Rajant Selected the IIoT Network of Choice for Western Australia's Largest, Busiest, and Historically Important Port

Fremantle Ports, also known as the Fremantle Port Authority (FPA), is among Australia's busiest. Considered the most extensive port operations in Western Australia, FPA carries historical significance dating back to 1897 when it welcomed European settlers.

Fremantle Ports surround the mouth of the Swan River with the container handling and primary operations located on the north side, known as Rous Head. It is serviced by trucks and a rail terminal providing the logistics arteries in and out of Fremantle. A passenger terminal, vehicle import laydown areas, and the administration building are located on the south side of the port, known as Victoria Quay. To harness other technologies and provide the opportunity to become a digital port in the IIoT age, Fremantle chose Rajant as its wireless network.

The Challenge

An operational port environment, like Fremantle, provides many challenges for a wireless network. This includes the movement of ships, cranes, and walls of sea containers stacked and moved constantly. Sea containers are made of rippled metal surfaces, which are reflective to radio frequency (RF) but disperse radio signals due to the shape of their construction. FPA is located in an urban area. This adds other RF sources, including Wi-Fi networks, LTE coverage, and ship radar, all of which contribute to a hostile RF environment.

In the 2019-2020 financial year alone, Fremantle moved 783,437 TEU (twenty-foot equivalent unit), importing 77,962 vehicles and 32.6 million mass tons of cargo. Becoming a digital port meant installing a wireless network to provide continuous awareness of the shipment and the people, machinery, and infrastructure supporting this operation level.

Real-time monitoring was a requirement to aid in efficiency, traffic congestion, and public safety for the port. What Fremantle needed was a wireless mesh network that enables mobile trailers to connect and communicate with the fiber optic LAN throughout the Fremantle Ports inner harbor.

Fremantle Ports

- Fremantle is at the mouth of the Swan River, on the edge of the Indian Ocean and a gateway to Western Australia.
- The port has played a significant part in Western Australia's development and history, including wartime.
- Deepwater bulk facilities in the Outer Harbour were first developed in 1955 to service the Kwinana industrial area, which expanded rapidly in the 1960s and 70s.

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The Partners

- **Rajant:** provides peer-to-peer radio communications enabling voice, video, and data for mission-critical applications; connects machines, robotics, and people together in a secure private instant network
- **TASC:** is in the forefront of digital security systems, working with global brands and local organizations to ensure they have access to the latest in digital security technology.

Kinetic Mesh Components

- KM3
- LX5
- SlipStream
- BC|Commander
- BC|MeshMapper

The Solution

TASC Digital Control Systems WA successfully won a tender to provide a mobile vehicle detection system and supporting wireless network for the Fremantle Port Authority. Their project was split into mobile trailers with surveillance capabilities and a wireless network to provide connectivity for the trailers.

Mobile trailers are platforms to relocate monitoring devices to critical areas of the port easily and were based on the Briteforce lighting towers TASC had previously supplied during the proof of concept undertaken. Briteforce is a Western Australian-owned and operated manufacturing company whose trailers are entirely solar-powered and electrically operated. This means they are self-sufficient and benefit from not requiring hydraulic maintenance, providing low upkeep costs and easy operation.

Mounted to the trailers are Bosch 5000i and 7000 series CCTV cameras that are License Plate Recognition (LPR) and analytics-capable. They provide data and statistics of vehicle movements in the area, making the application a success. Cameras are a mix of fixed and PTZ, each streaming 1080p video with backup recording locally via SD card. All CCTV devices are powered via a managed Allied Telesis Network switch, forming part of the security networking infrastructure and providing network authentication of connected devices.

For the second project component, **wireless network**, TASC used Rajant as the solution to provide the necessary coverage for this application as well as expansion in the future. Rajant Kinetic Mesh® delivers a network that is intelligent, scalable, resilient, secure, and above all, easy to use for the client. The network is a self-learning and self-healing hive of intelligence that always provides the fastest path for network packets to get to their destination.

Once deployed, the network requires zero configuration, alignment, or management from technical staff for any necessary location changes of the mobile assets. Anyone who can tow a trailer can park it within the coverage areas, stand it up, turn it on, and have the live-feeds streaming back to the control room in just a few minutes.

In Fremantle's case, the majority of their network is powered by Rajant's KM3 BreadCrumbs®, which have dual radios for frequency redundancy. Key network locations were powered by LX5 BreadCrumbs with four radios, providing both frequency and channel redundancy as well as bolstering important wireless links in the network. A SlipStream unit was included in the design to handle the data's encapsulation between the wired and wireless networks providing plenty of bandwidth headroom for future expansion. Network traffic is split across multiple VLANs,

> "It's been an exciting achievement from all at TASC to be able to deliver a project for one of Australia's major Ports, utilizing the advanced features and functions in the wireless space that Rajant provides."
>
> **— Luke Porcaro**
> **Project Manager and Project Lead**
> **TASC, Digital Control Systems (W. Australia)**

which can be prioritized based on user requirements and the importance of the transmitted data.

FPA provided the infrastructure for the Rajant network to be installed on, with the majority being solar-powered skids. These skids were able to be placed to meet the TASC radio network design requirements and can be repositioned if required in the future.

The Results

Two extra skids with a LPR-capable camera connected to the BreadCrumbs provided VLAN tagging needed to operate the network and acted as added, semi-permanent locations for logistics' monitoring.

Variations to the project included a traffic support vehicle fitted with cameras and a BreadCrumb to provide rapid onsite video streams for traffic control events. Solar charging and battery-level monitoring to the cloud was also added.

The network is managed via Rajant's BC|Commander with BC|MeshMapper providing the ability to view real-time network information. This includes all radio configuration, over-the-air firmware updates, configuration export/import, and Kinetic Mesh snapshots that offer diagnostic and device log information.

TASC further completed a map of Fremantle using a node attached to a vehicle that logged network connections at four-second intervals, providing a realistic expectation of the network's connectivity locations and performance.

There are nineteen 1080p video feeds that stream back to the VMS from the wireless network. Network management and trailer monitoring data is also sent across the network on separate VLANs.

20+ YEARS OF GAME-CHANGING WIRELESS

R A J A N T

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*Industrial Wireless Networks **Unleashed.***