Next Generation Communication and IoT

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Nokia

NOKIA

Go Allwhere.

Networking solutions for the new age of industry.

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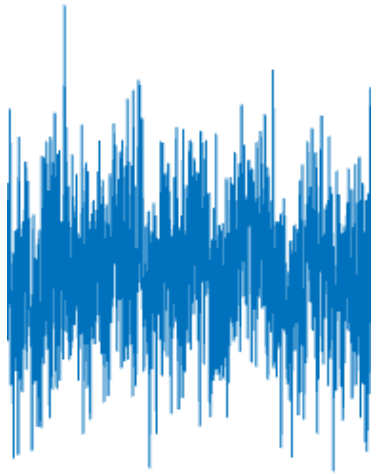
Energy Key Trends

Bulk

Distributed

Rapidly improving economics of renewable generation & storage



Time (sec)

Increased variability in supply & demand

Climate Change

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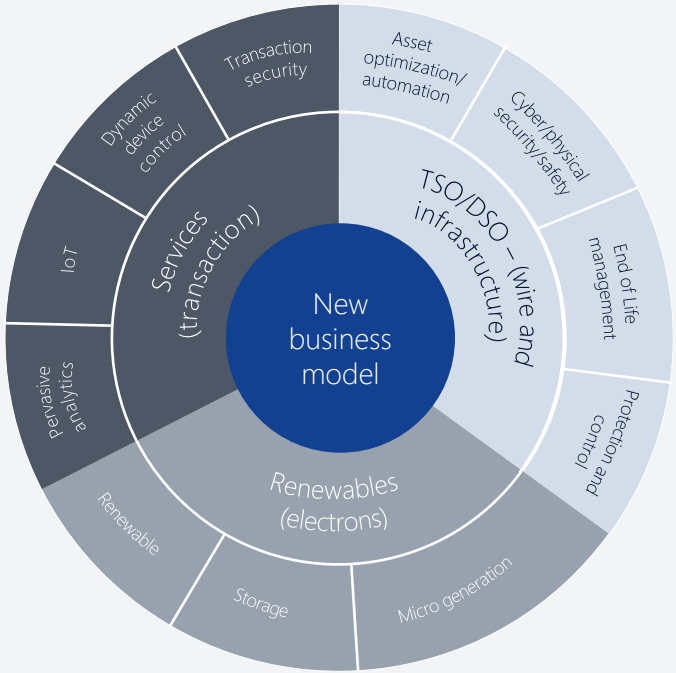
Power Utility of the Future

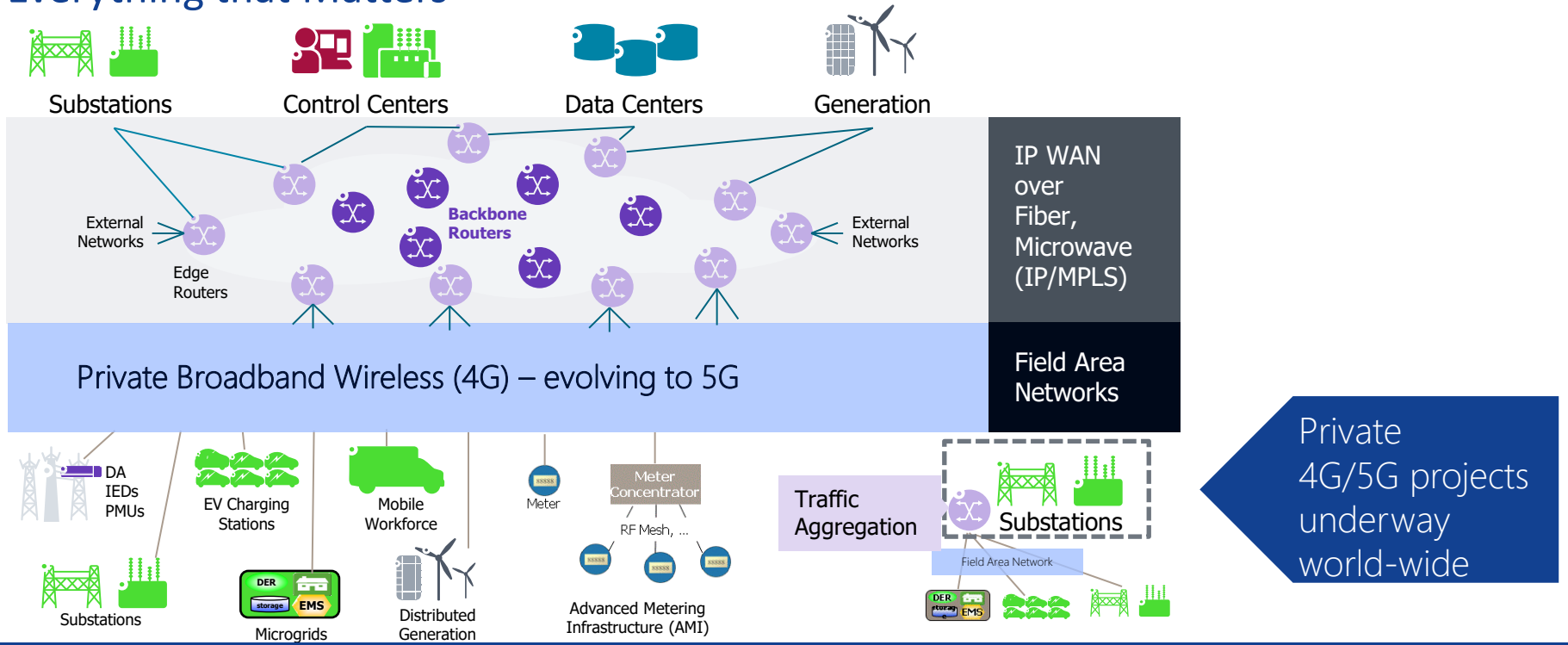
Opportunities

New Business Model

- Digitize
- Automate



Network, Store, Compute & Control
Everything that Matters



Private 4G/5G projects underway world-wide

Utilities must build a ubiquitous wired + wireline network → New revenues

SDH/PDH network modernization for mission-critical OT applications

Project background

- A verticalized power utilities in Hong Kong
- Replacing part of the existing SDH/PDH network covering control center and ~100 power substation locations with IP/MPLS to provide a high-availability, efficient, lower total cost of ownership and future-proof network to minimize impacts on the technology transformation
- All legacy TDM interfaces need to be supported and better manageability
- Critical applications include teleprotection, SCADA and operational voice in the initial phase.

Technical requirements

- Support of various TDM interfaces from the MPLS router, e.g. C37.94, 64k G703 co-dir, RS-232, E&M, FXO/FXS
- Stringent requirements in e2e latency (< 4ms) and delay asymmetry (<200 us) for teleprotection service
- Management solution for network, equipment and services
- RCA, alarm correlation and ML (future)

Solution

- 7705 SAR-8/18 MPLS router solution to provide TDM (C37.94, G703 64k co-dir, FXS/FXO, E&M, RS-232, E1 and STM-1 interfaces)
- Nokia patented ADC feature for delay asymmetry control. NGE for security.
- NFM-P premium package to provide network and service management, as well as analytic.

Customer benefits

- Proven OT transformation solution and experience from Nokia
- Rich legacy interface and service support in SAR-8/-18 to provide smooth migration and no multiple-box solution required
- Advanced management capabilities with NFM-P to provide network, service and security management

New Services, New Capabilities – IP/MPLS, pLTE

San Diego Gas & Electric, USA

"Every month a large number of customers are introducing Solar and we need to find a way to support that"

California's major utilities have reached the state's 2020 renewable energy target of 33%,

On track to hit 2030 target of 50% by 2020

Challenges

- Reduction in demand
- Managing large amount of solar
- Supporting government and communities push for green power
- EV charging
- Innovative business model

Solutions

- Increase monitoring and control capability – upgrade IP/MPLS
- Increase number of endpoints to 200,000 end points (vs 3.6m customers)
- Awarded Private LTE contract to Nokia (as a managed service)

Benefits

- Improved integration of renewables
- Gain new revenue from service business – islands, green communities, etc.
- New business model – DSO
- Platform

IIOT connectivity, Analytics, Edge Cloud for Wind Farm

Background, challenges and drivers

- Requirement for very wide area coverage in very remote locations (no CSP commercial network coverage)
- Secure, plug-and-play and reliable connectivity in all conditions
- Solution approach – more than just connectivity: Commercial collaboration with OSIsoft (data infra), Advantech (sensor GW in turbine) and Dianomic (OSIsoft stack in sensor GW)

Initial application(s)

- Connect wind turbine sensors data for monitoring the health of wind turbine pitch mechanisms and assembly
- Early warnings give opportunity to perform predictive maintenance and save up to 90% of turbine pitch assembly repair.

Next steps

- Advanced analytics solution by Nokia
- High frequency PMU control data over Nokia DAC platform
- Multiple video uses for e.g. worker safety and site surveillance

Crane blades pitch system repair is extremely costly

Video: Private LTE use case – pervasive connectivity
Press release: Nokia and OSIsoft collaborate to boost analytics capabilities with high-capacity infrastructure

New York Power Authority, USA

(Source: New York Power Authority)

Private LTE trial

"The goal of this project is to build a secure, robust, and reliable wireless LTE network to enhance our operational and programmatic capabilities and leverage all the benefits of the ever-evolving innovation in wireless technology. We believe that this network will advance NYPA along the path to becoming the nation's first end-to-end digital utility. "

– Gil C. Quiniones, NYPA President and CEO

Press release – drone tests

Press release – pilot/trial plans

Drone's view of NYPA private LTE field trial webinar

Drone tests video

Challenges

- Become nation's first end-to-end digital utility
- Highly reliable, secure wireless communications to support multiple applications: drones, workforce mobility, deep metering services, WiFi telephony/PTT and more

Solution

- Nokia Digital Automation Cloud (DAC) P-LTE network using Bands 71 & 8 to test uses cases:
  - Drones
  - Digital utility worker
  - VoLTE
- Nokia Drone Networks

Benefits

- Enhance operational capabilities
- Communications platform for end-to-end digital utility for transmission lines and generating facilities
- Optimize performance and simplify deployment with integrated communications and applications (drones and voice) solution

IoT and revolutionary engine enable reliable power supply

Lower Cost, Higher reliability and SLA for (Mission Critical) Networks and DER

1. Low number of parts reduce cost and ensure high reliability
2. Sensors allow remote monitoring, management by Nokia

https://www.reuters.com/article/nokia-aquarius-electricity/israels-aquarius-nokia-to-supply-micro-generators-to-southeast-asia-idUSL8N2DD07Z

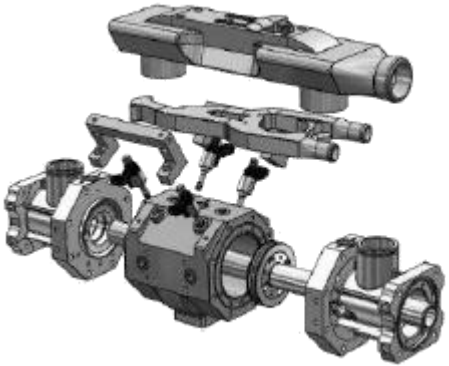
https://markets.ft.com/data/announce/detail?dockey=600-202101281017PR_NEWS_USPRX____LN62760-1

High Reliability

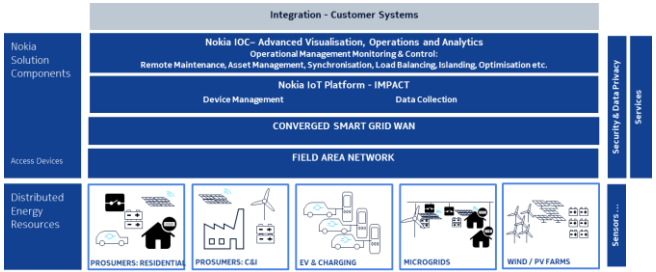
Load Balancing

Redundancy Control

0.9L Engine 16kW



- 15 main parts
- 1 moving part
- No oil filter
- Maintenance every 2000+ hrs
- Weight 10.5 kg
- Efficiency > 30 %



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