

Next Edge Solutions

4G/5G networks Power Utilities

UTCAL Presentation
Jorge Iporre, September 15th



Agenda

1. Power utilities overview (Snapshot & Problematics)
2. Communications needs and market demand
3. Why Private networks
4. Applications over Private LTE networks
5. Q&A



Jorge Iporre Teran

Utilities Sales Manager NOKIA

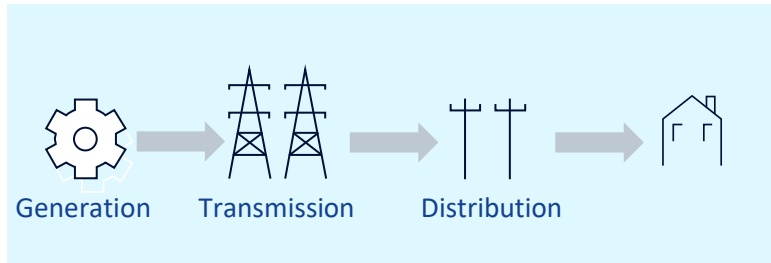


- Ingeniero en Telecomunicaciones con mención especialidad Eléctrica.
- Maestría en Dirección estratégica de Tecnologías de Información.
- Gerente de Telecomunicaciones IT/OT en la empresa de distribución eléctrica ELFEC S.A. (11 años)
 - Despliegue de redes de automatización SCADA, + 2000 enlaces inalámbricos y 1800 Km de F.O. (OPGW, OPPC, ADSS, DDR)
 - Gestión y Control del sistema SCADA (HMI, integración ADMS y FLISR)
 - Gestión de comunicación de subestaciones de transformación y potencia bajo estándar IEC 61850-3.
 - Director del proyecto de medición inteligente y Smartgrid.
 - Presidente de comisión de innovación de la corporación ENDE

The evolving electrical network

Unidirectional
flow of electrons

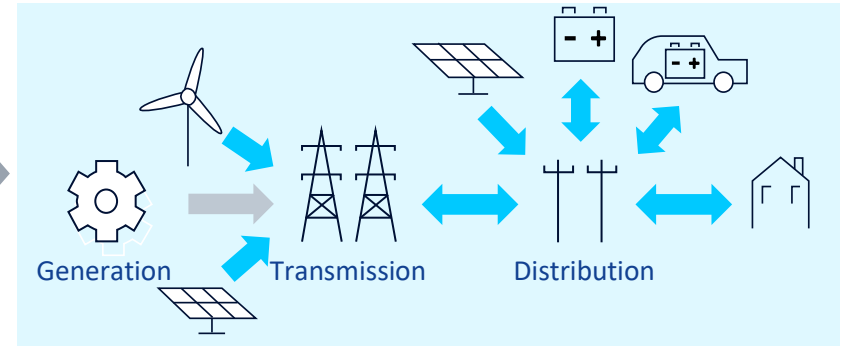
Inconscient of
environmental
impact



Distributed
Energy
Resources

Importance of the
ecological transition

Need for more
flexibility



Smart network

HOW?

A snapshot to the Power Utilities

Basic needs to meet

Dedicated OT Backhaul communications for SCADA & signalling information between Substations and HQ

Dedicated analog/digital Radio communication network for Worker connectivity. (Conventional or trunked)

Leased communication network for decentralized commercial Branches

Wireless, fixed or leased communication network for active assets on the grid

Geopositioning system for truck fleet

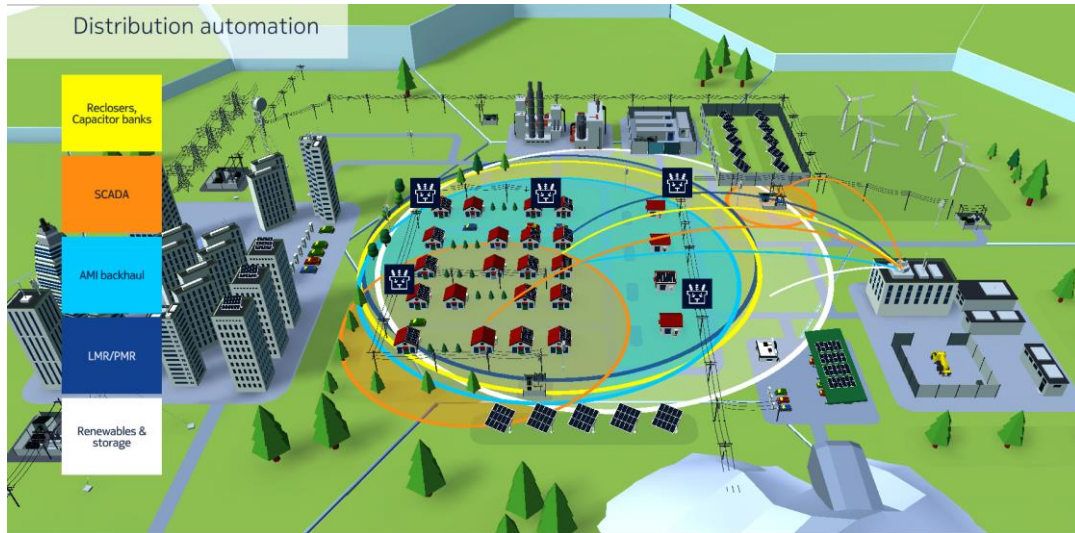
Electrical Meter reading

- Manual
- Remote (AMI initiatives)

Enterprise communications

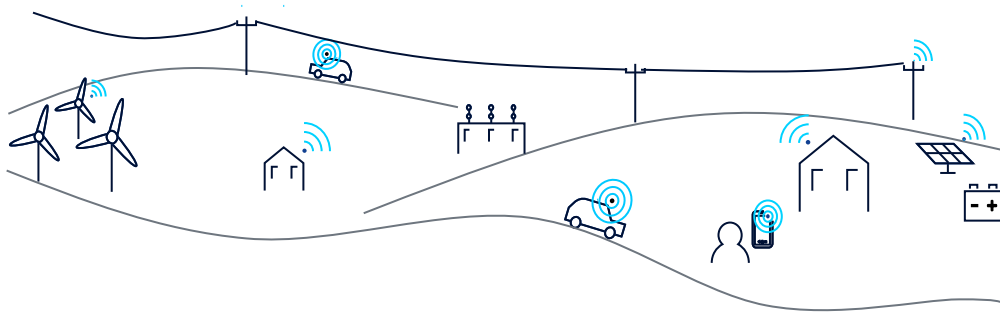
- VoIP
- Multimedia (CCTV & data)
- Centralized/ decentralized Call Center

Most common approaches – Power Utilities



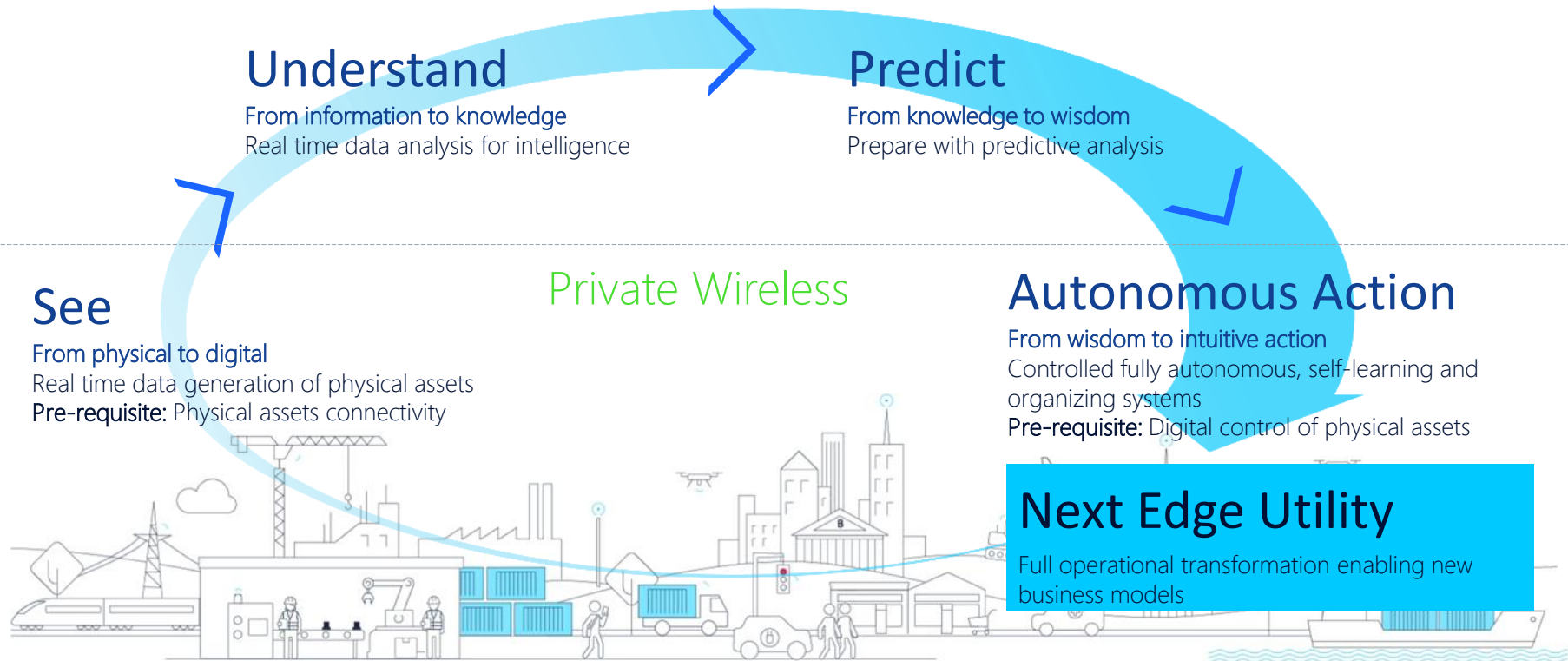
- Deploy of specific networks for a specific demand.
- Management of several NMS, one for each application
- Communication systems with different availability/confiability rate.
- Use of non convergent architectures for OT and IT
- Communication focused on Active assets, leaving the passive ones on a second plane.
- Incongruence of security schemes within the OT/IT subsystems.

New infrastructures & services in Utilities



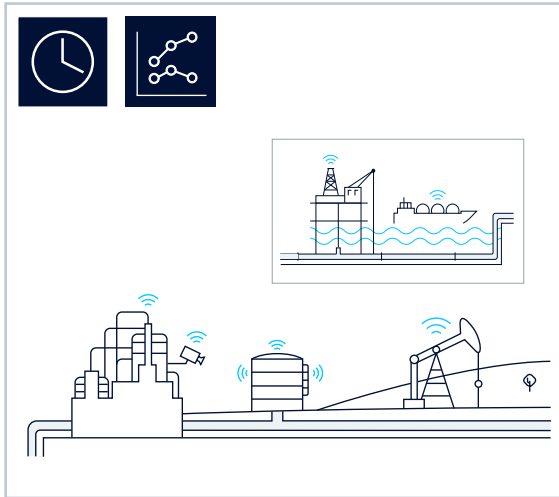
- Deployment of IP/MPLS WAN networks between substations (Fixed & wireless).
- Deploy of Fiber Optics networks over the electrical transmission network (ADSS, OPPC & DDR)
- 3G/4G public network used to communicate active assets (reclosers)
- CCTV services for substations (robbery or vandalism)
- IIOT sensors deployment over the electrical grid.
- OMS,ADMS & GIS convergence.

Power Utilities transformation cycle

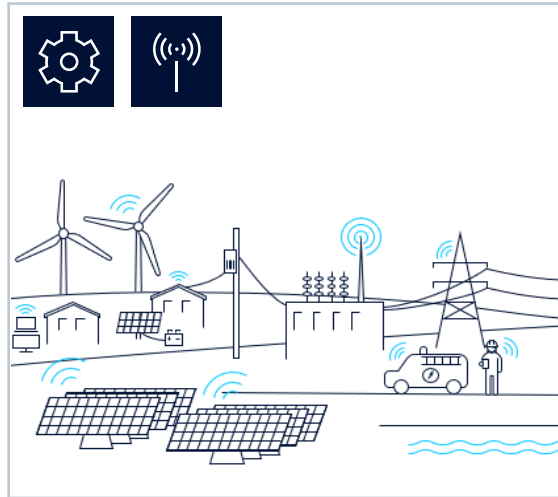


Asset intensive Utilities “Must-have” needs

Continuous operations with multiple redundancies & mission critical performance



Efficiency and safety rely on coordination between multiple physical assets at work sites and in the field

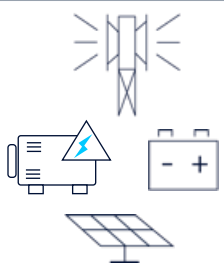


Guaranteeing security while having the flexibility to react to change

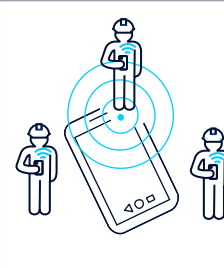


Mission critical communications imperatives


Going beyond commercial services



72h
Power backup



Group Comms
Mission Critical



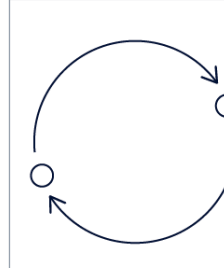
QoS
Guaranteed & differentiated



Geo. Cover.
Metro, Regional Remote



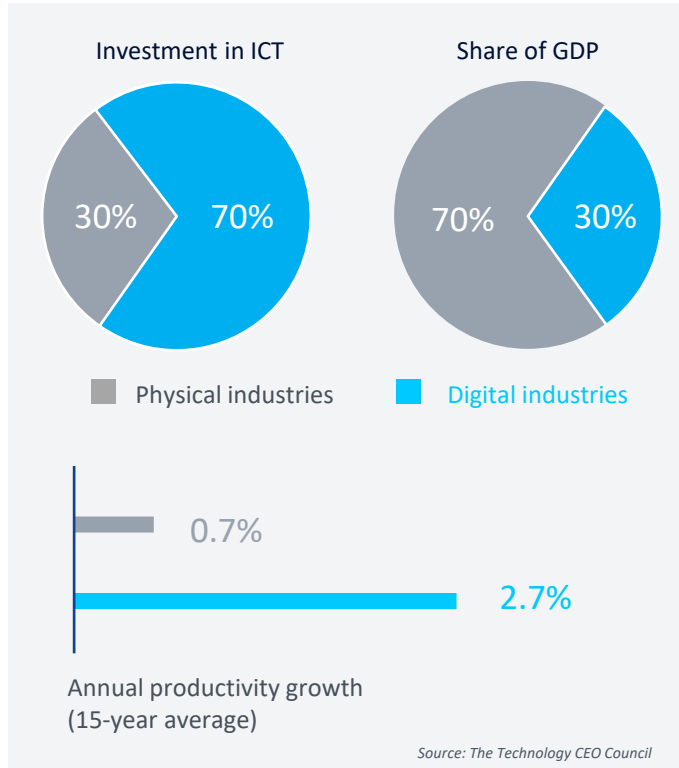
Security
Critical Infrastructure



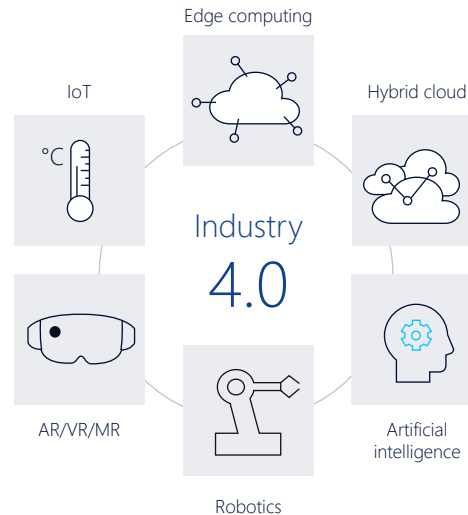
Life Cycle
>15 years

On the cusp of the 4th industrial revolution

...and this is happening NOW



Confluence of key technologies enablers create the perfect environment for Industry 4.0



>70%

enterprise are investing in IIoT today

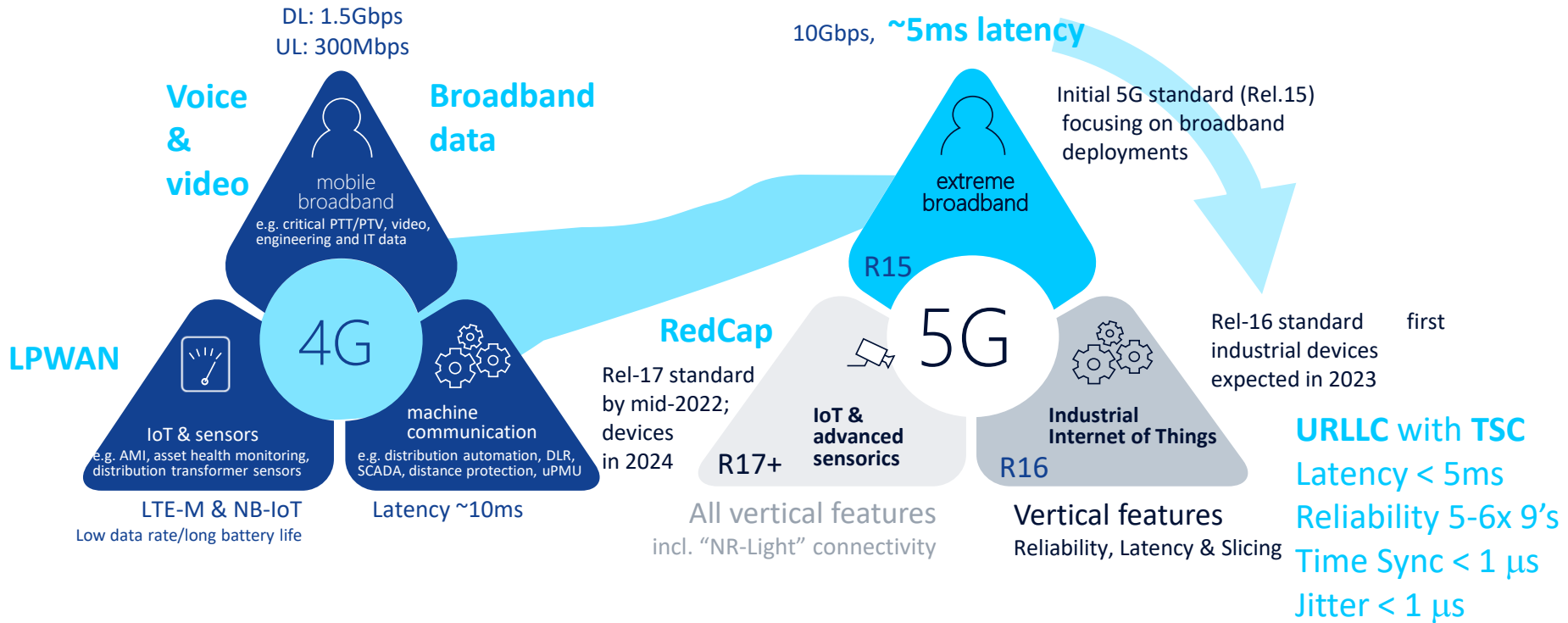
<https://www.pwc.pt/pt/temas-actuais/pwc-apresentacao-iiot.pdf>

49%

IT are reporting working closer with OT on IoT projects (32% in 2018)

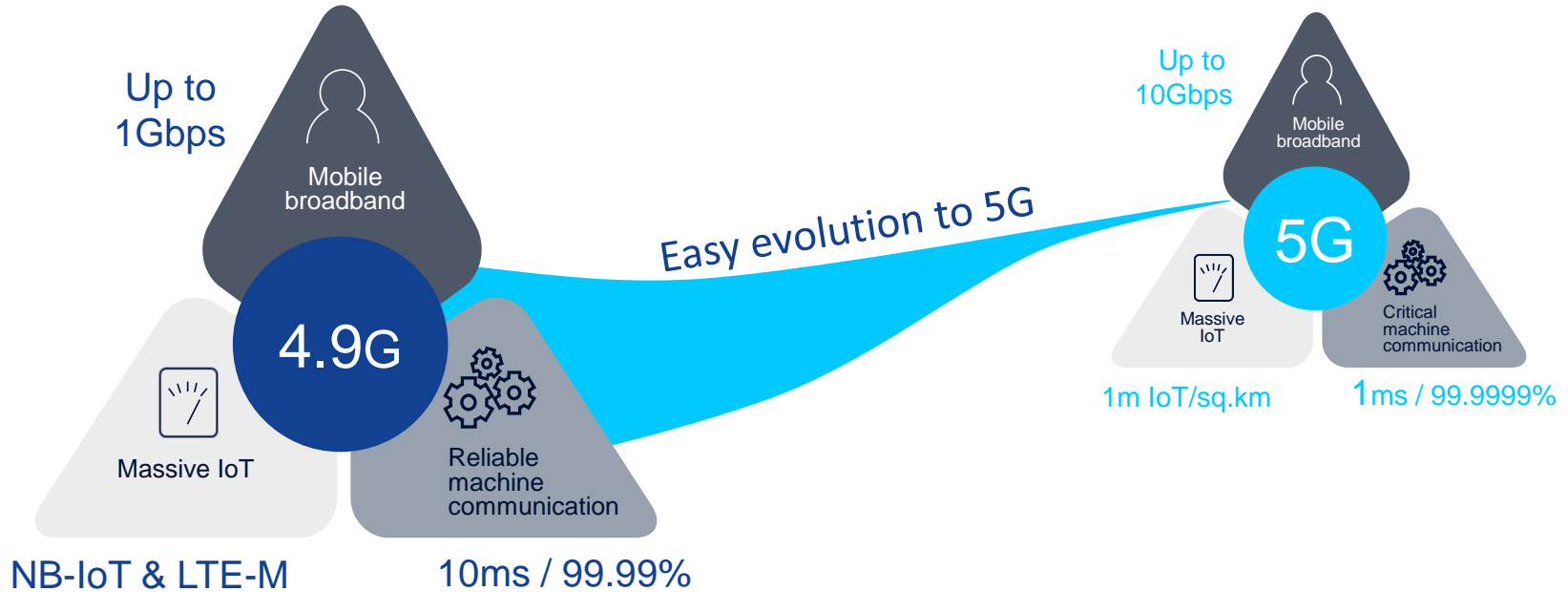
451 research - Internet of Things, Organizational Dynamics 2019

5G will redefine grid automation and workforce experience, and enable Net Zero



5G is often the catalyst that start the discussions...

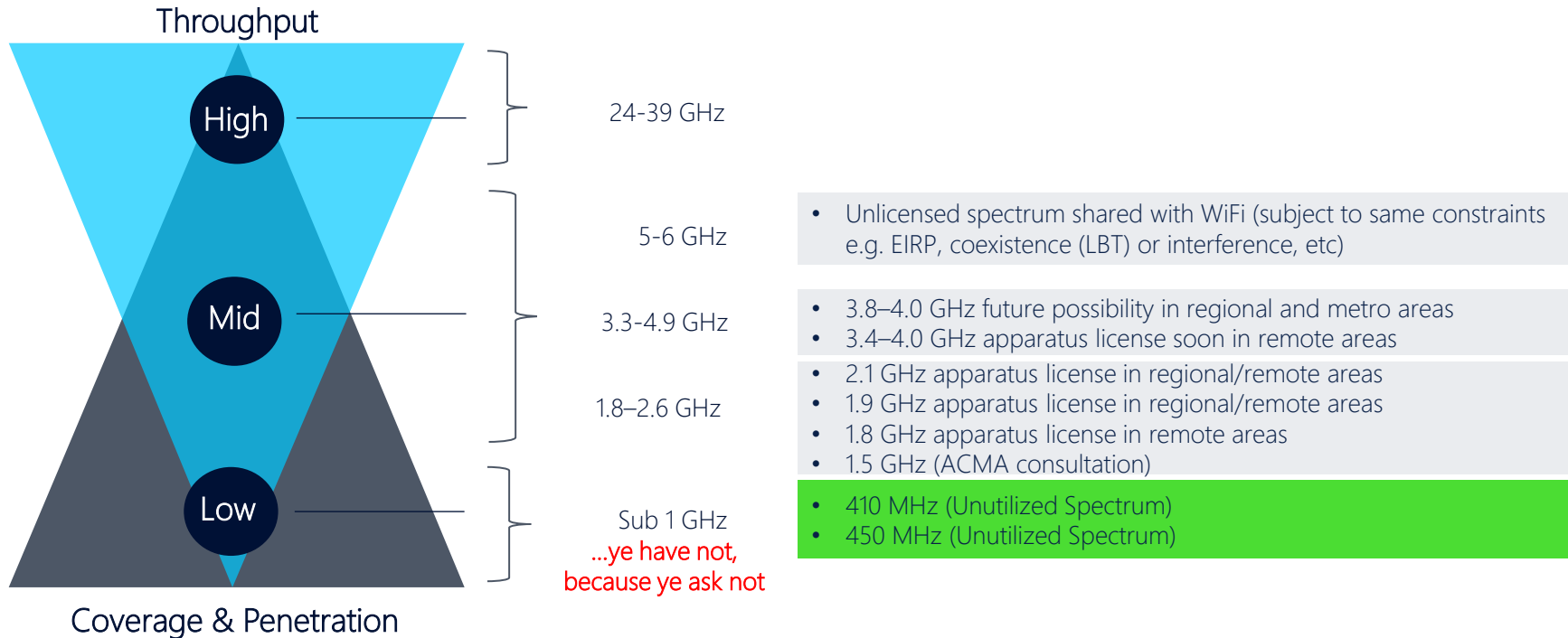
but private 4.9G is creating value for Utilities today



4.9G support most of today's Utilities or industrial applications
Large industrial ecosystem available today to support all use cases.

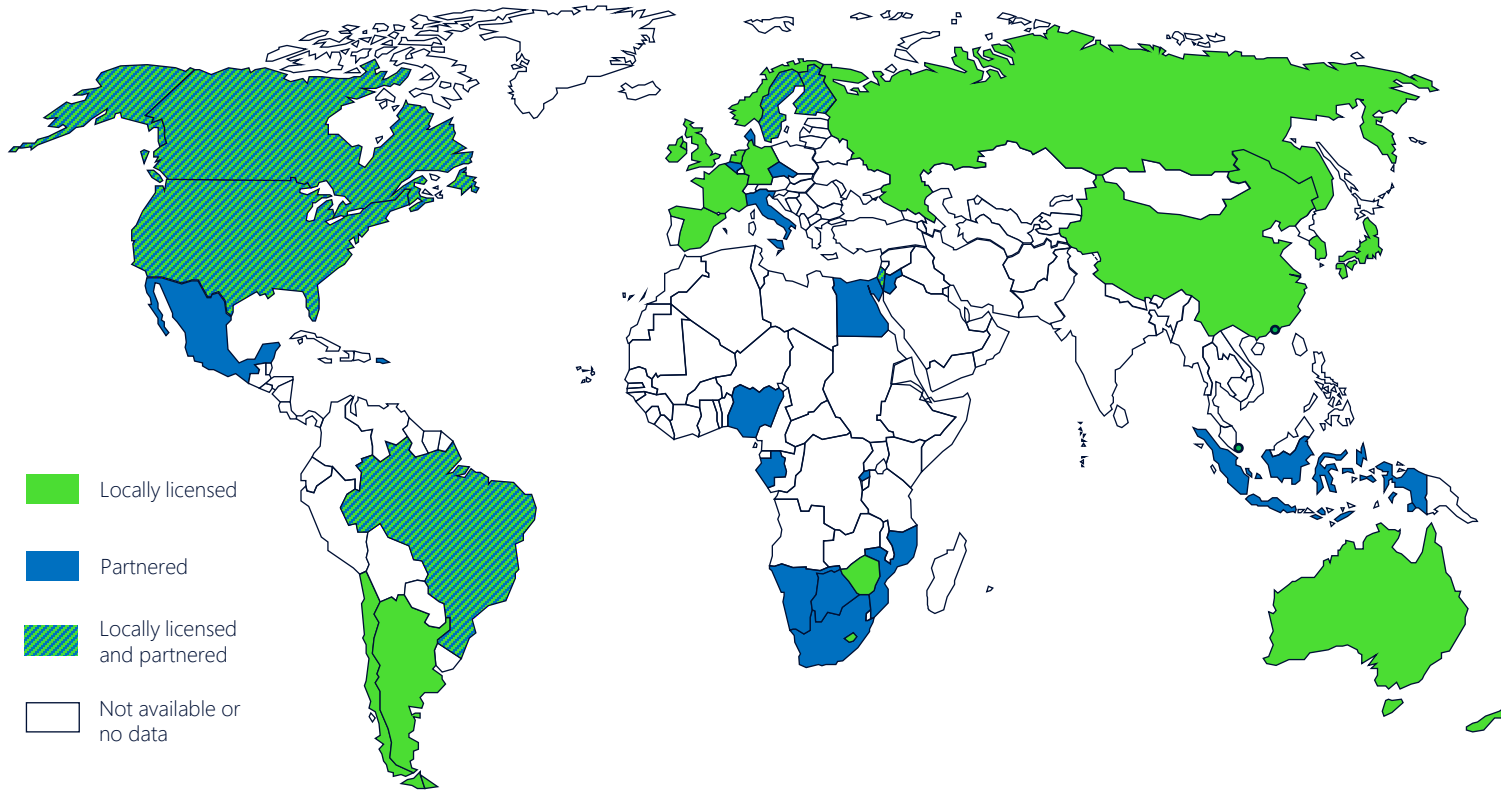
Spectrum bands to serve different use cases

South American spectrum outlook



Available 4G/5G spectrum for industrial sites/campuses/plants/FAN

Licensed bands



	Locally licensed	Partnered licensed
Argentina	31	
Australia	1,3, n258/257	
Belgium		7,42
Botswana		53
Brazil	40, 87, n257	53
Canada	43	53
Chile	40	
China	50, 3 DG	
Czech Rep		42/n78
Denmark		43/n78
Egypt		3,5,28,39,41
Finland	40/n40, n258	31, 38
France	38, n258	
Gabon		53
Germany	43/n78, n258	
Hong Kong	n261	
Indonesia		31
Israel		3
Italy		42
Japan	39, n79, 41+n257	
Jordan		3, 42
Korea (south)	n79, n257	
Lesotho	7, 38	
Mexico		42
Mozambique	40	53
Namibia		53
Netherlands	42,43/n78	
New Zealand	38	
Nigeria		40
Norway	40/n40, n77	
Puerto Rico		53
Russia	n258	
Rwanda		53
Singapore	40 (*)	
South Africa		53
Spain	40/n40	
Sweden	43/n78, n258	38
UK	3, 40, n77, n258	
US		4, 8, n24, 30, 41, 48, 53, n99, 1.6 GHz
Zimbabwe	3 DG	

(*) Only for testing, no commercial use

Nokia Mission Critical Industrial Edge (MXIE) digitalisation enablers

Going beyond connectivity

Industrial private
wireless 4G/5G SA



Critical team
communications



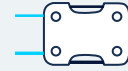
Operations center



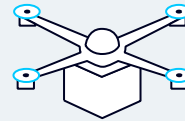
Video analytics



Tracking and
positioning



Drone networks



AR/VR for
connected workers



Industrial connectors



Webscale connectors



Click to deploy Industrial
applications accessed from
DAC application catalog

Automated provisioning
on MXIE edge

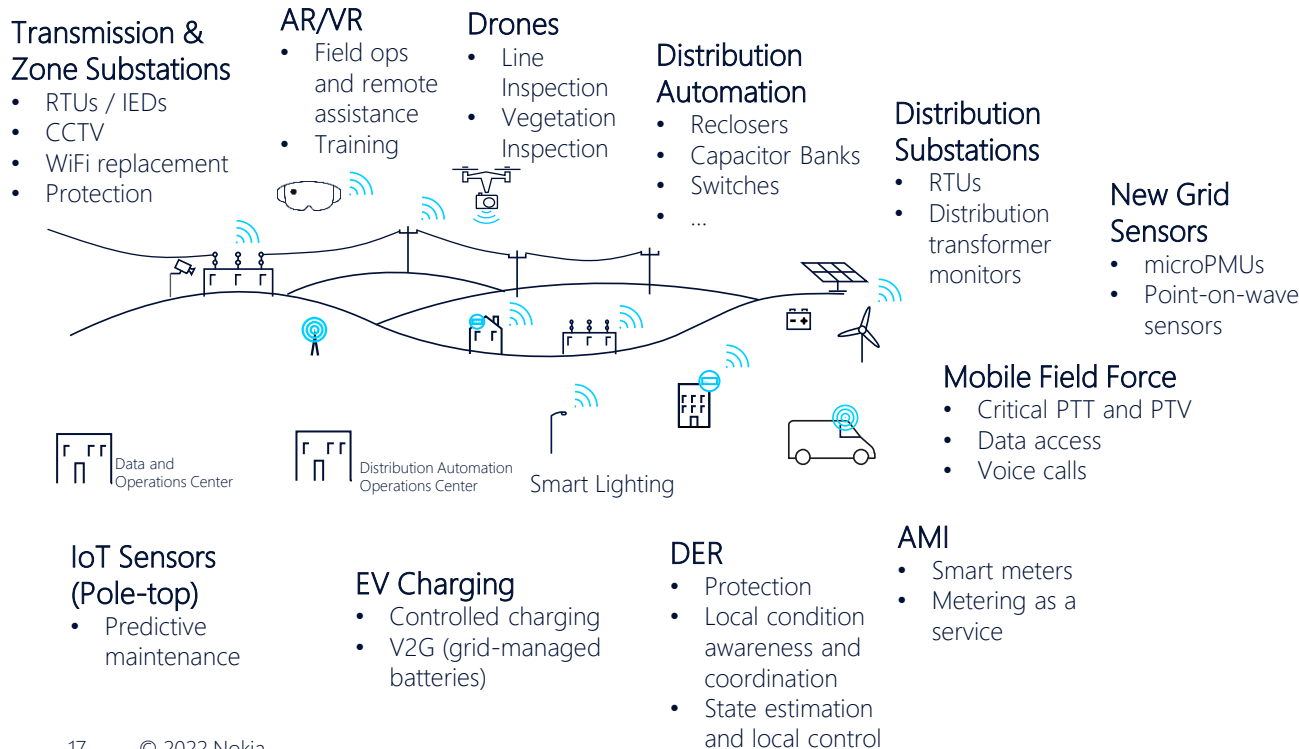
Automated application
lifecycle management

Includes Nokia and partner
applications

The nervous system of the grid

4.9G - Low latency, high reliability, broadband, LPWA

5G - Ultra reliability low latency, time sync, broadband++



Better integrate DER and EV with new methods to *Monitor, Control* and *Protect* the grid:

- μ PMUs for real time state estimation, etc
- Protection in the distribution grid (R-GOOSE, R-SV) with low latency, and later uRLLC (+TSC)
- DERMS-integration, VPP, FCAS, ...

Enable safer and more efficient field operations:

- AR/VR
- Drones for lines and vegetation inspections (beyond-VLOS, real time HD video and thermal video streaming, C&C)
- Pervasive CCTV for Safety, security, anti-vandalism and asset inspection
- PTV to complement critical PTT for enhanced field coordination

Massively scale existing grid management:

- Distribution Automation
- Grid monitoring down to LV
- Asset condition monitoring

“There can be no Green without Digital”

Pekka Lundmark
CEO of Nokia

(previously President and CEO, Fortum – Finnish Energy company)



NOKIA