



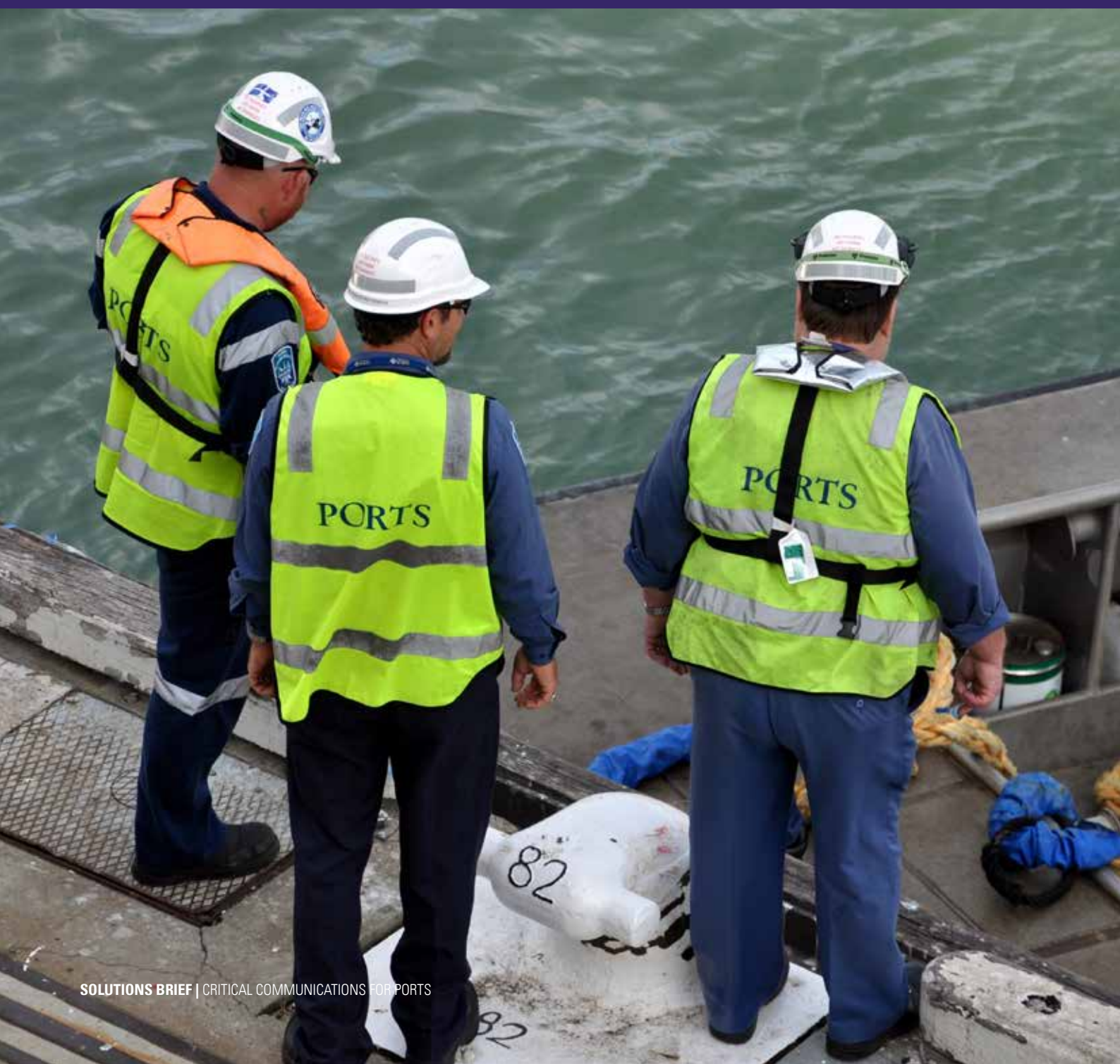
# MAXIMISING PORT SAFETY, EFFICIENCY AND SECURITY WITH BUSINESS-CRITICAL COMMUNICATION





# MARITIME TRANSPORTATION CHALLENGES AND THREATS

Emerging trends in the global maritime transport industry<sup>1</sup> are creating new challenges for ports. Business-critical communication systems can help minimise the impact of these changes by increasing productivity and enhancing safety to deliver efficient and secure port operations.





## INCREASING CAPACITY

One of the most visible trends within shipping, and one that is affecting ports worldwide, is the increasing scale of operations. Mega ship capacities can exceed 14,000 Twenty-foot Equivalent Units (TEUs) driving the requirement for port expansions covering vast areas, with massive infrastructure and machinery and workers who are often dispersed over large distances in potentially hazardous environments.

Due to their larger volumes, these mega ships call at ports less frequently, generating large surges in demand and extreme peak pressure on port operations. Gate congestion is becoming a key challenge, with higher volumes of lorries and trains entering and leaving the port in a shorter time window. The benefits created by economy of scale at sea are negated when ports become bottlenecks and cargo dwell-times increase.

Ports that are unable to accommodate mega ships must focus on increasing the throughput of smaller vessels – loading and unloading 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 rapid, dependable information transfer between people and devices is crucial.

## INCREASING COMPETITION

Increasing consolidation within the liner shipping market means that competition amongst ports is growing. In order to succeed, ports must ensure highly efficient operations and reduce their running costs. This is leading to increasing automation, the need to ensure effective coordination of a mobile workforce and the necessity to respond instantly to incidents to minimise delays. Rapid, reliable transfer of information between people and smart devices is paramount.

In addition to the trend towards mega-ships, maritime transportation is witnessing the formation of mega-alliances between key industry players. This means that ports must be able to work effectively with a wide range of different organisations, each using different technologies and utilising different business processes. Seamless communication across multiple organisations is essential to achieve the increased efficiency these mega-alliances are driving.

## INCREASING THREATS

The frequency of extreme natural events is on the rise. Tornadoes, hurricanes, floods, tsunamis, and earthquakes create an urgent need for early warning systems that can provide ports with timely notifications to help them stay informed and take appropriate action. When emergencies strike, it is imperative to reliably and quickly deliver the right information to the right people, in order to best protect workers and minimise the impact on structures and the environment.

In addition to natural disasters, the threat of terrorism and crime is increasing. Shipping containers filled with valuable goods are attractive to organised crime gangs, making ports prime targets and creating a growing need for physical security. Providing protection involves multiple inter-related steps:

- Proactive analysis and identification of issues and vulnerabilities before they ever become problems.
- Installation and maintenance of deterrent systems like physical barriers with strong access control at gates is essential.
- Detection of problems as soon as they happen. This can be achieved with solutions such as video surveillance, perimeter monitoring and motion detection systems, allowing port management and authorities to detect issues as soon as possible.
- Swift, effective response to incidents. Reliable, instantaneous voice and data communications enable rapid responses to detect and deter potential problems, or to minimise the impact when events occur.

Another requirement that is becoming increasingly critical is cyber-security. Data attacks and other on-line criminal activities are becoming commonplace, driving the need for vigilance. The average cost of a data breach to a company has risen to over \$3.8 million<sup>2</sup> and 60% of malicious software (malware) payloads in Q1 2017 were ransomware<sup>3</sup> making protection against cyber attacks critical to modern port operations.

All these factors – ever larger ships and ports, increasing competition, environmental conditions, physical threats and cyber-attacks – mean that modern ports need to ensure all their managers and workers, systems and processes and facilities and assets are working together as efficiently and effectively as possible to boost productivity, safety and competitiveness. Business-critical communications can help achieve this by connecting people and equipment to form a single coherent network.



## BUSINESS-CRITICAL COMMUNICATION

Business-critical communication comprises different elements which are tailored to meet the needs of individual ports as 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. Business-critical communications are designed to operate in even the worst-case scenario.

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

## ENHANCING PORT EFFICIENCY

### Efficient Communication

Efficient operations call for effective co-ordination of all workers dispersed across the entire operation, often working remotely and in tough environments. Communication needs to be dependable and easy to use so workers can rely on it when needed. It should be able to reach all areas workers operate and it should be clear and easy to understand. And in a unified system, communication should be able to span different devices and technologies to connect all workers wherever they are.

That requires high quality, dependable systems and two-way radio has clear advantages over other mobile communication technologies:

- Reliable, dedicated, instantaneous communication for individuals and groups at the touch of a single button
- Customised coverage area to ensure reception where it's needed – even over heavy mobile machinery, tall buildings, silos and tanks, metal cranes and gantries
- Rugged devices that are easy to use in extreme environments and are designed to withstand the harshest treatment and the conditions found in ports: rain, salt spray, dust, heat, cold and vibration.

A two-way radio system can be designed to provide coverage across the entire port, and when 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. These PTT workgroup applications simulate a two-way radio and use broadband technologies such as Wi-Fi® and 3G and 4G cellular networks. Broadband PTT workgroup applications can also be used to communicate seamlessly with workers who are using different telecommunication technologies and devices – allowing unified communication between different organisations.

### Efficient Control

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. For greater speed and efficiency, intelligent Remote Terminal Units (RTUs) can be pre-programmed to activate local switches automatically in response to input from local sensors without the need to wait for commands from the central control system.

### Efficient Co-ordination

Vessel Traffic Services (VTS) play a critical role in improving the efficiency of navigation in port waters. Traditional solutions for VTS centres have used disparate communication systems, requiring operators to use multiple screens, keyboards and devices, 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 business-critical communication system provides port management teams with the means of monitoring, coordinating and managing their operations, workgroups and resources 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 voice commands, text messages or work ticketing applications
- Predicting potential hazards with intelligent data and video analytics.



## ENHANCING 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 communication tools as a lifeline. Two-way radio solutions include special features designed to maximise workforce safety:

- Instantaneous voice communication at the push of a button means no waiting for a dial tone or for a connection to be made. This allows a faster response when an incident occurs, minimising risk and containing the impact of the event. This is especially useful for workers in restricted areas such as crane, gantry and vehicle operators.
- A dedicated, high visibility alert button on the radio can initiate an emergency call that will take priority over any other calls on the system and will automatically be routed to the personnel necessary to resolve the problem as quickly as possible
- "Lone Worker" feature monitors activity over a pre- defined time period and will automatically generate an emergency call to raise the alarm if the user becomes incapacitated.
- Radios equipped with "Man Down" include an accelerometer which detects when the radio has unexpectedly tilted or remains stationary, for example if a worker has an accident and falls to the ground. The radio will then automatically generate an emergency call to get help.
- Integrated GPS and Bluetooth® allow the location of a two-way radio to be monitored inside or outdoors by a mapping application in the central control room. Then, if an incident happens, response teams can be quickly sent to the right location.

- Body-worn sensors can communicate with radios to raise the alarm in the event of circumstances that involve extreme temperatures, dangerous gases or 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.
- Intrinsically safe ATEX/IEC Ex certified devices are available for use in environments where potentially explosive gases or particles are present.

Within a vast port environment siren systems are often deployed to ensure all workers are aware of impending or ongoing incidents involving hazards such as fire, security breaches and movement of large cargos or machinery. These siren networks are typically controlled by SCADA systems to improve safety and help eliminate human error.

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

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





## STRENGTHENING PORT SECURITY

Physical security is an increasingly complex challenge for ports. With increased risks and greater areas to be protected, ensuring perimeter security, controlling access at gates and tracking valuable cargo and resources are critical requirements.

Smart surveillance cameras with video and data analytics help to quickly identify potential threats before they can act. Combined with facial recognition technology and Automatic Licence Plate Recognition (ALPR), they can be used to identify and track people and vehicles without impacting flow rate through gates. A network of fixed cameras can be augmented with body-worn cameras on port security staff to provide real-time, ubiquitous monitoring.

When incidents are detected, two-way radios allow security teams to react quickly and work together to effectively co-ordinate activities to resolve issues. Their 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. The two-way radio system can also be designed to utilise robust access control mechanisms to ensure only authorised devices are able to join the system to make and receive calls. Similarly, business-critical SCADA solutions use data encryption and access controls to provide highly secure data communication to protect automated systems and prevent unauthorised monitoring or control of devices and sensors.

## BUILDING A BUSINESS-CRITICAL COMMUNICATION SYSTEM WITH MOTOROLA SOLUTIONS

Founded in 1928, Motorola Solutions has a long history of innovation that has revolutionised communications by connecting people through technology. Public safety and commercial organisations around the world turn to Motorola Solutions when they want highly connected teams that have the information they need throughout their workdays. Working with a global network of channel partners, Motorola Solutions reaches an extensive customer base, from individuals and small businesses to Fortune 500 companies. The focus is on developing integrated end-to-end solutions that deliver a clear return on investment, and products that empower individuals through seamless connectivity.

Motorola Solutions is the global market leader in all three of the major digital two-way radio technologies used in ports, providing users with a choice of systems and devices to best address their needs:

- Our MOTOTRBO™ portfolio meets the Digital Mobile Radio (DMR) standard and offers an extensive range of systems and devices to meet the widest range of user needs. Thousands of MOTOTRBO systems and millions of devices are deployed in over 150 countries.
- Our DIMETRA™ portfolio meets the Terrestrial Trunked Radio (TETRA) standard and includes infrastructure and radio devices that build systems from one site up to full nationwide coverage. Over 1,000 Motorola Solutions TETRA systems have been deployed in over 120 countries
- Our ASTRO® portfolio complies with the Project 25 (P25) standards developed to provide digital voice and data communication systems for public safety organisations. Motorola Solutions has installed over 2,500 ASTRO solutions in over 90 countries.

In addition to our two-way radios, our WAVE™ portfolio provides PTT functionality over broadband wireless technologies such as 3G, LTE and Wi-Fi. WAVE enables those on radios, smartphones, tablets and laptops to communicate with one another seamlessly.

The Motorola Solutions IIoT portfolio includes the ACE1000 and ACE3600 RTUs to seamlessly connect workflows, people, and processes over either wired or wireless networks, including our two-way radio systems. These SCADA networks provide real-time information to users, giving them the power to operate more productively and safely.

Motorola Solutions also offers a comprehensive range of Command and Control solutions to enable centralised, intelligent, fully-integrated monitoring and management of complex port communication and operations.

## 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.

Business-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.

Motorola Solutions has a proven track record that is unmatched within the critical communications industry. Our market-leading portfolio of products and services, matched with unparalleled experience and capability in delivering business-critical communication networks, delivers effective solutions and minimises risk for our customers.





To learn more about business-critical communications from Motorola Solutions, visit [www.motorolasolutions.com](http://www.motorolasolutions.com)

<sup>1</sup> Review of Maritime Transport 2017, United Nations Conference on Trade and Development (UNCTAD)

<sup>2</sup> Microsoft Advanced Threat Analytics 2016

<sup>3</sup> Verizon 2018 Data Breach Investigations Report

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