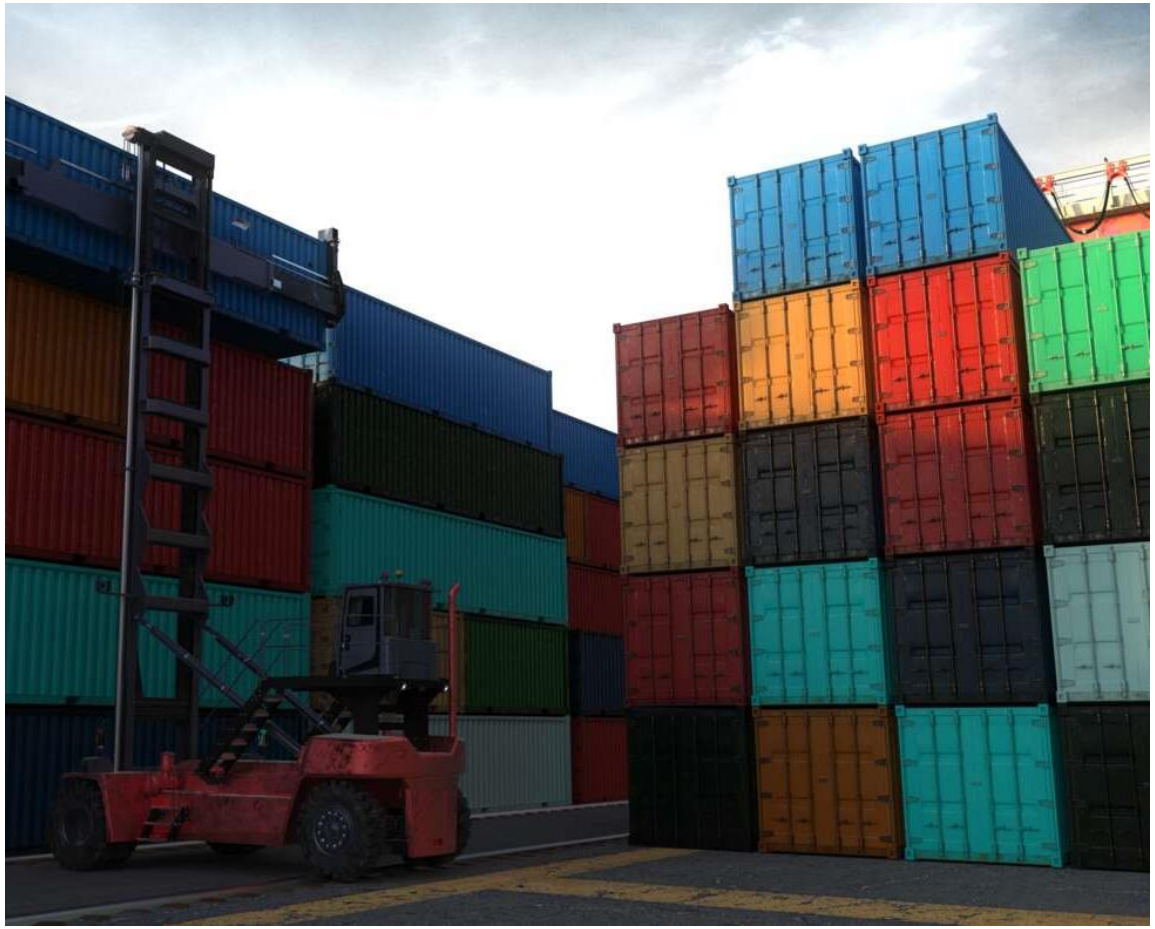
Ericssson - Ports use cases



Remote controlled Ship-To-Shore cranes in ports

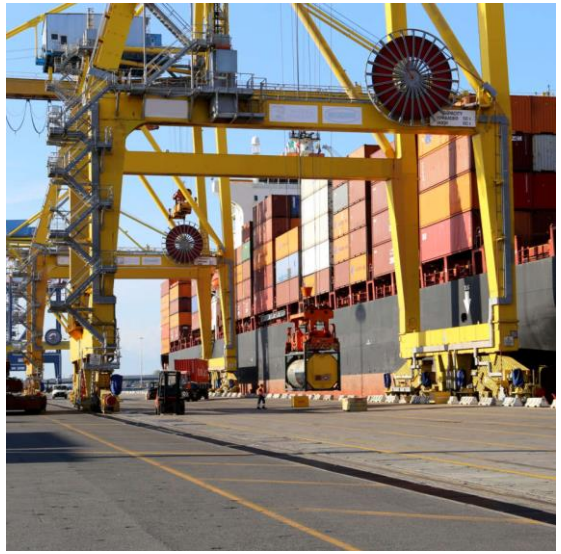
By remote control of ports ship-to-shore (STS) crane operations, the risk of fatalities is reduced, and an overall 20% productivity increase can be gained.

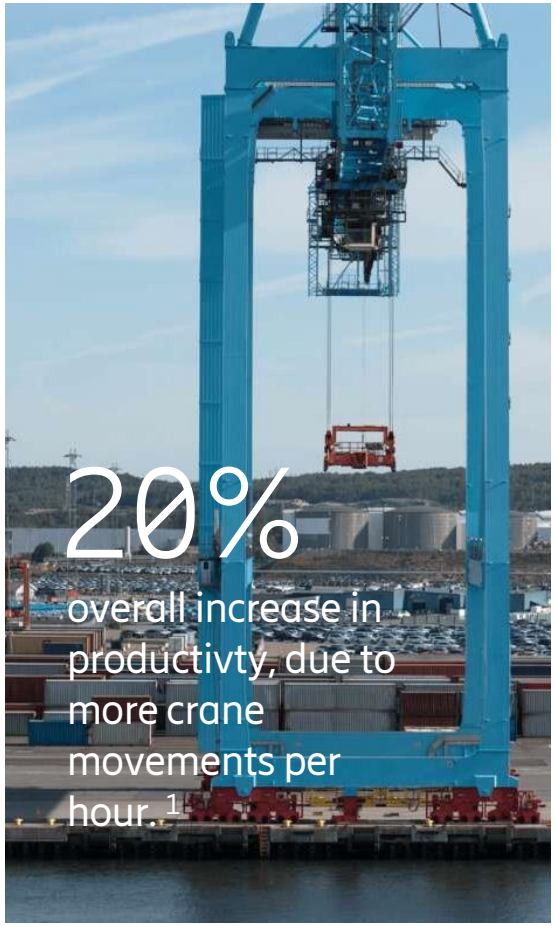
Located dockside, ship-to-shore (STS) cranes are responsible for both the loading and unloading of containers between the ship and the dock, which requires very precise movements. Also, accessing the crane's control room is dangerous and time-consuming for operators.

Port yards are full of vehicles, machines and containers, which makes crossing the yard and then ascending the crane to a control room often 60-70 meters high, a very dangerous task. 22% of crane-related fatalities in the U.S. between 2011 and 2015, occurred to the crane operator.

By fully digitalizing the information exchange, the entire dockside operation can be automated. The crane operator can control the cranes remotely from a control room, in real-time, with help from cameras and 3D sensors enabling greater visibility.

Case type: Concept/research
Category: Ports
Location: Global
Year: 2020





Source: 1. World Cargo News (2018)

Remote controlled Ship-To-Shore cranes in ports

Challenge

Responsible for loading and unloading ships, ship-to-shore (STS) cranes are an operations bottleneck in ports. In addition, it is dangerous and time-consuming for operators to traverse the port yard to access crane control rooms, which are often located 60-70 meters high.

To gain the precision and visibility required when moving and stacking containers, a team consisting of the operator, checker and deckman is needed, all of whom are at risk for injury.

Solution

A private cellular network provides the high resiliency, availability and low latency needed to digitalize and automate the operations of STS cranes.

By digitalizing the information exchange at the dock, the presence of humans in the yard is removed, reducing the threat of injury. More than 20 high-definition cameras and 3D sensors collect the information, in real time, needed by the operator to control the crane's movements from the safety of a remote-control room.

A 5G-ready private network is ideally suited to meet the high-performance data needs to safely operate STS cranes remotely.

Result

- Increased productivity due to more movements per hour
- Increased worker safety
- 156% ROI by year five, driven by improved productivity (35%) coupled with decreases in downtime (37%), operator costs (16%) and effort from checkers (12%) [2]

20+ high-definition cameras and 3D sensors per crane

20% increase in overall productivity [1]

Source: 1. World Cargo News (2018); 2. Ericsson, Arthur D. Little;

Automated Rubber-Tired Gantry cranes in ports

ifm

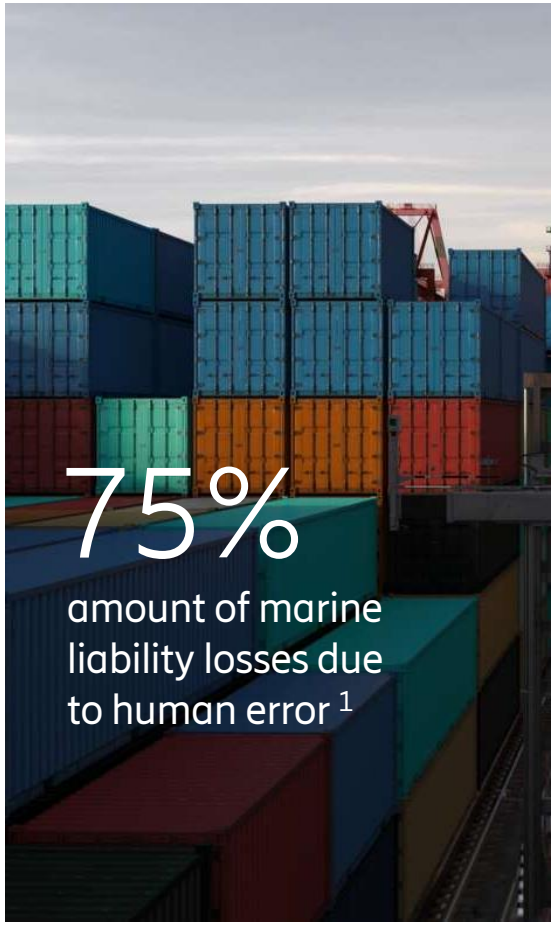
Through automation and remote control, high-capacity container stacking and maneuverability can now be solved at reduced risks and decreased liability losses.

Automated Rubber-Tired Gantry (RTG) cranes increase port operations efficiency. RTG cranes are the most popular choice for container stacking at terminals globally, especially where high-capacity stacking and good maneuverability are key requirements.

Most RTGs are operated by on-site, human operators, who need to move through the container yard and then climb up to access the crane's control room. Cranes are also located close to many large machines, trucks and other containers, which adds risk for the operator as they traverse the yard.

Enabled by safety controllers and smart 3D-sensors, automated RTGs conduct stacking operations automatically, but whenever any irregularity occurs, an operator can take manual control from the safety of a remote-control room.

Case type: Concept/research
Client: ifm
Category: Ports
Location: Global
Year: 2020



Source: 1. Maritime Journal (2017)

Automated Rubber-Tired Gantry cranes in ports

ifm

Challenge

Accessing an RTG crane adds risk for the operator as they traverse the yard.22% of crane-related fatalities in the U.S. between 2011 and 2015, occurred to the crane operator.[1] Unfortunately, human error is also responsible for 75% of marine liability losses. [2]

Today's automated RTGs usually connect through a combination of WiFi and fiber cables, solutions prone to breaking, costly, potentially dangerous to repair and with inconsistent reliability increasing dangers.

Solution

A private cellular network provides the high resiliency, availability and low latency needed to digitalize and automate the operations of RTG cranes.

Automating as much of crane operations as possible increases both worker safety and productivity. Enabled by safety controllers and smart 3D-sensors, automated RTGs conduct stacking operations automatically, but whenever any irregularity occurs, an operator can take manual control from the safety of a remote-control room.

The solution puts very high requirements on reliability, bandwidth (approximately 200 mbps), latency and high security, which makes a private 5G network suitable for this use case.

Result

- Increased safety and productivity
- Reduced maintenance
- 98% ROI by year five, driven by reductions in cost of operator labor (73%), maintenance materials and labor (5%), and increases in productivity due to system benefits (22%) [3]

70% of a port´s labor costs can be saved with 5G automation [4]

75% amount of marine liability losses due to human error [2]

Source: 1.. U.S. Bureau of Labor ; 2. Maritime Journal (2017); 3. Ericsson, Arthur D. Little; 4. Ericsson

Automated Guided Vehicles for ports

ifm

Horizontal movements at ports are performed by a massive fleet of human-operated terminal tractors, which experience numerous collision accidents annually.

During the past five years, 36% of accidents in ports were caused by pilot error and 42% of accidents were classified as “traffic” accidents .[1] Collisions and poor communications between tractor drivers result in congestion, which reduces efficiency and productivity.

Automated guided vehicles (AGVs), connected by cellular, can significantly improve productivity, efficiency and safety in ports.

Case type: Concept/research
Client: ifm
Category: Ports
Location: Global
Year: 2020

Source: 1. Budiyanto and Fernanda (2020)

Automated Guided Vehicles for ports

ifm

Challenge

Human-driven tractors are responsible for performing horizontal movements within ports. Research has shown that 42% of accidents are classified as “traffic” accidents.

Collisions and the currently poor communication standards between drivers cause congestion, which results in reduced efficiency and productivity.

Legacy AGVs rely upon WiFi to transmit data, which provides neither the reliable and seamless connection, nor the positioning accuracy needed.

Solution

A private cellular network provides the high resiliency, availability and low latency needed for coverage, capacity and responsiveness required by AGVs to navigate efficiently and safely.

Latency increases risk of accident or inefficient operation. AGVs, also known as “Intelligent Autonomous Vehicles” (IAVs), need highly stable connectivity and significantly higher bandwidth to support high-resolution video and sensor feeds.

A 5G-ready private network is ideally suited to meet the high-bandwidth and location data needed to safely operate AGVs and IAVs.

Result

- Reduced energy costs (10%) for the same transport due to optimized routes and the removal of the driver
- Fewer accidents and injuries
- 149% ROI by year five, driven by reduced operator labor costs (74%), improved productivity (23%) and lessened energy costs (3%) [3]

70% of a port´s labor costs can be saved with 5G automation [1]

36% amount of port accidents caused by pilot error over the past five years [2]

Source: 1.. Ericsson; 2. Budiyanto and Fernanda (2020); 3. Ericsson, Arthur D. Little

Asset condition monitoring in ports

ifm

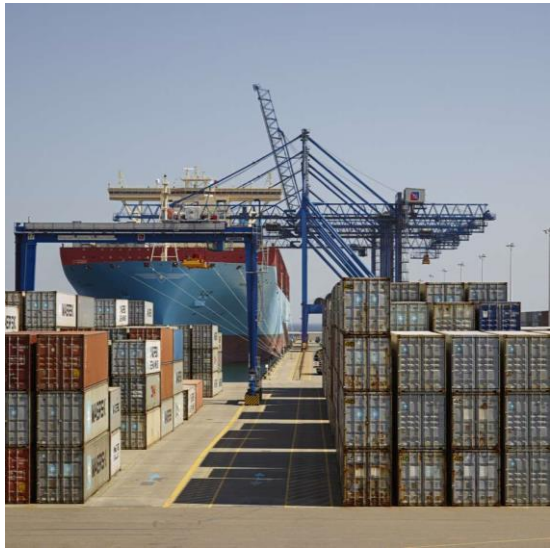
Asset downtime and accidents in ports can be addressed by asset condition monitoring, offering preventive maintenance for improved costs, safety and lifespans.

Asset downtime results in the disruption of operations and is very costly for a port. The key reason for an accident or disruption is a machine malfunction. In the past five years, 6% of port accidents were due to poor tool maintenance.

Port operators are under immense pressure to increase safety. With the volume of dangerous good stored in ports, there is also a strong focus on fire prevention. Over the past five years, 11% of accidents in container ports were due to fires. The key cause: equipment damage that could have been avoided with proper maintenance.

Monitoring asset conditions to perform preventative maintenance not only reduces costly unplanned downtime, it increases the asset's safe operations and lifespan.

Case type: Concept/research
Client: ifm
Category: Ports
Location: Global
Year: 2020



Source: 1. Budiyanto and Fernanda (2020)

Asset condition monitoring in ports

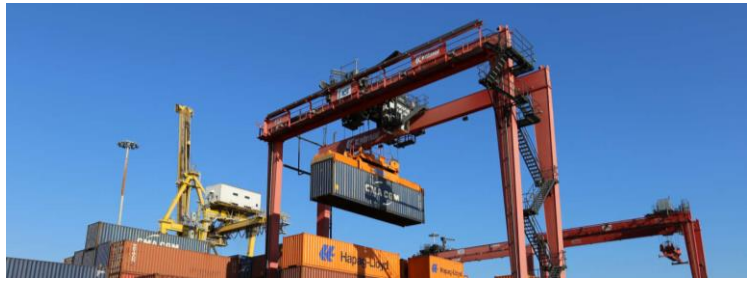
ifm

Challenge

Asset downtime is very costly for a port, resulting in accidents and disruptions to operations.

Today, port equipment is normally maintained on a set schedule. In some cases, the condition of the equipment is evaluated through vibration or temperature monitoring, often performed manually by an operator.

Fires are also a chief concern, especially considering the amount of dangerous goods stored in ports.



Solution

A private cellular network provides the high resiliency, availability and low latency connectivity needed for real-time asset conditions monitoring.

With cellular-connected sensors, ports can monitor the conditions of all assets, like cranes, AGVs and stacks. Sensors monitor factors like vibration and temperature enabling early detection of potential faults and their causes.

Sensors require response times as fast as one millisecond, making a private 5G network ideally suited for this case.

Result

- Reduced asset downtime
- Fewer accidents and increased worker safety
- 126% ROI by year five, driven by reductions in maintenance labor (53%), cost of monitoring (40%) and cost of maintenance materials (7%) [3]

75% reduction in maintenance costs [1]

50% reduction in parts, oils and resources needed for maintenance [2]

Source: 1.. SAAB RDS; 2. HBM; 3. Ericsson, Arthur D. Little

Drones for surveillance and deliveries in ports

Drones can serve two different, but very useful, money-saving purposes in a port: small deliveries to ships still at sea and security surveillance.

Security is a huge concern for port operators as thefts are common, resulting in costly supply chain disruptions. Research has shown that 20% of marine transport thefts occur at a port.

Shore-to-ship and ship-to-shore deliveries of papers and necessary documentation often need to be performed before a ship reaches the port. Normally, a tugboat or launch is used to complete the delivery, which can consist of a single piece of paper, yet still cost more than $1,000 USD per round trip.

Case type: Concept/research
Category: Ports
Location: Global
Year: 2020

Source: 1. Björn and Eckwall (2017)

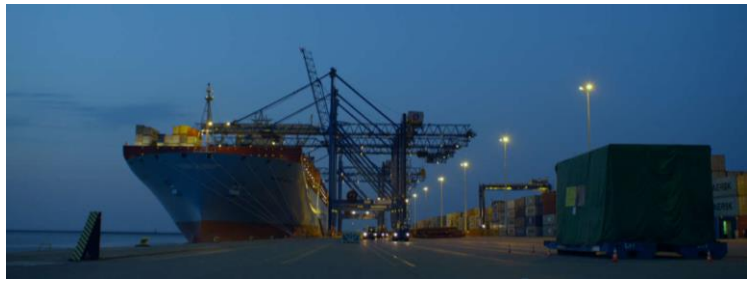
Drones for surveillance & deliveries in ports

Port of Singapore

Challenge

Thefts of cargo are quite common, disrupting many supply chains. In 2018, there were an average of 15 cargo thefts reported daily. [2] Other research shows that 20% of all marine transport thefts occur at the port. [1]

Deliveries of documentation often need to be completed before a ship reaches the port. Normally, a tugboat or launch is used to make the delivery, which can consist of a single piece of paper, yet still cost more than $1,000 USD per round trip.



Solution

A private cellular network provides the high resiliency, availability and low latency needed for safe drone operations.

Modern drones use 3D sensors connected by cellular to real-time analytics to navigate and collect data. Drones provide more effective security surveillance and more efficient delivery of documents to and from vessels still en route to the port.

The high bandwidth and low latency required to transfer sensor and navigation data in real-time, makes a 5G-ready private network ideally suited to meet these demands.

Result

- Drastically increased security of the port
- Reduced costs, efforts and resources for deliveries between ships and the port
- 154% ROI by year five, driven by reductions in cost of security labor (83%), cost of offshore deliveries (10%) and insurance premiums (10%) [3]

90% reduction in cost to perform off-shore deliveries [1]

75% reduction in thefts at the port [2]

Source: 1.. Freightwaves (2020); 2. Shipping & Freight Resources (2019); 3. Ericsson, Arthur D. Little