FROM BOTTLENECKS TO BREAKTHROUGHS: HOW PRIVATE 5G IS TRANSFORMING PORT OPERATIONS

Frank Rubotham, Head of Solution Specialists, Logicalis UK&I, and **Dez O'Connor**, 5G & Mobility Global Development, CISCO

From smart factories to hyper-efficient ports of industry, Private 5G (P5G) is rapidly transforming a range of sectors by unlocking new levels of automation, security, and connectivity. Unlike public 5G, P5G gives businesses full control over their networks, enabling them to tailor connectivity for mission-critical applications while tightening any necessary security measures.

It could be argued that the initial implementation costs for P5G are higher than traditional Wi-Fi. However, the counterpoint is that the long-term benefits, such as reduced maintenance, lower power consumption, and improved security, are proven to result in a positive return on investment.

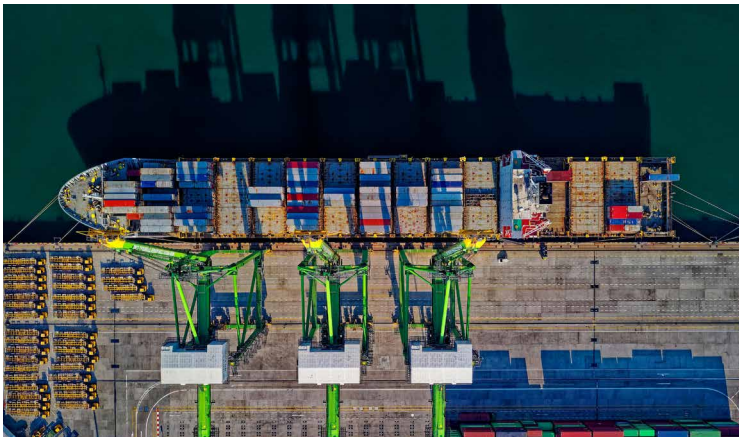
Additionally, the low latency and increased bandwidth offered by P5G support the highly data-intensive applications emerging across industries, including AR/VR, video surveillance, increased automation, and remote maintenance. Businesses worldwide are benefitting from these new technologies to streamline complex logistical and security operations.

The application of such technologies requires a strong network backbone, like P5G, to remain valuable over time.

One notable sector making inroads in securely automating machinery-based operations is maritime, particularly within ports.

P5G FOR PORT INFRASTRUCTURE

As critical assets of national infrastructure, ports house an array of heavy and sensitive machinery, such as automated gantry cranes for container handling, vessel traffic management systems to coordinate ship movements, and X-ray scanners for cargo inspection.



These complex operations face growing pressure to integrate smart wireless technologies for long-term innovation and sustainability. Meanwhile, physical and cyber threats continue to rise, with ports increasingly targeted by ransomware and critical infrastructure attacks.

This calls for robust protocols and greater international cooperation to safeguard ports and their supply chains.

Desmond O'Connor, Business Development Leader at Cisco, commented: "Typically, you have three main options when it comes to wireless technology in these types of businesses: point-to-point or backhaul; unlicensed spectrum (Wi-Fi); and private networks, or what we call lightly licensed spectrum networks. Lightly licensed spectrum can only be used by the company that bought it. This is being implemented for P5G network connectivity by Peel Ports Group at the Port of Liverpool."

Frank Rubotham, Head of Solution Specialists at Logicalis UK&I, further added: "Ports are very difficult environments to deliver wireless networks into, with lots of moving machinery and people as well as large metal structures, but P5G has made this much easier; it has reduced the amount of cabling that is required and the number of hardware devices. But more importantly, it has delivered connectivity right across the port, so that Peel Ports Group can develop this port in terms of efficiency, security, and employee safety."

Beyond increasing visibility, establishing and evolving smart port infrastructure underpinned by P5G goes a long way in cutting costs, particularly as energy prices continue to rise.

Rubotham added, "From our point of view, it was all about designing the solution to ensure that the use cases across the port could be fully tested and

their success measured. This entails looking at the environment where connectivity is required; undertaking detailed radio planning and simulation exercises; and ultimately getting to a design that would support the proof of technology."

Deploying P5G into ports must be done without disrupting the tight schedules ports operate under, often down to the second. Once operational, P5G can minimise critical congestion delays that can arise during cargo delivery and reduce wait times in the transport and supply chain.

With P5G, operators can benefit from low-latency and highly secure connectivity across the entire port. This reduces the need for cabling and hardware and allows for lower power consumption.

SETTING THE GROUNDWORK

For any digitalisation project aiming to improve efficiency, the very first place to start is with the network. This serves as the backbone of any automation plans undertaken by port operators.

However, deploying such infrastructure in these environments is no easy task due to the sprawl of heavy machinery operating in a fast-paced, high-risk environment.

A gradual approach is often best, leveraging existing infrastructure. This helps minimise the risk of downtime in docking areas, storage zones, and masts, while avoiding the hassle and cost of building new infrastructure from scratch.

Managing expectations from the outset is crucial to a smooth implementation of P5G rollout, especially when overhauling port operations.

This involves ensuring that high-level organisational goals are properly aligned with the project.

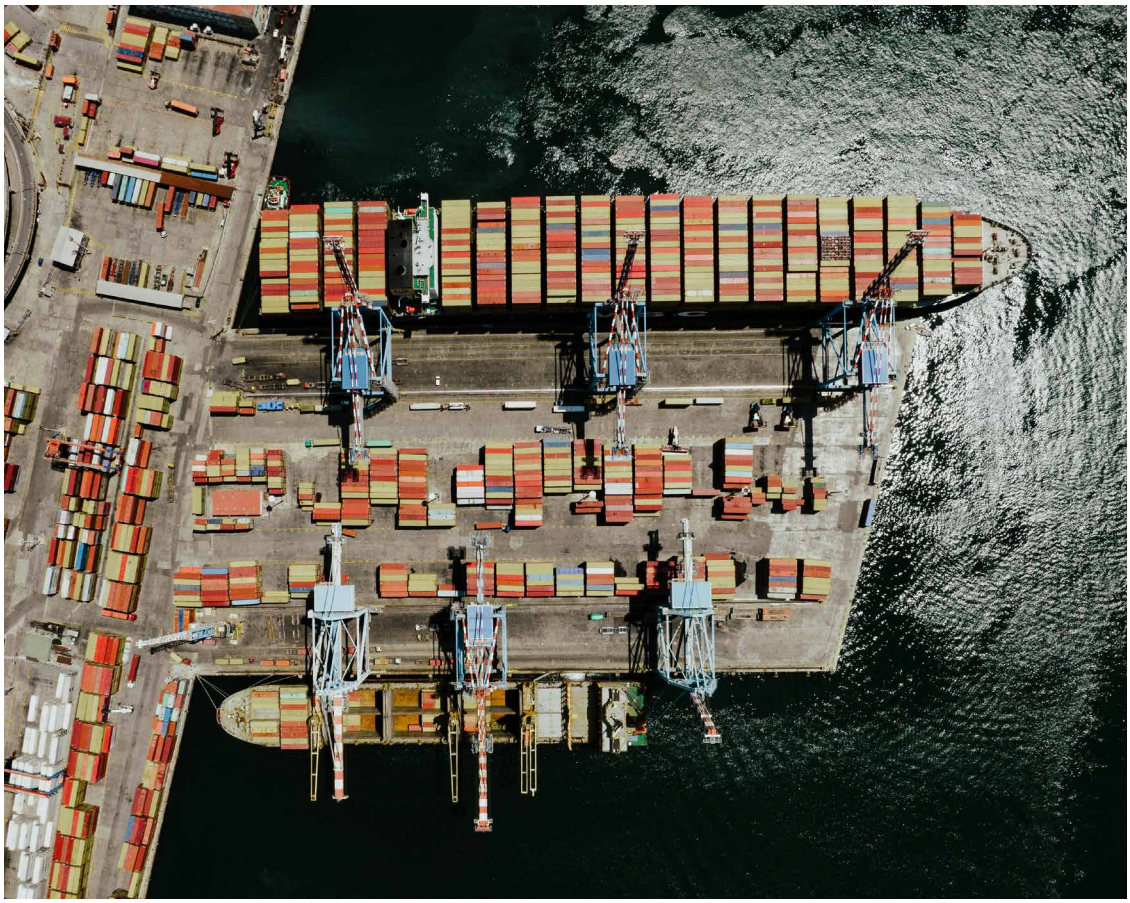
After all, if the backbone of the network cannot meet the expectations of key stakeholders, progress will be limited. Without stakeholder buy-in, even the most advanced P5G implementation can stall. This is why aligning network capabilities with the business objectives from the outset is vital to ensuring long-term adoption and return on investment.

As ports ramp up their digital transformation, they're not just becoming more efficient—they're also expanding their attack surface. Every new connected system, sensor or autonomous asset introduces a potential vulnerability. That's why aligning cybersecurity with automation strategies isn't optional—it's essential.

P5G plays a crucial role in bridging this gap by offering control over who and what accesses the network and ensuring secure data flows across every layer of the port infrastructure.

BOLSTERING CONNECTIVITY AND AUTOMATION

With so many areas of responsibility for port operations, from cargo and traffic management



to weather condition monitoring and communications, continuous connectivity is paramount.

Automation bolsters efficiency and reduces strain on staff while also improving safety. By leveraging the location intelligence within P5G networks and integrating with 'Man Down' solutions, port operators can instantly detect when a worker is in distress and trigger an immediate response.

In high-risk, fast-moving environments, this real-time visibility can be life-saving, helping protect both personnel and critical infrastructure.

However, the sheer volume of data needed to feed these safety solutions and automate operations adds to an already quite complex model, making reliable, high-speed network connectivity essential.

Implementing P5G can go a long way in helping overcome the pitfalls brought by other networking technologies. These include loss of connection as machinery moves across Wi-Fi access points, latency and downtime during disconnections, and the need to deploy miles of cables to ensure port-wide coverage.

Port operations are inherently sensitive and require full network control—something that public networks, as they remain prone to outages and congestion that can bring services to a catastrophic standstill.

Conversely, a fully private 5G network allows ports to customise automation processes, increase capacity, and offer full control over the network and data access, giving increased and tailored security control back to the operator.

P5G will not only solve current issues but also future-proof operations for growth in line with the evolving needs of stakeholders and users of the port. Any maritime applications that Wi-Fi cannot support now can be established over time, with the P5G network able to grow with those new requirements.

LONG-TERM EFFICIENCY AND SECURITY

While implementation must be gradual, P5G lays the foundation for more efficient and secure port operations. The network can mitigate evolving stakeholder needs and any physical or cyber threats that persist in targeting industrial hubs.

Performance is also boosted by eradicating the extra cabling and hardware that comes with manual technologies.

Partnering with an experienced digital services provider like Logicalis can stop the costs involved in overhauling network and application management from spiralling. Such a partnership also provides access to a wealth of sector-specific and technical knowledge to guide decision-makers through previously uncharted territory.

By aligning a secure automation strategy with business objectives from day one, missteps can be avoided, addressing a common risk in 5G projects.

At the Port of Liverpool, P5G has reduced service dropouts compared to Wi-Fi. Network performance has improved tenfold, thanks to increased bandwidth and reduced latency.

O'Connor added, "This is connecting the cranes and gantry carriers, and in the long term, this could also facilitate push-to-talk and man-down technology on phones, tablets and security cameras. As long as it has a SIM card, it can be connected with P5G."

Rubotham concluded, "The next phases of this project will be to prove that the technology works to the challenging demands of the port and that it can support any growth, expansion or change that Peel Ports Group wants to implement.

We would see this as the future networking solution of choice across all of the ports."

ABOUT THE AUTHORS

Frank Rubotham is a senior technology leader at Logicalis UK&I, responsible for driving strategic partnerships and propositions across networking, security, and Private 5G. With over 25 years of experience in IT and telecoms - including roles at Cisco, Vodafone, and BT - Frank helps enterprise customers adopt transformative technologies that deliver measurable business outcomes.

Dez O'Connor has been innovating across the telecoms sector his entire career. Having led product development in several service providers, Dez has overseen the network evolution from 2G to 5G. He has also run a telecommunications management consultancy serving customers across Europe, the Americas and Asia. More recently, with Cisco Systems, Dez develops Cisco's global 5G and WiFi7 business. He also leads several UK Government engagements around topics such as the development of rural coverage to solve the digital divide, private 5G networks, neutral host networks and public/private roaming.

ABOUT THE COMPANIES

Logicalis harnesses collective technology expertise to help clients build a blueprint for success, enabling them to deliver sustainable outcomes that matter.

As a global technology service provider, the company delivers next-generation digital managed services, offering clients real-time visibility and actionable insights into the performance of their digital ecosystems, including reliability, user experience, security, economic performance, and sustainability.

With over 7,000 'Architects of Change' operating across 30 territories worldwide, Logicalis supports more than 10,000 clients across various industry sectors in creating sustainable outcomes through technology.

Cisco (NASDAQ: CSCO) is the worldwide technology leader that is revolutionising the way organisations connect and protect in the AI era. For more than 40 years, Cisco has securely connected the world. With its industry leading AI-powered solutions and services, Cisco enables its customers, partners and communities to unlock innovation, enhance productivity and strengthen digital resilience. With purpose at its core, Cisco remains committed to creating a more connected and inclusive future for all.