THE SKY'S THE LIMIT

USING DRONES TO FUTURE-PROOF THE SEAPORT

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Drones are transforming the way organisations operate across the world. While most are prevalent in the military and defence industry, seaports are climbing to the top of the list of industries in the commercial sector that can reap the benefits.

From container and cargo management through to data storage, logistics management, and national security, drones can be used across the entire supply chain. Some companies have already reimagined drones to take their benefits one step further. Maersk Tankers, for example, recently revealed it had completed its first drone delivery to a ship to test whether unmanned aerial vehicles can be used and implemented in its supply chain.

Seaport operators can also maximise their potential by taking advantage of small, lightweight drones. These aerial platforms can collect and transfer large amounts of information, work around a range of obstacles and operate days, or even weeks, over long distances. This in turn enables port terminals to achieve transformative productivity and efficiency gains. Research has shown that the use of drones rather than launch boats could drive down costs by up to 90% for vessel operations and ship managers, meaning the entire industry would be saving upwards of US$675 million . The large scale in efficiency savings is essential for such a dynamic environment where all assets – cargo, people and vehicles – are constantly on the move.

NETWORK INFRASTRUCTURE

In order to be considered a viable means for which to deliver a whole range of communication services, drones need to operate and communicate on the same network infrastructure that supports any other port asset that needs to transmit and receive communications – be it a quay crane, RTG or straddle carrier. Furthermore, seaport operators can schedule a drone, or a swarm of drones, to take flight or simply push one button for it to fly an entire mission without human intervention.

Considering the criticality of time, resources and the advancements being made to migrate more functions and applications autonomously, ports are evaluating drones for some of these key uses:

- Monitoring road traffic in the port: With truck drivers constantly working their way in, out and through a port, drones can increase the visibility of all moving vehicles. This enables operators to reduce lane blockages and congestion as well as speed up stacking times, which is critical in December when cargo shipping skyrockets.
- Logistical support with a birds-eye view of the port operations and

infrastructure: Instead of a truck driver searching for a container, for example, they can be told where to go and wait for the container. By minimising the level of vehicle and container movement, ports can significantly boost their daily operations.

- Watchdogs: With 90% of world trade carried by the international shipping industry, ports have become high-risk targets for terrorism, theft, and trafficking. Drones can provide an extra layer of security to a port's existing security, monitoring and surveillance measures.
- Getting to difficult to reach locations for search and rescue operations: Flight data, as well as video streams from multiple drones in the field, can be quickly sent to a ground station operator, allowing them to scan a large area quickly.
- Identify defects: Drones can be used to inspect and diagnose a wide range of issues with a port's equipment and the maintenance thereof. In 2015, the British Royal Navy did just that. It tested a mini drone to survey its warships, as well as in particularly hard to access sections.
- Cut human costs: By deploying drones, operators can free up their staff from repetitive and laborious tasks and instead re-deploy them in other areas.

Ultimately, drones can add a whole new set of capabilities and with the right network, enable seaport operators to make smarter decisions, safely and cost-effectively.

GETTING YOUR NETWORK RIGHT

Many of the world's major ports are faced with the challenges of an aging, limited-mobility network infrastructure in an environment more dynamic than ever before. Data volume demands for SCADA, RFID, CCTV – and now drones – have increased, and the need for mobile communications is now essential. Operators need reliable access to real-time data, yet the harsh environment of an intermodal port makes constant connectivity challenging.

Operators, therefore, need to rapidly modernise their largely wired networks. Today, a network that is scalable, dynamic and operating in real-time is vital if operators are to keep up the constant flow of goods in and out of a port as well as enable the proper functioning of autonomous equipment. Simply put, drones will only be as good as the supporting network infrastructure.

Traditional wireless networks fall short when trying to bring reliable and scalable mobile connectivity to every corner of the port terminal. These Wi-Fi networks are not designed to provide reliable connectivity over widespread and complex areas such as port environments, especially when assets within that environment – like drones – are highly mobile.

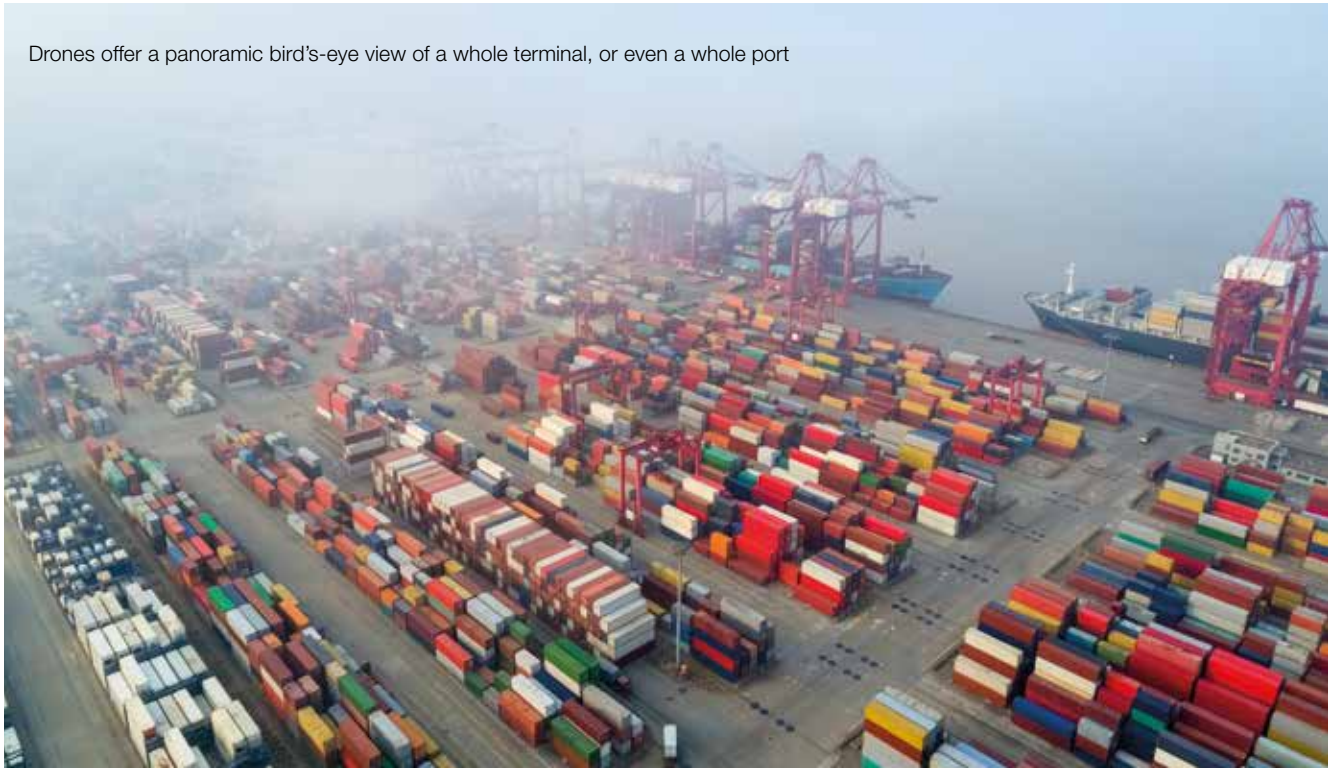
In Wi-Fi and faux-mesh networks, for example, mobile nodes continually break and re-establish connectivity as they move between access points and each break results in a temporary loss of communications. If personnel or port equipment is sending data to each other or to the command centre during these periods of broken or lost connectivity, the information is at best delayed, but more likely completely dropped.

The consequences of dropping connection could be catastrophic. Port operations will either cease or stall, with operations suffering a domino effect, and the impact on the drones themselves would also be severe. If there is latency or delay in data transmission to a drone, for instance, it will stop functioning and effectively nullify its productivity and efficiency benefits.

Additionally, traditional networks dedicate frequencies to a single purpose which increases the risk of slowed or dropped traffic. Data can only travel one way to reach a server and performance factors like congestion, node outages, or interference are not accounted for – so data would have no way to route around these issues even if they were detected.

Granted, networks like these can be specifically arranged to avoid such signal interferences but only in a static and predictable environment. Such configuration is unrealistic in ports, where large metal equipment and cargo containers – the key culprits of signal blockage and interference – are constantly in motion.

There is also a correlation between data security and the quality of the network. With seaports implementing drones, the number of interconnected devices, cameras, and sensors on site is fast-growing, but this also increases the need to secure and authenticate the



Drones offer a panoramic bird's-eye view of a whole terminal, or even a whole port

communication traffic moving in, out and around the network. Traditional network infrastructure is not sophisticated enough to cope with the wider terrain of threats.

All of these shortcomings of a traditional network infrastructure culminate in a lack of agility to support a dynamic port's mission-critical mobility requirements.

Ultimately, there are five critical success factors for implementing drones in ports:

1. GPS capabilities: For real-time tracking of drones so that containers, equipment, and people can be located instantaneously in a built-up seaport.
2. Single, private infrastructure: For combatting delays in network coverage as well as interference from ships and competing port operators.
3. Multiple radio frequencies: To continuously and instantly transmit data in real-time via the best traffic path and frequency.
4. Robust security measures: To protect the increasing volumes of data, as well as physical assets, across a sprawling environment.
5. Proven power sources: To ensure that appropriate power sources are readily available and tested and can meet both short and confined flight routes as well as longer over water monitoring flight plans.

SOLUTIONS

In order to address these issues we at Rajant have built the Kinetic Mesh private wireless network in a bid to help ports rapidly deploy the fully mobile, highly adaptable, and secure connectivity required to fully capitalise on next-generation applications such as drones. Contemporary solutions such as ours enable ubiquitous and continuous location tracking via highly accurate differential GPS to ensure precise location capabilities of these devices too.

By combining real-time networking software and an unlimited number of 'ruggedized' wireless radio nodes, ports can leverage new mesh networks to continuously and instantaneously route data via the best available traffic path and frequency. Furthermore, instead of each node having to always communicate via a LAN Controller, they can, instead, all share information back and forth in a highly interconnected web of communications.

The bottom line is that a modern network can help operators embrace the opportunities of the 'Port of Things' because the network is about connecting the assets. All of the variable and valuable 'things' must connect and communicate to power efficiency and productivity gains.

We at Rajant have invested time in effort in working towards transforming a port's network into a strategic asset by providing the port-wide access, reach, and mobility needed to support next-generation applications. After all, if these applications are constantly moving, it's only right the network moves with it too.

ABOUT THE AUTHOR

Chris Mason is the Director of Business Development for the EMEA Market at Rajant Corporation. Prior to Rajant, Mason worked with British Telecom (BT) in a variety of sales, business development and management roles to help worldwide organizations identify IT solutions for common business challenges. Mason has experience with the United Kingdom's Terrestrial Trunked Radio (TETRA) network for the Emergency Services and the Ministry of Defence. Mr Mason also earned a Bachelor of Arts and a Master of Science in Telecommunications Business from University College London and is an active member of the Institute of Directors.

ABOUT THE ORGANIZATION

Rajant was established in October 2001, after founders Robert Schena and Paul Hellhake recognized the significant shortcomings in traditional wireless mesh technology, particularly when it came to mobile voice and data networks used by first responders. The Rajant team envisioned a new, more robust mesh technology that would allow these networks to be fully mobile and mobility-enabled, and operate reliably in even the most demanding environments. Enter the Rajant Kinetic Mesh® network.

ENQUIRIES

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