MAXIMIZING PORT SAFETY

EFFICIENCY AND SECURITY WITH MISSION-CRITICAL COMMUNICATION

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The trend towards increasing scale of operations is affecting ports worldwide, with mega ships' capacities exceeding 14,000 TEUs driving the requirement for port expansions covering vast areas, with massive infrastructure and machinery.

With workers often dispersed over large distances in potentially hazardous environments, and mega ships, which are calling at ports less frequently with larger volumes, generating surges and extreme peak pressure on port operations, gate congestion is becoming a key challenge.

Higher volumes of trucks and trains entering and leaving the port in a shorter time window means that the benefits created by economy of scale at sea are negated when ports become bottlenecks and cargo dwell-times increase.

Ports which are unable to accommodate mega ships must focus on increasing the throughput of smaller vessels – unloading and reloading ships quickly and closely controlling the flow of cargo into and out of the port.

To achieve this requires a well-coordinated workforce and the ability to communicate across diverse organisations, with the rapid and reliable transfer of information between people and smart devices of paramount importance.

Due to the formation of mega-alliances between key industry players, ports must be able to work effectively with different organisations utilising varied technologies and business processes.

The frequency of extreme natural events is also increasing.

Tornadoes, hurricanes, floods, tsunamis, and earthquakes create a need for early warning systems that provide fast information to ports and the right people to allow preventative action and minimize the impact to individuals, resources and the environment.

In addition to natural disasters, the threats of terrorism and crime are increasing, creating a growing need for physical security.

Ports are prime targets for terrorist attacks. Shipping containers are attractive to organised crime gangs engaged in theft of valuable goods.

Cyber-security is another critical requirement as the incidents of crippling data ransom attacks and other online criminal activities are becoming more frequent.

The average cost of a data breach to a company has risen to over $3.8 million [1] and 60% of malicious software (malware) payloads in Q1 2017 were ransomware [2], meaning that protection against physical and cyber-security attacks is critical to modern port operations.

MISSION-CRITICAL COMMUNICATION

Mission-critical communication comprises different elements which are tailored to meet the needs of individual ports – no two ports are the same. Typical consumer-grade, off-the-shelf communication solutions designed to maximise operator revenue are simply not up to the task in port environments.

Mission-critical communication operates in even the worst-case scenario.

With its origin in demanding and highly complex deployments for emergency services around the world, mission-critical communication has evolved to deliver essential efficiency, safety and security benefits for commercial organisations striving for competitive edge.

ENHANCING PORT EFFICIENCY

Coordinating dispersed mobile workers operating remotely in tough environments requires instantaneous, high quality, dependable voice communication.

Two-way radio has clear advantages over other mobile communication technologies:

- Rapid, instant group communications at the touch of a single button, to disperse, multi-functional mobile workers
- Customised, ubiquitous communication coverage over heavy mobile machinery; tall buildings, silos and tanks; metal cranes and gantries
- Rugged devices that are easy to use in extreme environments – rain, salt spray, dust, heat, cold, vibration, with the harshest treatment.

When port staff are working offsite and are operating beyond the coverage of the two-way radio system, communication with their onsite colleagues can continue using Push-To-Talk (PTT) workgroup applications on their smartphones or personal computers.

For example, a manager can keep in close contact with the security and safety teams in the event of an incident, even if she is located overseas.

These PTT workgroup applications simulate a two-way radio and use broadband technologies such as Wi-Fi and 3G and 4G cellular networks.

The drive towards higher efficiency is leading to increasing automation and the connectivity of processes and smart devices through the Industrial Internet of Things (IIoT).

Two-way radio can provide reliable, long-range data communication within a supervisory control and data acquisition (SCADA) system, enabling connectivity between control rooms and sensors and switches to monitor and control remote infrastructure and equipment such as sirens, gates and port access security systems.

Vessel Traffic Services (VTS) play a critical role in improving the efficiency of navigation in port waters.

Traditional solutions for VTS centres have followed a silo approach, requiring operators to use multiple screens, keyboards and devices to access different communication systems, resulting in lower efficiency.

With global shipping traffic continuing to increase, an efficient VTS centre needs a more streamlined way of managing multiple communication systems.

The command and control centre at the heart of a mission-critical communication system provides port management teams with the means of monitoring, coordinating and managing their operations across multiple communication systems:

- Real-time tracking and recording of workers, vehicles, machinery and cargo
- Coordination across different technologies to ensure seamless communication between different organisations
- Workflow management utilising work ticketing applications
- Predict potential hazards with intelligent data and video analytics.

SAFETY FOR PORT WORKERS

Increasing automation and growing physical scale of operations means that port workers are often isolated from their colleagues and depend on their mission-critical communication tools as a lifeline.

As well as increasing personal safety for workers, mission-critical communications provide competitive business advantages for port organisations:

- Reduce insurance premiums and damages claims through improved worker safety.
- Cost savings through less downtime.
- Minimise expenditure on incident investigation with automated event logging.

Two-way radio solutions maximise workforce safety:

- Crane, gantry and vehicle operators in particular need instant voice communications, especially in the event of an incident as time spent dialling and patching in other users is time wasted and increases risks
- In the event of an accident, remote workers can initiate emergency calls with a single push of a high-visibility button on their device, with the call taking priority over all others and including all necessary personnel to resolve the problem as quickly as possible
- Lone worker devices can be programmed to automatically generate an emergency call if the user does not respond in a pre-defined time period or falls down, raising the alarm if the user is incapacitated
- Two-way radios use location tracking through integrated GPS and Bluetooth to report their location to the central control station
- Radios can communicate with body-worn sensors to raise the alarm in the event of circumstances that involve extreme temperatures, dangerous gases, abnormal biometrics
- When fitted with accessories such as remote speaker microphones, earpieces and headsets, two-way radios enable hands-free communication to reduce worker distraction and increase ease of use.

When operating in environments with potentially explosive cargoes or in close proximity to fuel, two-way radio equipment must be explosion-proof, or 'intrinsically safe'.

Within the EU, intrinsically safe equipment must comply with the ATEX Directive 2014/34/EU.

The ATEX regulations define multiple categories of environment and stringent parameters for the behaviour of equipment exposed to potentially explosive gas and dust.

Within a vast port environment, siren systems are often deployed to ensure all workers are aware of impending or ongoing incidents involving such hazards as fire, security breaches and movement of large cargos and machinery.

These siren networks are typically controlled by SCADA systems to improve safety and help eliminate human error.

STRENGTHENING PORT SECURITY

Physical security requires perimeter security, controlling access at gates and tracking valuable cargo and resources.

Smart surveillance cameras combined with video and data analytics help to identify potential threats before they can act.

Facial recognition technology and automatic licence plate recognition (ALPR) identify and track people and vehicles without impacting flow rate through gates.

A network of fixed cameras and port security staff body-worn cameras can provide real-time, ubiquitous monitoring.

Two-way radio voice communications can be encrypted to prevent eavesdropping by criminals or terrorists and lost or stolen radio devices can be tracked or remotely disabled to prevent unauthorised use.

Considering data communications, mission-critical SCADA solutions provide highly secure data communication between control systems, devices and sensors to ensure that terrorists and criminals cannot disrupt port operations.

Data encryption, combined with strong access controls helps to protect automated systems.

CONCLUSIONS

The new risks associated with the global trends of increasing scale, consolidation, formation of mega-alliances and more frequent physical and cyber-security attacks generate significant challenges for ports but also open up new business opportunities – ports that can effectively mitigate the risks and maximise their performance in the increasingly competitive environment will succeed and grow.

Mission-critical communication solutions are enabling ports to overcome the challenges and generate competitive edge through more efficient operations, safer working conditions and stronger security protection.

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ABOUT THE AUTHOR

Tim Clark is the Director of Systems Sales at Motorola Solutions, covering the Europe, Middle East and Africa (EMEA) from the regional headquarters in London. Since graduating with a Master of Engineering degree in telecommunications, Clark has gained extensive experience in a variety of development and commercial roles with global telecommunications manufacturers. Clark is a passionate advocate of the unique benefits that mission-critical communications deliver to public safety and commercial organisations. In his current role he leads a multi-national team focused on satisfying customers' requirements for more efficient, safer and more secure communication solutions.

ABOUT THE ORGANIZATION

Motorola Solutions creates innovative, mission-critical communication solutions and services that help public safety and commercial customers build safer cities and thriving communities. Spanning devices, infrastructure, software and services you can find our solutions in a variety of industries including law enforcement, fire, emergency medical services, national government security, utilities, energy, manufacturing, hospitality, ports, transportation and logistics, and public services.

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