt/pt/temas-actuais/pwc-apresentacao-iot.pdf>

53%

Plants & systems in production, logistics and warehousing are equipped with sensors

MHP - A Porsche Company / LMU
Industry 4.0 Barometer 2024

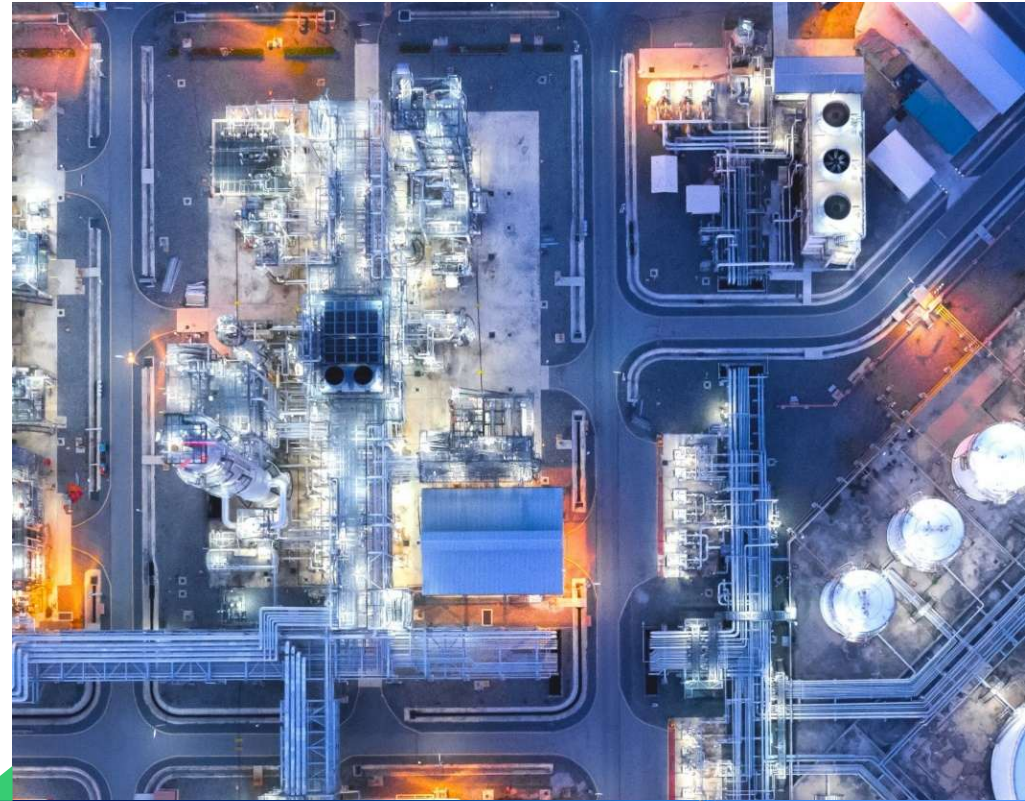
...but we are not yet fully there
Connect the unconnected

74%

Of today's data not yet collected!

14M

Sites require reliable wireless
connectivity for OT use cases



NOKIA

No green without digital



“ We found that connectivity will be a huge challenge if we want to scale. We need strong bandwidth anywhere people access the metaverse solutions

VP of IT, Global Automotive Supplier

Industrial metaverse study “The Metaverse at Work”, EY/Nokia, 2023

”

Vertical key use cases

... for 5G private wireless networks realizing Industry 4.0 potential

Automotive & Manufacturing



- Factory, plant and site automation with real-time machine connectivity
- Predictive maintenance and digital twins for simulation
- Automated guided vehicles and logistics
- Connected worker support and augmentation
- Automotive data shower for over-the-air updates in factories and at retailers

Railways & Airports



- Connectivity for shunting and maintenance yards (“factory-like” use cases)
- Enhanced airport operation with below-wing and forefield processes
- Reliable and secure worker communication
- Video analytics and security surveillance incl. drones
- Overhaul procedures and remote video inspection

Maritime & Logistics



- Autonomous mobile robots or vehicles (AMR, AGV) incl. automated straddle carriers / cranes
- Group, voice and video communication
- Reefer container monitoring – on-ship and on-port
- Private 5G on vessels for “in transit” monitoring
- Automated site access system and security

Oil, Gas, Mining & Utilities



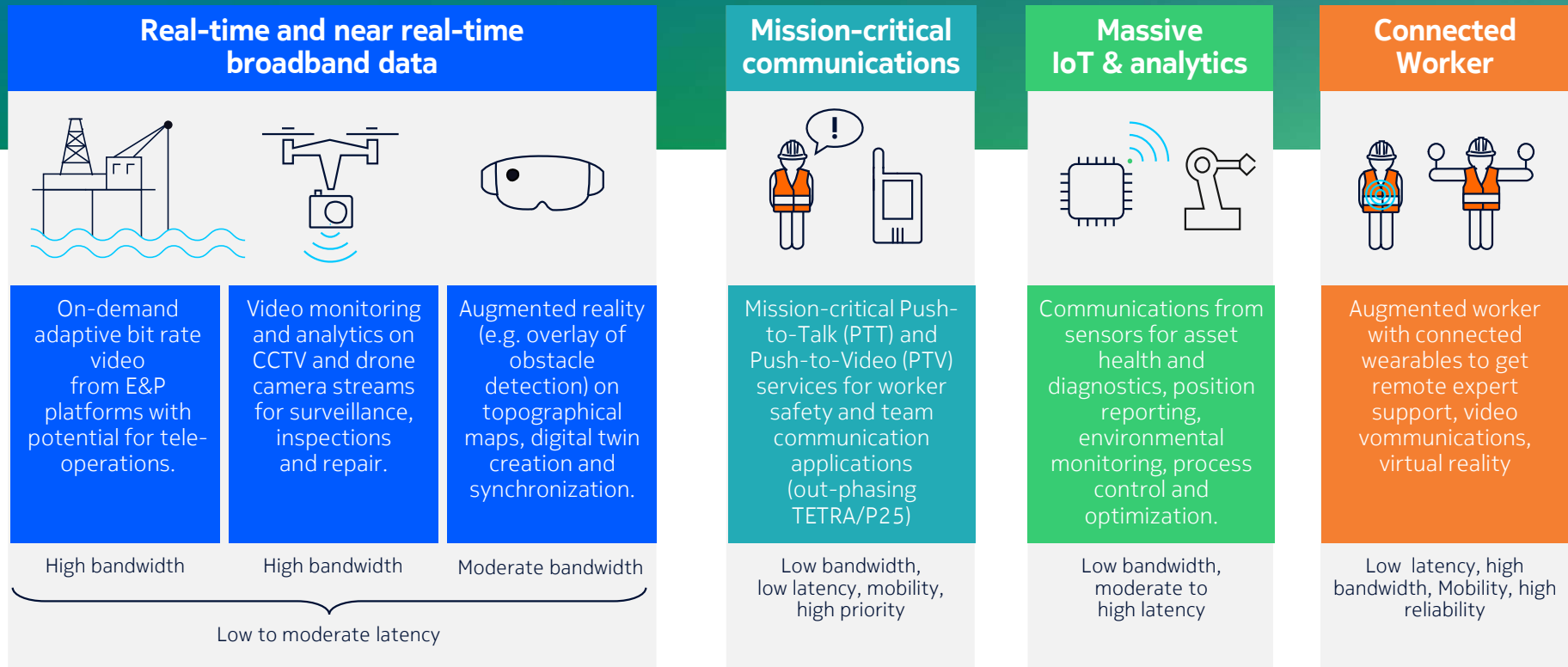
- Autonomous haulage systems and remote-controlled vehicles
- Advanced group communications and push-to-talk / video
- Predictive maintenance and situational awareness
- Wind turbine, FAN or grid monitoring / automation
- Bio-vital sign and personal safety equipment (PSE) monitoring

Public Safety, Health & Defense



- Transportable connectivity solutions (“backpack”) for defense battlefields and outposts
- Mission Critical group voice and video communication
- Drones for security and surveillance
- Situational Awareness applications

... and they demand for different network attributes

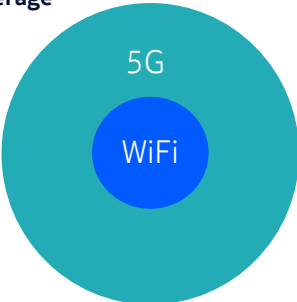


Benefits of 5G for industrial connectivity

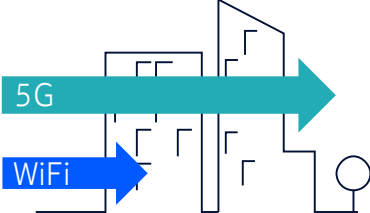
A comparison against Wi-Fi...

Wide & deep coverage

4-100x coverage

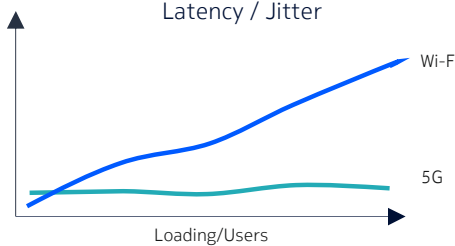


>3 extra walls of penetration

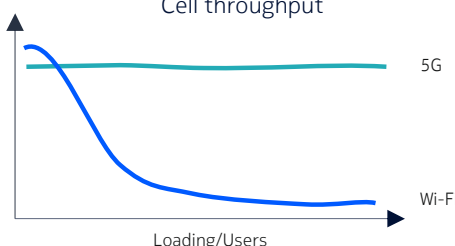


Predictable performance


Stable <15ms latency



25x multi-user capacity



Military grade security




Wi-Fi
WPA2/3 compromised

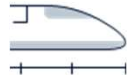


5G
SIM authentication
E2E encryption

High speed mobility

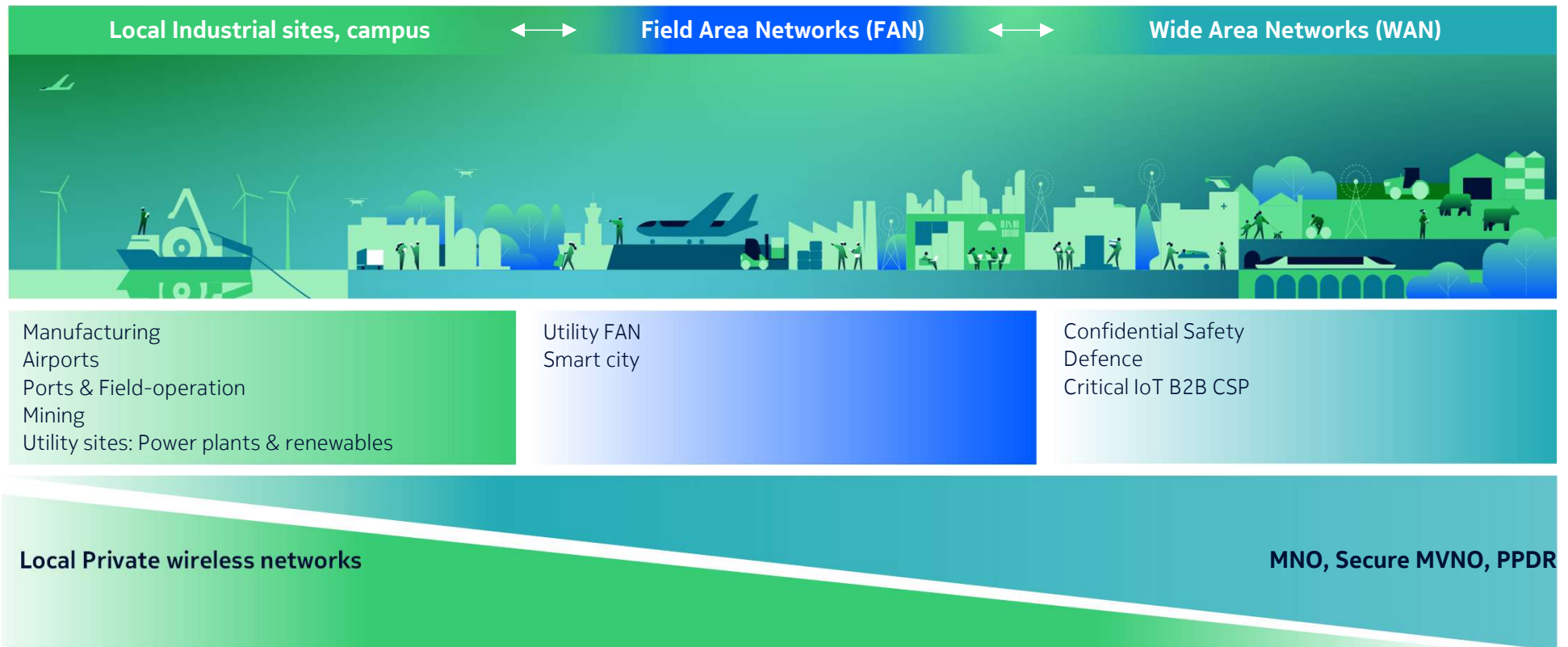


WiFi | Up to **15 sec** latency on fast hand-over

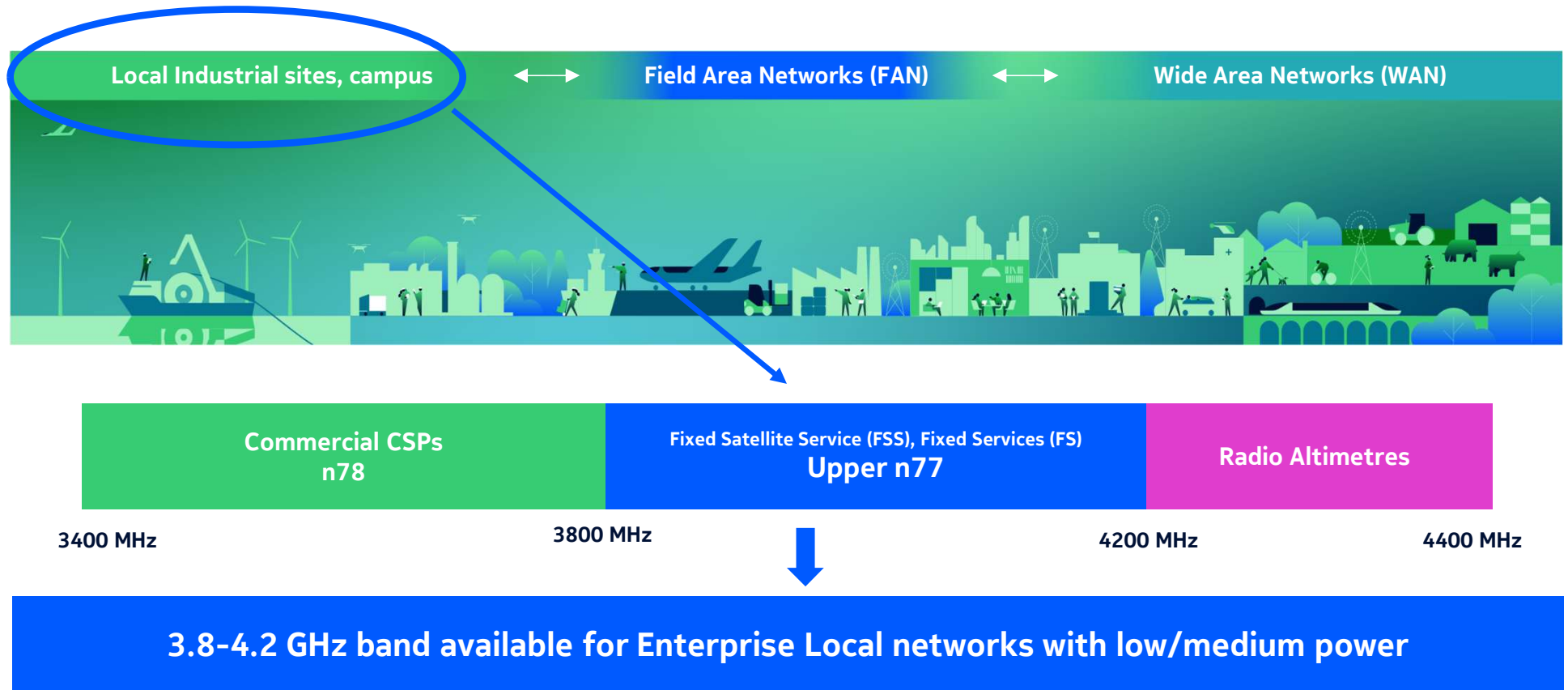


5G | Smooth hand over up to **350kph**

Private wireless ranges from industrial site to nationwide



5G Band for Enterprise Local Private Wireless in Europe



n77 - 3.8-4.2 GHz regulatory timelines

Europe & EU Harmonization

ECC Report 358 (3.8-4.2 GHz)
ECC Report 362 (Radio Altimeters)

CEPT	EU
46 members (EU + non-EU)	27 Members
ECC Decisions: non-binding ECC Recommendations: measures that the national admins are encouraged to apply ECC Reports: in support of ECC Dec/Rec	EC Decisions (binding) CEPT reports: carried out triggered by EC Mandates, used as basis for EC Decisions



n77 to unlock next-generation use cases



Low-Cost Spectrum

Enabler for enterprise models that were previously impossible

Economically viable for the mass market enterprise segment (examples: UK, Poland, Norway)

CEPT: rapid, large-scale adoption

Enterprises will gain access to a consistent, predictable spectrum layer across all major European markets

European eco-system

Europe-wide availability

Lower the HW/SW costs due to scale

Faster time-to-market for industrial solutions

Simpler certification and regulatory compliance

Enterprises can now run high-reliability, low-latency 5G with guaranteed performance

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Summary

There is still strong demand for connectivity

5G for wireless Enterprise networks

**Spectrum availability
for the Enterprise local networks in Europe**

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