CTAC NORTH AMERICA 2023: IN CONVERSATION WITH NOKIA

Margherita Bruno, Editor, Port Technology International, interviewing
Peter Miller, Technical Specialist Director, Private Wireless, Nokia

In the wake of Port Technology International's Container Terminal Automation Conference (CTAC) North America 2023, this Q&A delves into the forefront of port development, specifically focusing on connectivity. Here, we illuminate the seamless integration of Nokia's digitalisation solutions into the evolution of conventional port operations. Within the connectivity domain, Nokia's technology serves as a catalyst, reshaping the port landscape to enhance efficiency, streamline processes, and champion environmental responsibility. Success stories, exemplified by the experiences of the Port of Seattle and Husky Terminal at the Port of Tacoma, underscore Nokia's pivotal role in fortifying the core structures of port infrastructure.

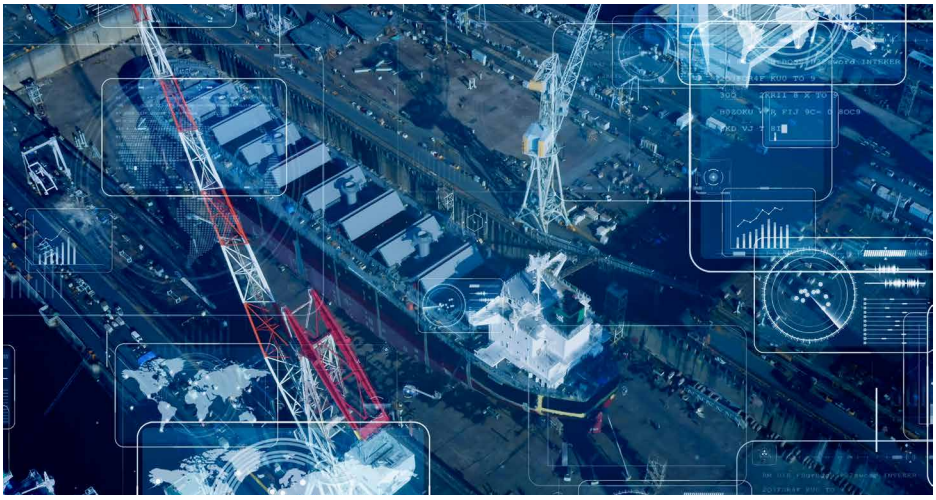
How is Nokia's digitalisation technology transforming the traditional port operations into more efficient and streamlined processes?

Nokia's digitalisation technology, applied to traditional port operations, aims to transform the operations to be more efficient and streamlined in several ways:

1. **Enhanced Connectivity:** By utilising Nokia's One Platform, ports can leverage the advanced connectivity provided by private wireless solutions, including 4.9G/LTE and 5G networks. These networks offer reliable, high-capacity communication that is critical for port operations, allowing for seamless transfer of large amounts of data in real-time, which is vital for logistics management, remote operations, and various automation processes. Combining with existing Wi-Fi infrastructure which supports non-mission-critical IT systems, the connectivity can be streamlined to enable and focus on advanced operational (OT) use cases.
2. **Operational Efficiency:** Digitalisation with Nokia's technology facilitates more efficient operation management. High-bandwidth and low-latency

"THE DEPLOYMENT OF NOKIA PRIVATE LTE WAS A SIGNIFICANT MILESTONE FOR US AT THE PORT OF TACOMA AND HAS EXCEEDED OUR EXPECTATIONS. THE REGULAR DISCONNECTIONS AND PACKET LOSS THAT WE EXPERIENCED OVER WI-FI, THAT CREATED DOWNTIME AND IMPACTED PRODUCTIVITY, ARE NOW A THING OF THE PAST. WITH RELIABILITY NO LONGER A CONCERN, WE'VE MOVED FROM FIREFIGHTING MODE TO FOCUSING ON THE STRATEGIC USE CASES THAT WILL FURTHER ENHANCE OPERATIONS FOR OUR CUSTOMERS AS WELL AS OUR TEAMS WORKING AT THE PORT."

Philip Styf, Director of IT, Husky Terminal



communication enable better coordination of operations, reduce waiting times, and optimise the flow of goods and vehicles through the port, leading to increased throughput.

3. **Automation and IoT:** The use of the Internet of Things (IoT) allows for various components of the port to be interconnected. Equipment such as cranes, trucks, and containers can be equipped with sensors and become part of an integrated ecosystem that communicates continuously. This data can be used to automate processes, schedule maintenance, and reduce downtime, thereby enhancing productivity.
4. **Safety and security:** Nokia's platform can support applications that improve safety and security in port environments. Surveillance systems, drones, and other security measures can be integrated into the network, providing real-time monitoring to prevent accidents, unauthorised access, and other security threats.
5. **Data analytics:** With the deployment of Nokia's digitalisation solutions, ports can gather vast amounts of data from various sources. This data can be analysed to gain insights into operational efficiencies, traffic patterns, and predictive maintenance. Such analytics support decision-making and future-proofing of port operations.
6. **Sustainability:** By optimising routing and scheduling, reducing congestion, and supporting autonomous vehicles and cranes, Nokia's solutions help reduce the environmental impact of port operations. Less idling time for ships and on-ground vehicles reduces fuel consumption and emissions.
7. **Remote and real-time insights:** Centralised management software can provide a real-time view of all operations across the port. This ensures that port management can react promptly to any situation and adjust operations accordingly, even remotely.
8. **Scalability and flexibility:** As ports grow and evolve, the digital infrastructure provided by Nokia's technology can scale to meet changing demands without the need for extensive physical reconfiguration, making it a future-proof investment.

"WE ARE WORKING WITH AT&T MEXICO AND NOKIA BECAUSE OF THEIR EXPERTISE AND UNIQUE KNOWLEDGE IN THE MEXICAN TELECOM MARKET. THE SIGNAL STRENGTH HAS REALLY EXCEEDED OUR EXPECTATIONS SO FAR. WE CAN COVER THE ENTIRE PORT WITH THE SOLUTION, REACHING A RADIUS OF ABOUT 6 KILOMETRES. THIS PLATFORM IS ALREADY CONSIDERED A REFERENCE FOR THE REST OF THE TERMINALS IN THE GROUP."

Nathalie Rush, Managing Director, APM Terminals Yucatan

Can you share some success stories or case studies of ports that have implemented Nokia's digitalisation solutions and witnessed significant improvements?

SSA Marine at Port of Seattle
In January 2021, Nokia announced a new LTE/5G private wireless network deal with the Port of Seattle. The deployment of this network aimed to modernise operations to deliver better performance, reliability, and security. Nokia provided high-performance private wireless/LTE, which was an upgrade from the previously used Wi-Fi networks, lacking in capacity, coverage, and performance. This improvement allowed the Port of Seattle to leverage IoT and machine-to-machine communication, which is essential for modern port operations. As a result, the port anticipated improved operational efficiency and safety, paving the way for further IoT adoption, operational flexibility, and a platform for innovative applications.

Husky Terminal at Port of Tacoma
In September 2023, Nokia announced its deployment of private wireless at Husky Terminal. The deployment included a Nokia Digital Automation Cloud (DAC) end-to-end private wireless network, which provided reliable, secure, and high-speed connectivity to support all terminal operations. With the Nokia DAC, the Husky Terminal aimed to optimise its container handling using advanced applications such as real-time yard inventory management, which would help track and move freight efficiently through the terminal. The improvement enabled Husky to manage its operations more effectively, ensuring precise scheduling and reducing container idle times, leading to increased throughput and reduced operational costs. The terminal experienced benefits in terms of asset tracking, video surveillance, and voice services through the enhanced connectivity. This supported Husky Terminal's move towards full optimisation and digitalisation in alignment with broader trends in the maritime industry.

What role does 5G technology play in enabling digitalisation at ports, and how does Nokia contribute to this advancement?

5G technology plays a crucial role in the digitalisation of ports, enabling a transformation in operational efficiency, safety and sustainability. It provides the high-speed, low-latency and massively connective network infrastructure required to handle the vast amounts of data generated by port operations and supports the use of advanced applications that require real-time data processing. 5G enables a number of key use cases echoing my keynote presentation at CTAC North America 2023. Nokia contributes to port digitalisation through its integrated 5G digitalisation solutions, which are tailored for mission-critical industrial applications requiring high reliability and security.

Nokia provides private wireless networks leveraging 4.9G/LTE and 5G, which deliver the needed control, reliability, and cybersecurity for port operations. These networks are designed to support both outdoor and indoor coverage, ensuring comprehensive connectivity across port facilities. Nokia Digital Automation Cloud (DAC) and MX Industrial Edge (MXIE) offer a scalable, high-performance end-to-end private wireless network combined with edge computing capabilities crucial for port operations, enabling innovation and technology evolution.

With over 675 private wireless customers around the world, Nokia is the most preferred partner for port operators. Nokia has recently been recognised by Kaleido Intelligence as the number one champion in private network software, hardware and management.

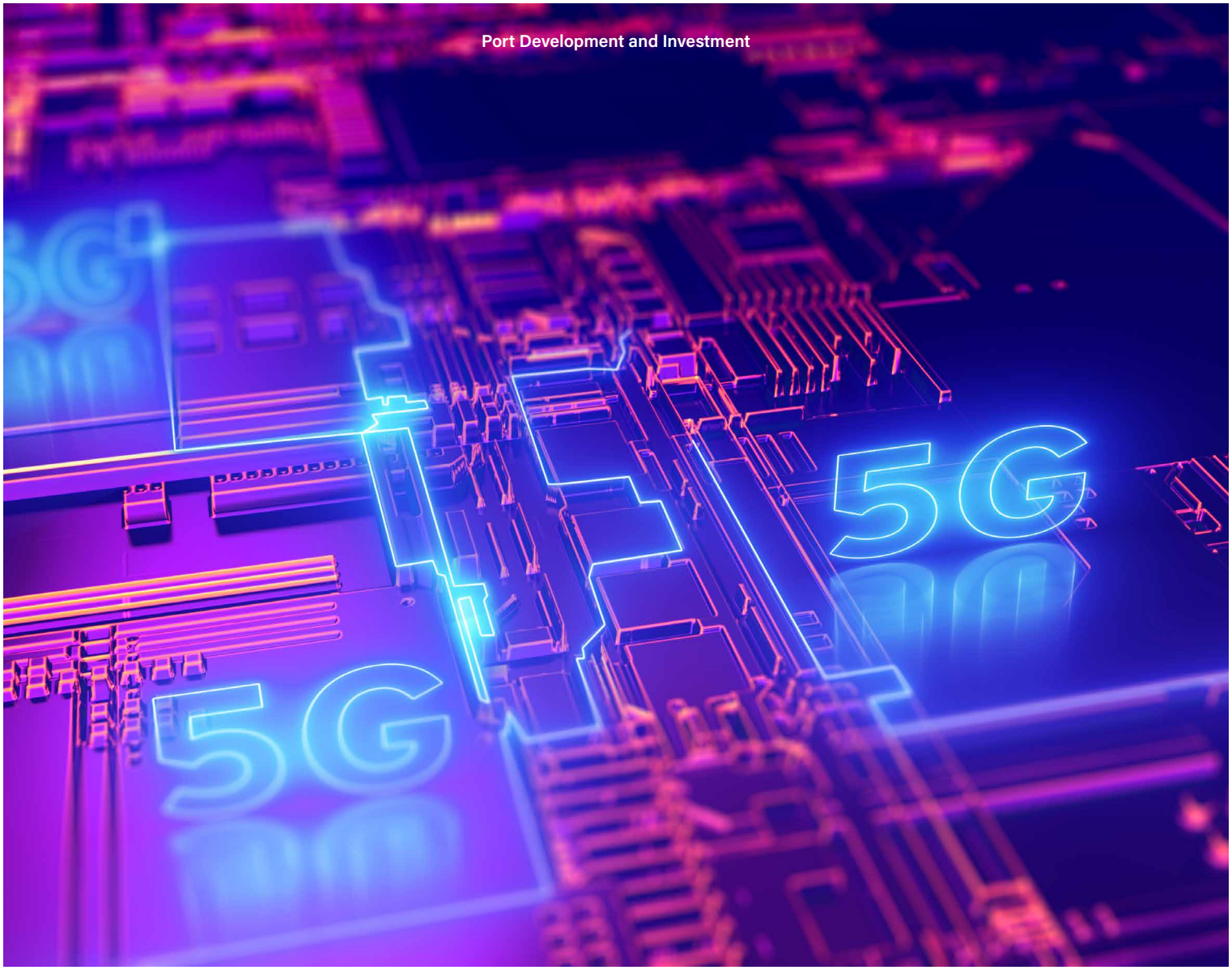
Can you explain how Nokia's solutions help ports reduce their environmental footprint through digitalisation?

Nokia helps port operators reduce their environmental footprint achieving more efficient and sustainable operations.

1. **Automated and optimised operations**
   Automated equipment such as cranes, carriers and trucks can operate more efficiently, reduce idle time and optimise fuel consumption connecting through a robust network without any signal loss. The productivity gain and consumption reduction by reducing human errors cuts down costs and accidents.
2. **Predictive analytics and energy management**
   The reduction in hardware required by private wireless networks means that the energy consumption is also reduced. Our Bell Labs study shows that replacing Wi-Fi infrastructure with private wireless can reduce up to 90 per cent of electricity required to cover the same area, while reducing blind spots and improving signal handoffs. Advanced predictive analytics can forecast when machinery or vehicles require maintenance, which ensures they operate at peak efficiency, using less energy and reducing the likelihood of energy-intensive breakdowns. The on-premises

"BUILDING FLEXIBLE AND RESILIENT TECHNOLOGY PLATFORMS TO MEET OUR CUSTOMERS' NEEDS IS A KEY ELEMENT OF OUR STRATEGY, AND BECOMING THE FIRST MAINLAND PORT OPERATOR IN THE UK TO OFFER A PRIVATE 5G NETWORK TO OUR CUSTOMERS IS A FANTASTIC MILESTONE FOR ABP. WE WOULD LIKE TO THANK OUR PARTNERS FOR ENABLING THIS PROJECT, WHICH WILL EQUIP OUR PORT IN SOUTHAMPTON WITH THE STATE-OF-THE-ART INFRASTRUCTURE NEEDED TO BE AT THE FOREFRONT OF THE DIGITAL REVOLUTION IN THE MARITIME INDUSTRY."

Henrik L. Pedersen, Chief Executive Officer, Associated British Ports



edge computing can facilitate a low-latency, fast responding process across the entire yard.

3. **Asset tracking and enhanced monitoring**
   Using IoT connected to the private wireless network can help port operators monitor the condition and performance of equipment, ensuring that assets are used efficiently and environmental resources are managed responsibly. Besides, reducing the equipment loss and/or theft also reduces waste and costs.
4. **Nokia innovations**
   Nokia actively invests in research and development to continuously improve its technology and services, supporting innovative applications that can further reduce the environmental impact of port operations.

Nokia committed to becoming carbon neutral by 2030, through our technology, advocating for policies that promote connectivity and reducing environmental impact through our products and services. (Nokia press release about ESG strategies)

How does Nokia collaborate with other industry partners to enhance optimisation at ports and drive digital transformation in the sector?

Nokia deploys digitalisation solutions to meet the unique needs of different ports by fostering strong ecosystem partnerships and deploying advanced, flexible technologies that can be tailored to various operational environments.

In April 2021, Nokia collaborated with Edzcom, a leader in edge connectivity for industrial settings, to deploy a 5G SA private wireless network for Konecranes, a company specialising in equipment and services for container handling. This partnership underscores the importance of creating an ecosystem that includes connectivity experts and industrial equipment manufacturers to deliver quality, integrated, reliable private wireless solutions. The private wireless network supports Konecranes' research and development work and expands the sophisticated R&D capabilities within the port industry.

In January 2021, Nokia also announced our extended partnership with Kalmar, a company that provides cargo solutions and focuses on

"BY IMPLEMENTING THE NOKIA INDUSTRIAL FIELDROUTERS AND DONGLES WITHIN STRADDLE CARRIERS, CRANES AND MOBILE MACHINES WE CAN RELY ON THEM STAYING CONNECTED TO THE CONTROL CENTRE. IT HAS ALLOWED US TO INCREASE AUTOMATION AS WE CONTINUE TO DELIVER INNOVATIVE SOLUTIONS THAT WILL BENEFIT OUR CUSTOMERS"

Toni Söderlund, Vice President, Products & Solutions, Kalmar

developing automated transport and logistics systems. Nokia demonstrated the ability to scale and enhance its digitalisation offerings to match the changing demands of port operations by co-developing new features with Kalmar. This partnership helps drive efficiency, safety and sustainability in port operators, which are common concerns for adaptation and scalability for port operators.

These partnerships reflect Nokia's strategic approach to adapt its digitalisation offerings to the distinctive requirements of each port, ensuring that the solutions are not only scalable and adaptable but also future-ready and aligned with the industry's move towards increasing automation and intelligence in operations.

What benefits can ports expect in terms of cost savings and increased operational efficiency by implementing Nokia's digitalisation technologies?

Cost savings
Nokia One Platform consists of industrial-grade 4G/5G private wireless, on-premises edge computing, ruggedised devices and one-click-to-deploy industrial applications, offered on subscription/as-a-Service. It means port operators enjoy low CAPEX deployments and have full flexibility to scale up when they see fit. While increasing productivity and reducing idle time, the cost savings are substantial, in comparison to traditional Wi-Fi deployment. Our business case page summarises the key data points including return-on-investment (ROI), equipment cost reduction and productivity improvement: https://www.nokia.com/industries/ports/private-wireless-business-case/

Operational efficiency
The Nokia One Platform helps streamline operations through facilitating real-time coordination of activities, leading to more efficient cargo handling and less vessel turnaround times.
The reliable and fast connectivity for data transfer on the Nokia One Platform allows for better communication between various stakeholders and systems within the port, improving response times and decision-making processes.
With better tracking and monitoring of equipment, ports can optimise the use of their assets, ensuring that they are used efficiently and reducing idle times. Enhanced data analytics capabilities also enable ports to optimise logistics and supply chain management, reducing bottlenecks and improving the overall flow of goods.

How does Nokia ensure the reliability and uptime of critical systems when deploying digitalisation in a port environment?

Quoting Husky Terminal as an example, Nokia ensures the reliability and uptime of critical systems in a port environment by deploying the Nokia Digital Automation Cloud (DAC) platform, which provides a secure and resilient private wireless network. Nokia DAC delivers a private LTE network that is tailored for Husky Terminal's specific operational needs. LTE is known for its reliability and strong coverage, which is essential in a dynamic port environment where uninterrupted connectivity is critical. In addition, Nokia's industrial equipment such as fieldrouter, handheld, workpad and dongle is built to withstand the harsh and hazardous conditions often present in port environments, further ensuring the continuity of operations.

How does Nokia plan to support smaller or less technologically advanced ports in their journey towards automation and digitalisation?

Nokia recently announced the Nokia DAC PW Compact,

designed to support smaller or less technologically advanced ports in their journey towards automation and digitalisation by offering a solution that is both easy to deploy and manage, with a small footprint and reduced deployment complexity.

The compact nature of the solution means it requires less physical space for installation, making it ideal for smaller ports that may not have the extensive infrastructure or space to accommodate large or complex systems. DAC Compact comes with pre-integrated hardware and software which reduces the time and expertise required to get the network up and running. With plug-and-play components, ports can set up their private wireless network with minimal disruption to existing operations.

Despite its compact size, the solution does not compromise on coverage or capacity, ensuring that even smaller ports can enjoy the benefits of a high-performance private wireless network capable of supporting current and future digitalisation initiatives. The network is designed to be scalable, allowing ports to start with a small deployment and expand as their operations grow and as they adopt more advanced technologies. This scalability ensures that the investment is future-proofed, giving ports the confidence that the network can grow in line with their digitalisation journey.

By reducing the complexity and size of the required equipment, the DAC PW Compact offers a more cost-effective solution for smaller ports, which may have tighter budgets for technology upgrades. Nokia DAC PW Compact is well-suited to support smaller ports as they modernise their infrastructure, enhancing efficiency and competitive advantage through digitalisation.

ABOUT THE AUTHOR:

Peter has been working in the networking industry for over 35 years, as both an RF Technician/ Engineer (US Army 33S) and Systems Engineer at sizeable global companies. Throughout his career he has been involved in networking technologies and products including high security wired and wireless networks, video surveillance cameras, autonomous hauling, PC networking technology, and Wi-Fi networking products. He submitted several patents which ultimately drove the requirements for Wi-Fi connectivity initiatives.

Peter is experienced with commercial and federal marketplace, sales channels, and project management. He earned his bachelor's in business at Strayer University with a major in business administration and minor in computer information systems and possesses an EET equivalent U.S. Army Education.

ABOUT THE COMPANY:

At Nokia, we create technology that helps the world act together.

As a B2B technology innovation leader, we are pioneering networks that sense, think, and act by leveraging our work across mobile, fixed, and cloud networks. In addition, we create value with intellectual property and long-term research, led by the award-winning Nokia Bell Labs.

Service providers, enterprises and partners worldwide trust Nokia to deliver secure, reliable, and sustainable networks today – and work with us to create the digital services and applications of the future.