



**Tech
Mahindra**

PortNXt

– Port Automation Solutions enabled by 5G

The global ports and shipping industry is witnessing a paradigm shift with ports looking to harness the power of technological advancements. The combination of Digitalization, Datafication, and Automation offers significant efficiency gains to port container terminal operators. By leveraging this combination, port operators can improve terminal capacity and efficiency across the entire value chain.

The key challenge being faced by port operators today is that **container ships are growing larger – the average number of containers per ship more than doubled in the past two decades – leading to an exponential increase in per ship handling costs.**

This is further evidenced by:



To address the above challenges 75% of the port operators firmly believe – that automation is the way forward with following targeted improvement in the business metrics

50%

potential increase in productivity

50%

reduced operating costs

75%

manpower reduction

An integrated system comprising of sensors, connected devices and equipment, and digital platforms connected over a stable and efficient private network is a must-have for transforming into ‘Smart Ports’. It provides the ideal ecosystem where port personnel and machine can work in tandem to optimize operations and improve efficiency.

As per market trends, the global smart ports market is expected to reach \$5.3 billion by 2024 at a CAGR of 25% during the 2019-2024 period.

Ubiquitous network connectivity is the backbone of ‘smart ports’ based on which on-field personnel, machines, and devices can share information seamlessly.



5G and MEC - Key enablers for Smart and Connected Ports

Digital Solutions like automated container inspection and remote control of cranes require high bandwidth, reliability, low latency, and broader coverage.

The movement of container-handling equipment throughout the yard would require seamless coverage while ensuring no breaks/disruption. Private 5G provides improved cell edge performance connection reliability as well as wide-area mobility.

Low-latency, high-capacity (bandwidth and density) communications are needed to automate port operations, including use cases in areas such as container management, remote operation of gantry cranes and straddle carriers, digital safety, and automated maintenance. The network has to relay video captured by multiple cameras from equipment such as at the gates, gantry, and quayside cranes in near real-time and facilitate almost instantaneous responses.

A private wireless network with today's Private 5G network capabilities and edge computing can support use cases demanding ultra-low latency like haptic feedback and AR/VR for remote maintenance. In addition, it would also provide high bandwidth for video & audio, which improve operations of remote handling equipment.

MEC (Multi-access Edge Computing) can be used to reduce the overall latency for deployments to be successful even in a hybrid 4G environment. An added benefit would be that the data would be processed within the ports' network, thereby ensuring data security.



PortNXt – Port Automation catalyzed by 5G and Edge Computing

PortNXt from Tech Mahindra is an offering that is enabled over a private LTE/5G network. It incorporates a 3-tier architecture distributing data and intelligence across Device, Enterprise Edge, and Cloud. The solution leverages the advantages offered by MEC and private 5G network.

Enhanced container terminal efficiency and **reduction in operational costs** are the key advantages that PortNXt offers container terminal operators.

Here are the offerings under PortNXt:



Automated Container Management



Digital Operations



Digital Safety and Surveillance

Automated container damage detection and reefer monitoring make the optimal use of 5G, IoT, MEC, Cloud, and other technologies so that ports can cut down unnecessary costs and reduce damage related claims.

Solution Offerings with respective use cases:

Container Management	Digital Operations	Digital Safety
Automated Container Identification	Remote Control of Gantry Cranes, AGVs, IGV	Workforce Safety – PPE compliance, Fall Detection, Workforce Tracking
Automated Container Damage Inspection	AR/VR enabled Remote Maintenance	Drone based Video Surveillance – Perimeter Safety, Leakage & Hazard Sensing, Cargo tank leakage monitoring, Asset Inspections
Reefer Container Monitoring	Tracking, CBM, Predictive Maintenance of CHE	
Container Location Management	Digital Twin	Emergency Response - Medical Emergency Management
	Connected Workforce	

With Tech Mahindra’s solution for **Container Management**, real-time and automated inspection of containers is performed by monitoring the live-video streams from the cameras mounted across the terminal. The early detection of damage significantly improves as the automated inspection is done at critical junctures (i.e., at the gate, yard, and quay areas). IoT and AI-enabled Reefer Container monitoring and transmission of temperature and humidity parameters are done to ensure the safety of sensitive reefer containers. The crane’s DGPS system records high precision 3-block co-ordinates of the container location so that appropriate CHE are tasked to retrieve the container.

Remote control of AGVs, Cranes, etc., enables faster load and unload operation throughout the day as well as enhances worker safety as the crane driver is not required to sit in the cabin on top of the crane. Also, it makes it possible for one operator to monitor 5-6 cranes and take appropriate action only if there is an emergency. The continuous movement of heavy machinery, including Automated CHEs, Trucks, etc., as well as the high-value goods being moved through the ports, make port terminals at a high risk with respect to hazardous & security-related concerns.

The **Digital Operations** solution from Tech Mahindra includes use cases such as AR/VR enabled remote maintenance that enables digitization of maintenance, repair, and operations of port terminal assets such as CHE. It encapsulates tracking of equipment health by real-time monitoring of critical parameters and performing schedule based diagnostics on equipment. Additionally, remote maintenance can be performed on the assets by leveraging AR/VR technology, thereby reducing downtimes and Mean time to repair (MTTR) of assets and hence improving productivity. The Connected workforce solutions enable the operator/workforce to complete the tasks efficiently, correctly, and safely such as guiding on setup procedures, tracking worker movements, and preventing access to restricted/hazardous areas, as well as AR/VR assisted training.

Using Tech Mahindra's **Digital Safety** solution, which incorporates technological advancements like smart wearables, drones, visual analytics, etc., utilized to ensure security at the port terminals as well as ensuring the safety of the port terminal and adjoining areas against risks posed by hazardous materials transited through the port. Offerings in this portfolio are targeted towards improved safety of personnel as well as the overall community with enhanced emergency response and reduced security risk. Private 5G networks can also improve situational awareness and site security. These can be achieved by deploying a significantly larger number of video cameras without expensive cabling infrastructure. It also allows workers to be equipped with wearable sensors for remote health and fatigue monitoring.

The Key Takeaway - A massive reduction in dwell time, enhanced terminal efficiency, and improved operational efficiency.

The larger the port, the bigger the benefits!

Get benefits up to:

17%

reduction in
loading time

35%

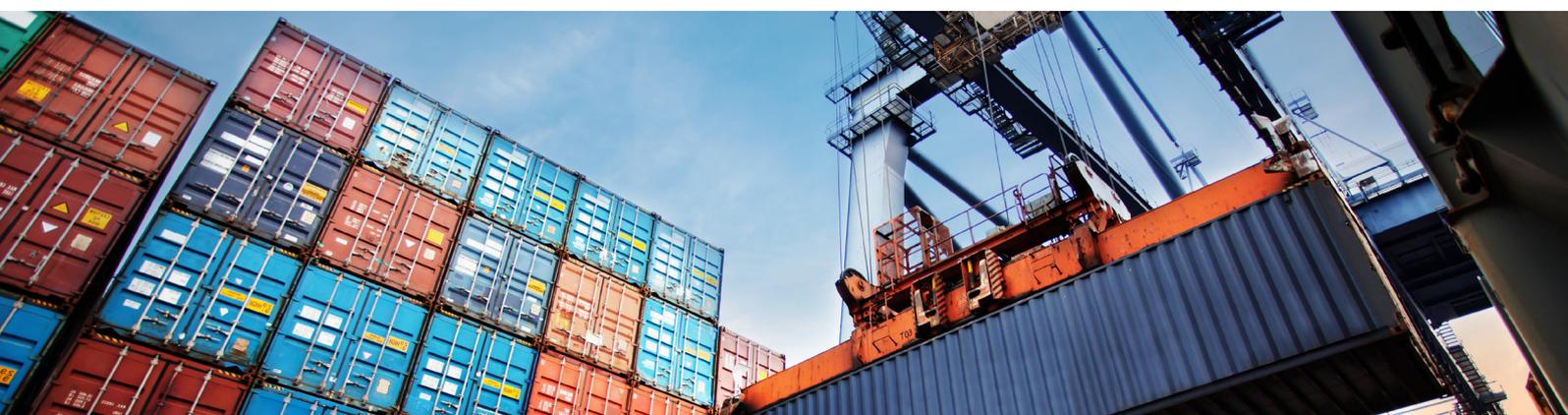
improvement in Yard
and Gate productivity

3 hrs

reduction in
vessel dwell time

\$6M

fuel savings on container yard movement for
large ports with TEU > 10 million per annum



Tech Mahindra enables port terminal operators to establish their Private Network to leverage digitization at scale. Our offering includes Private 5G Network, Edge Compute, SD-WAN, and pre-integrated enterprise applications.

The range of services includes consulting, solution integration, customization, network engineering, private network operations, and Edgification. With our vast experience in Enterprises, Telecom, Cloud, IoT, other Digital Platforms, and Applications, Tech Mahindra stands out from the competition as “THE” Systems Integrator of choice capable of offering innovative solutions in a Solution as a Services (SaaS) model.

PortNXt with 5G and MEC

– Gateway for a swift transition into ‘Smart Port’

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