

# Port Authority tightens security and improves operations with “everywhere coverage”



Communication is the cornerstone of any maritime port and wireless communications enable the mobility, stability, and reliability required for secure, efficient operations and complete site coverage. Regardless of the high RF-interference and challenging environment typical of most ports, Motorola’s Point-to-Point (PTP) wireless bridge technology, combined with Mesh Wide Area Network (MWAN) solutions, enables uninterrupted connectivity to and from moving machines and real-time video monitoring to and from port machinery.

## **Situation: An industry constrained by limited connectivity in a harsh environment**

With an industry suffering from the economic downturn, competition is increasing between ports for the reduced amount of container traffic and, thus, shrinking revenues. This is driving port operators to seek innovative ways to improve efficiency and reduce operational costs. In addition, as the risk of terrorism continues to pose a threat, ports must tighten security, ensure that all perimeters are monitored, and improve communications between work crews.

For a state-owned Port Authority that owns several terminals located on the coastline, as well as an inland port a few miles away, these challenges were compounded by a communications system nearing end of life that created operational inefficiencies and compromised port security, causing problems such as:

**Inconsistent coverage:** The port’s existing microwave technology relied solely on direct line-of-sight connectivity. However, signal interference and multi-path conditions created from passing container ships, constantly moving quay cranes, and other port and non-port machinery within the line-of-sight created transmission delays, disruptions, and unpredictable coverage.

**Compromised security:** Although video cameras were mounted on fixed poles around the perimeter of the ports, the stationary wooden poles could not reach the height required to transmit video around moving obstructions, such as 155 foot tall quay cranes, numerous 50 foot huge straddle carriers, or highly stacked ships entering and leaving the port. Security personnel could not adequately monitor the port to protect the shoreline.

### **Situation:**

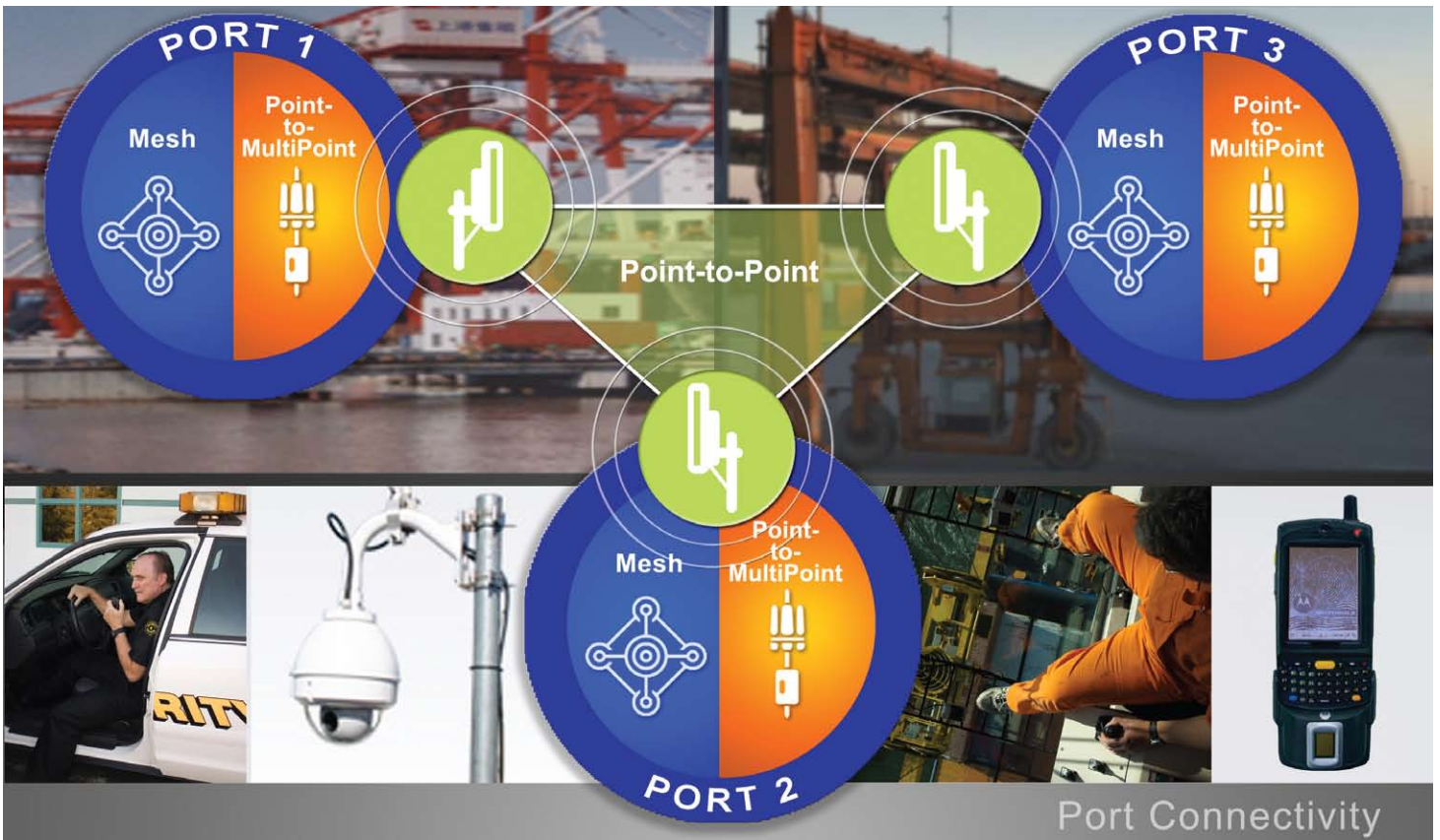
- Improve RF coverage and security for multiple ports
- Increase competitiveness through port efficiencies
- Reduce operating expense

### **Solution:**

- Point-to-Point 58600 Wireless Ethernet Bridge
- Mesh Wide Area Network Solutions
- IP video surveillance cameras

### **Results:**

- Scalable installation and expansion
- Real-time video surveillance and complete site coverage
- High-speed broadband access to analytics and network data
- Estimated cost savings of over \$400,000 annually



U.S. Coast Guard photo / Petty Officer 1st Class Christopher Evanson



**Slow data rate:** Port operations increasingly rely on the monitoring/telemetry capabilities of straddle carriers to keep an eye on fuel loads, tire pressure, location, and other critical data that keep the machines in operation and containers moving through the port. The amount of data transmitted significantly slowed the existing 9.6 kbps narrowband network, forcing operators to restrict or even eliminate that analytical data in order to free up network bandwidth.

**Cost-prohibitive T1 lines:** Reducing operational costs with increased reliability was also a priority. Currently using an array of commercial T1 lines for backhaul, the approximate \$400,000 yearly service fees had become cost prohibitive. The T1 solution was also highly susceptible to storms, which further decreased the reliability of the communications solution.

The Port Authority, responsible for security and legislative management of the terminals, wanted to not only offload its existing microwave link but also to extend the benefits of a shared network with its non-profit organization that held responsibility for operations. The goal for the new network was to provide a backhaul for improved communications that would facilitate high-speed data transfer between the ports; eliminate recurring service fees of its T1 lines; promote scalability and enable deployable wireless surveillance cameras for improved security and operations.

**SOLUTION: Wireless Broadband Point-to-Point Bridges and Mesh Wide Area Networking**

Motorola met with the Port to discuss the communications challenges and recommended a Motorola wireless, high-speed broadband solution between ports and overlaid by Mesh Wide Area Network (MWAN) technology within ports to ensure a reliable, rugged, industrial strength network designed to perform in high interference and harsh mobile environments.

MWAN self-forming networks provide ad-hoc configuration for automatic and survivable communications, regardless of obstruction, movement, or RF conditions. Each radio acts as a router/repeater to extend range and mitigate the many sources of interference. Wireless cameras are installed on moveable cranes, communicating as access points with adjacent points supporting on-demand video surveillance and going around obstacles for dynamic point-to-point networking. With uninterrupted connectivity to and from moving equipment, the Port Authority would have full access to operational control applications, such as automated guided vehicles (AGV) in the future, container tracking, equipment monitoring for health and diagnostics, and uninterrupted video monitoring.

“Objects move around in the port all the time and when you want to put a camera on a moving object, it’s hard to maintain connectivity,” says a Motorola representative. “We installed wireless broadband in areas with tactical (portable) cameras and continue to deploy a combination of MWAN and routers to get the backhaul from there. The network is self-forming and self-healing and with that configuration, coverage remains consistent even with moveable infrastructure like quay cranes.”

**RESULTS: Reliable, cost-effective connectivity keeps containers moving through the port**

Shipping companies will favor a port they know will get them in and out quickly and smoothly. This requires the Port Authority to ensure high levels of operational efficiency, which in turn is dependent upon consistent, reliable communications throughout and between each of its ports. The wireless solution overcomes communications gaps, ensuring constant connectivity with improved port operation capabilities.

Operational downtime is significantly minimized through secure, mobile handoff of data communications. For example, a ‘low fuel’ alert on a straddle carrier can help Operations make sure a replacement is sent to that location to keep the containers moving forward without skipping a

beat. Because the system automatically selects the best available channel and route on the network, future automated guided vehicles can receive the necessary information to go to the proper location.

Because the Mesh Wide Area Network allows the Port Authority to deploy cameras onto movable cranes, which can stand over 150 feet tall, cameras have the height to monitor the entire port area as well as the dock, shoreline, ships, and out into the water without obstruction. As the cranes move, the MWAN and multipoint architecture of the system accommodates the movement by forming alternative routes while remaining connected with the network. As a result, security is significantly increased because each port has full, shared access to surveillance data for faster response and greater situational awareness.

Other benefits include:

- **Improved Operational Efficiency:**
  - High bandwidth enables operators to quickly receive all status data from straddle carriers as well as video from the entire perimeter, including the shoreline.
  - The ability to locate and track containers with greater accuracy and with the most relevant data keeps operations consistently moving forward with minimized work stoppage due to lost or misplaced containers.



- **Increased Security:**
  - Video analytics act as a force multiplier, enabling a few trained staff to manage hundreds of cameras, providing situational awareness and proactive response to port police and security personnel.
  - Data available wirelessly by port security command, gate and mobile personnel can quickly detect unauthorized access, ensuring compliance with the Transportation Worker Identification Credential (TWIC) program. TWIC mandates that workers requiring unescorted access to secure areas are issued tamper-resistant biometric credentials.
- **Enhanced Safety:**
  - On the operations side, cameras mounted on the back and underneath the cranes can help prevent accidents by providing greater visibility as operators move containers to and from the ship.
  - The video also provides a record of evidence and liability by recording all activity in the event that an accident does happen; a measure that potentially reduces insurance costs.
- **Cost Reduction:**
  - By eliminating commercial T1 leased lines, the port estimates that it will save \$400,000 per year by eliminating service fees while increasing reliability.
  - With one wireless, redundant, optimized solution running both 2.4 and 4.9 GHz, fewer access points are required, reducing the cost of installation, maintenance, and lowering the Total Cost of Ownership (TCO).

**The bottom line:** With a communications system that was unreliable and quickly reaching end of life, the Port Authority needed a cost effective solution and needed it quickly. Motorola wireless broadband solutions help the port to keep containers moving, increasing location accuracy, and providing the telemetry bandwidth that improved operational efficiency. Prior to this implementation, each of the Port Authority's terminals tended to operate remotely with costly and unreliable communications support as individual ports. With the new Point-to-Point solution, the ports operate more connected as one with equal access to data, including video surveillance which provides port police and other security personnel with situational awareness and speeds their collective response to the situation.

Like any investment should be, the PTP wireless solution with MWAN not only addressed the port's current and unique challenges, but will continue to provide value into the future. For example, the port is now looking into using the flexible technology towards its expanding rail system operations and, providing similar capabilities with its inland port hundreds of miles away.



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