

Orchestrating the Flow of Commerce

Mobile Performance Management in Port Operations

Major ports are struggling with the congestion brought by larger ships and more containers. In fact, containerized traffic has grown at a clip of 8.5% annually since 2000, and container vessel sizes more than doubled over the same period. In order to optimize throughput of containers through the port and thereby increase capacity, use of technology to track assets as they flow through the port has long been a staple of operations. Wireless technologies have played a big role. The port environment, however, presents some unique challenges due to multipath interference and the blocking effects of massive metal equipment in constant motion and ever-shifting walls of stacked containers. Moreover, ports that want to improve the performance of existing systems or introduce new technologies are hampered by the impact of construction on their 24x7 operations. Adding new access points, introducing mesh networks or adopting highly specialized Wi-Fi access points and antenna arrays are a possible solution to the signal problems, but rely on lighting masts in the right locations. Otherwise, the facility faces an interruptive and highly expensive buildout. And elimination of the problems is still not necessarily guaranteed — especially when the end-goal of higher traffic and more-efficient movement through the terminal exacerbates the problem with more container moves and higher stacks.

The Role of Mobile Performance Management

Mobile Performance Management provides an elegant solution to the wireless challenges inherent in port environments. It optimizes, accelerates and secures data traffic, assuring delivery and preventing interruptions in the flow of data.

Mobile Performance Management solves the problem in two ways: One, it optimizes the connections, delivering reliable performance despite coverage gaps and weak-signal areas. It pauses the connection, then simply resumes when signal is again available. Two, it allows multiple networks to be used and transparently switches between the connections. This allows 3G or 4G cellular data connections to be used as the primary connection or a backup to onsite Wi-Fi. Because it maintains a single, secure and persistent tunnel regardless of which combination of networks is used — private or public — port operators can be assured of reliability and security.

Vessel Load/Unload

The ship-to-shore cranes set the tempo for the entire operation, and turnaround time for the containerships is one of the key metrics for port operations. At this critical point in the terminal, Mobile Performance Management software at the checker stations ensures that the flow of data about container moves and locations remains constantly available for other parts of the operation. In some ports, automatically guided vehicles handle the job of shuttling containers between the quay cranes and container stacks; here Mobile Performance Management ensures that the flow of instructions remains unimpeded.

A Key Enabling Technology for Port Operations

Mobile Performance Management handles the complexities of connection performance in dynamic environments that are challenging for RF signals. It also supports any application that runs in a wired environment including terminal operating systems, ERP and other systems, whether accessed as a terminal session or via a web interface. This allows port facilities to quickly make existing mobile environments more seamless and reliable, as well as implement new initiatives.

Traffic Optimization ensures applications and resources are optimized for weak and intermittent network coverage, and workers can roam freely between networks as conditions and availability change. It also allows bandwidth-intensive uses such as streaming video to be used successfully over marginal connections.

Adaptive Policies fine tune the mobile user experience, prioritizing applications and network access based on network, situation and location parameters specified by IT.

Performance Analytics and Diagnostics deliver constantly updated analytics on data use by devices, applications and networks, so IT can fine-tune the user experience. Root-cause detection quickly pinpoints problems for fastest troubleshooting to get workers productive again.

Security supports highly flexible and programmable secure access capabilities. IT can configure secure tunnels per-app or device-wide, securing access to enterprise applications and resources.

Container Tracking

In the container yard, operators of reach-stackers, bomb carts and straddle carriers working within the container stacks may need to move to an open area just to get a signal. Where gantry cranes are used to load and unload containers onto truck chassis and railcars, the changing locations of the cranes relative to the containers and to each other make signal availability unpredictable. Mobile Performance Management lets them continue to work and keeps the stream of drop off and pick up information going despite intermittent connectivity.

Dredging Operations

Dredging is an essential part of port operations and some ports automate this work using software. It sends work instructions to the vessel operators, and monitors progress via sensors that track the GPS coordinates and movements of dredge tools such as excavator buckets, suction tubes and cutter heads. The vessels often operate at the fringe of coverage areas, and Mobile Performance Management software is an essential ingredient for maintaining and optimizing the connections on which the automated systems depend.

Ship Navigation

At many port facilities worldwide, harbor pilots carry laptops and bring them aboard for accessing navigational aids and information. These include nautical charts with automated depth updates, displays that show surrounding vessel traffic and movements, and route-planning software which is useful in complex ports with multiple waterways. Also in some ports, pilots rely on connections with land-based servers to access highly accurate positioning systems for delicate low-speed, close-proximity maneuvers. Signal quality is often an issue with ships at the margins of coverage areas, moving in and out of range, and laptops needing to switch between various networks. Mobile Performance Management software handles the intricacies of maintaining the connections so the pilots can focus on the delicate job of guiding huge ships through congested waterways and bringing them safety to the dock.

Gate Operations

Many terminals have moved to automated ID systems using truck-mounted RFID tags to implement post-9/11 security and "clean truck" initiatives. Some also detect trucks when they pass checkpoints on the access roads, to ensure that containers, lifting equipment or both are at the ready before the truck enters the port. Typically tag reads can be accomplished with a fixed-mount reader. However, mobile devices are still used at some gates, and Mobile Performance Management makes connections more reliable when working around the trucks for confirming containers seals haven't been tampered with and for other inspections.

Asset Tracking

A wealth of high-precision sensing technologies are being applied to asset tracking including GPS devices, aerial photography, street-level imagery, underwater photography, 3D scanning, thermal imagery, satellite images and image capture by unmanned aerial drones. Such technologies record location data from multiple vantage points with unprecedented precision. Tech-savvy ports are applying a mix of these technologies for tracking ships in transit and vehicles in motion, as well as fixed assets such as roads, energy pipelines and buildings. Mobile Performance Management ensures the continuous flow of data — whether the assets are themselves in motion, or the data is collected by fixed sensor systems that rely on wireless networks to transmit.

Security and Safety

It is widely accepted that ports are a tempting target for terrorism and criminal activity; therefore security is a top priority. Technologies such as vehicle motion detection and access control are widely used, as are video surveillance for monitoring vehicle and foot access to the facility. Ports also turn to video for risk-avoidance measures such as monitoring load/unload operations, detecting safety violations and verifying accidents. Where wireless video cameras are used, Mobile Performance Management optimizes the connection, and delivers higher-quality video in marginal coverage conditions. It also plays a large role in managing the connections used by roaming security personnel, and for ensuring reliable connections for collaboration and orchestrating incident response.

Supervision and Management

Mobile devices allow port administrators to track operations and manage them from anywhere. Mobile Performance Management allows them to access any application written for a wired network, over any network connection. This allows them to access terminal management and other applications, and access reports and business intelligence no matter where the business takes them.