Enabling port terminal & port authorities digitalization and automation

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150 years of successful reinvention

From

paper, rubber boots and tires

over

mobile phones

to

telecommunications networking

and

industrial wireless, machine-learning and software

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How to increase
move per hour?

How to reduce
cost per move?

NOKIA

Big picture for digital transformation of terminal operations
IT / OT convergence for data-informed, real-time and longer-term decisions to respond accurately, effectively, and proactively to customers, partners and stakeholders

IT	Digital terminal	OT

• Business analytics • Video analytics • Wireless networking • Software-defined networking • ...		• Mobile workers • Container handling equipment • Monitoring and control systems • Assets • Sensors • ...

Advanced analytics
(Artificial intelligence, machine learning, etc.)

Pervasive industrial connectivity
(Data, voice, video)

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Digital transformation fabric for port terminals and port authorities

Modular suite of communications and automation solutions for next-generation port operations

IoT & Analytics for port terminals	Private wireless for port terminals	Local Area Networking for port terminals	Wide Area Networking for port terminals
Advanced **situational awareness** and **optimized yard operations**	**Port-wide private wireless bubble** with end-to-end systems for high reliability	A **better way to structure LAN** – futureproof, high performance and lower TCO	Boost **inter-terminal collaboration** with a secure, programmable and unified infrastructure
Nokia Integrated Operations Center Nokia Scene Analytics **Nokia Data Market Place**	**Private LTE and 5G**	**Nokia Optical LAN** Nokia Wavence Microwave Nokia IP Routing & Switching	**SD-WAN** powered by Nuage Network from Nokia Nokia Optical Transport

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Wireless in port terminal operations today
Private LTE or 5G as future wireless technology of choice

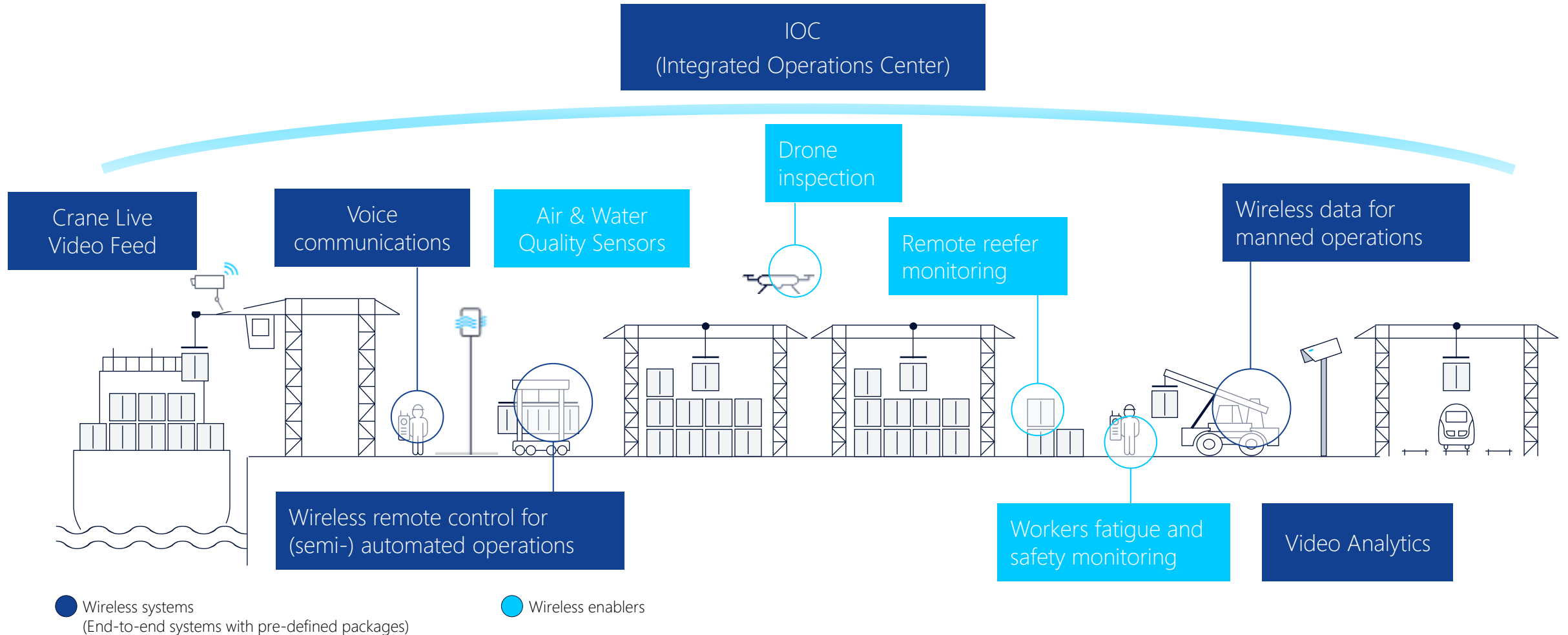### Fragmentation of existing systems

- Multiple networks and systems = **high TCO**
- Multi-devices for operations = **inconvenient and unsafe**

Voice	Data	Data (backup)	Localization	M2M	...
Private PMR / 2-way radio (TETRA / P25)	Private Wi-Fi / Mesh Wi-Fi	Public 3G / 4G LTE	Private Transponder network	Private Proprietary	...

Voice	Data	Data (backup)	Localization	M2M	...
		Private 4G LTE or 5G			

Converged private wireless infrastructure

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Digital transformation of terminal operations with private 4G LTE / 5G

IOC
(Integrated Operations Center)

Drone inspection

Crane Live Video Feed

Voice communications

Air & Water Quality Sensors

Remote reefer monitoring

Wireless data for manned operations

Wireless remote control for (semi-) automated operations

Workers fatigue and safety monitoring

Video Analytics

Wireless systems
(End-to-end systems with pre-defined packages)

Wireless enablers

ONE network serves multiple use cases

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A global track record of reference projects

Port authorities, terminal operators and partnerships with industrial players

KALMAR

SSA Marine
A Carrix Enterprise

KONECRANES

HPA
Hamburg Port Authority

TIC 4.0

Port of Antwerp

ABP | SOUTHAMPTON

PORT OF ZEEBRUGGE

"K" LINE

PELINDO

STEVECO

sembcorp marine

PORT OULU

450+ private wireless customers worldwide

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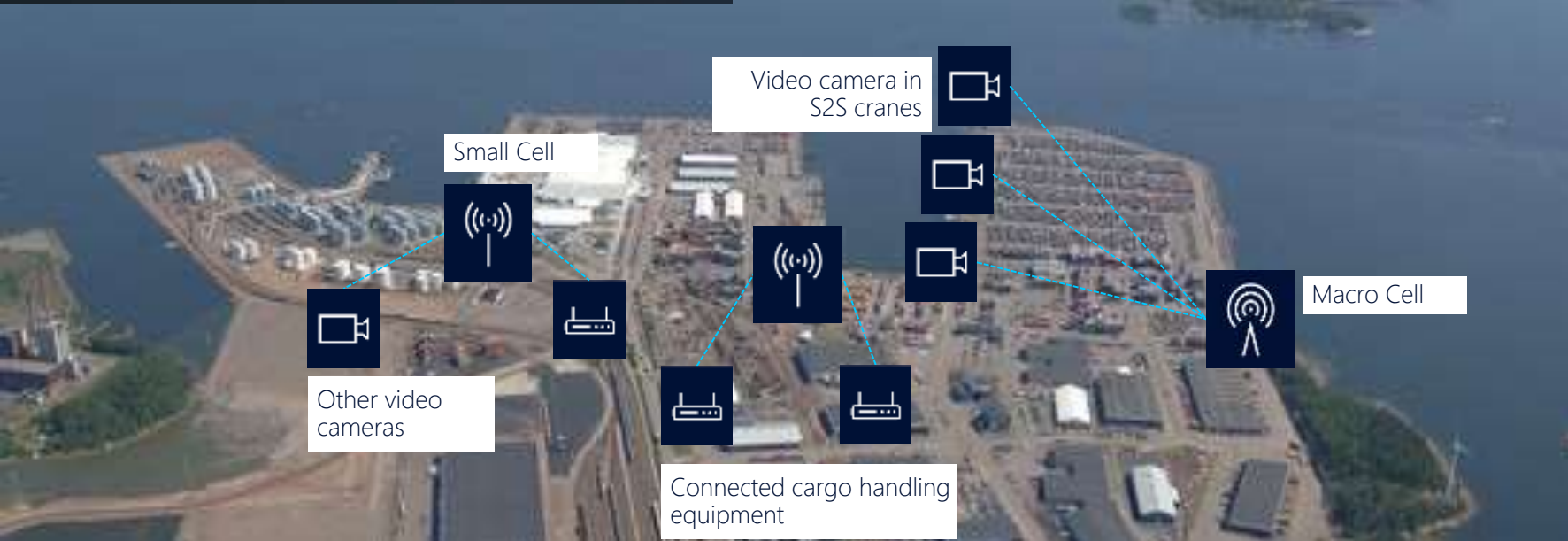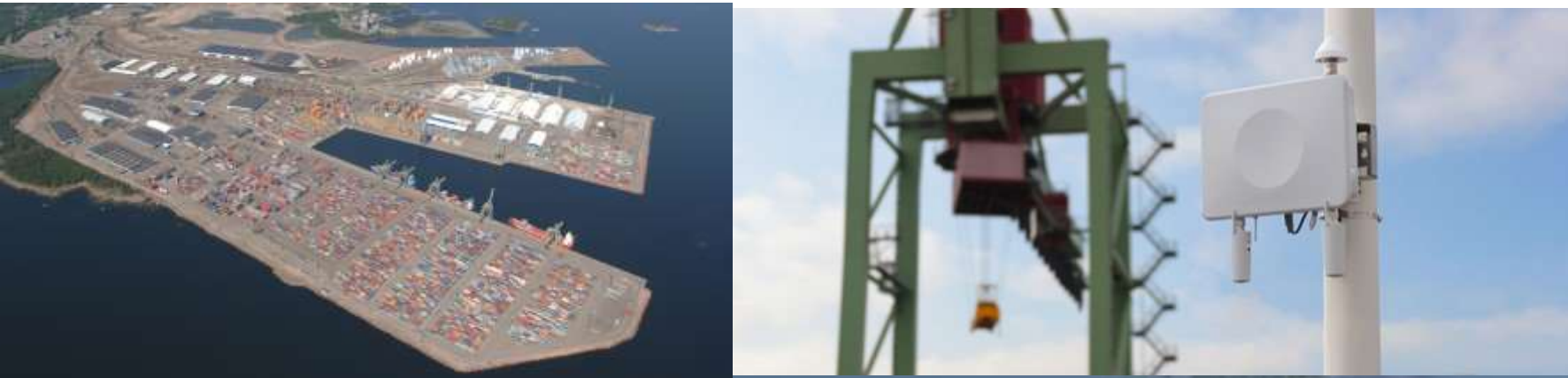# Verizon signs its first European Private 5G deal with Associated British Ports

Verizon's **private 5G** is the foundation for deployment of **Internet of Things (IoT)** and **Machine Learning** via completely dedicated **edge compute** infrastructure, enabling **ultra-low latency** at the premise, **higher levels of security**

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Joint research project (5G WIVE) on wireless connectivity for automated gantry cranes

KALMAR

Crane automation requires reliable industrial wireless connectivity, incl. **low latency for remote control** and high uplink capacity for **video streaming** that can be achievable by Nokia Private LTE/5G network

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Steveco, HaminaKotka port, Finland

Ship-to-shore **cranes mounted video cameras** to record status of containers at arrival and after crane handling
_____

Connectivity to 150x cargo handling equipment in terminal and warehouses

Video camera in S2S cranes

Small Cell

Macro Cell

Other video cameras

Connected cargo handling equipment

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Industrial devices for Ports
Standard 4G/5G devices

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From now to next

Bringing the most complete **4G** & **5G** industrial private wireless solutions that meets the critical connectivity application requirements for Ports 4.0 today and tomorrow

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