

Connectivity at the Heart of Port Operations

No container can move until a packet of data moves first

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Leader in Wireless M2M Connectivity



Why Ports are **Adopting Automation**

Labour Market **Tightening**

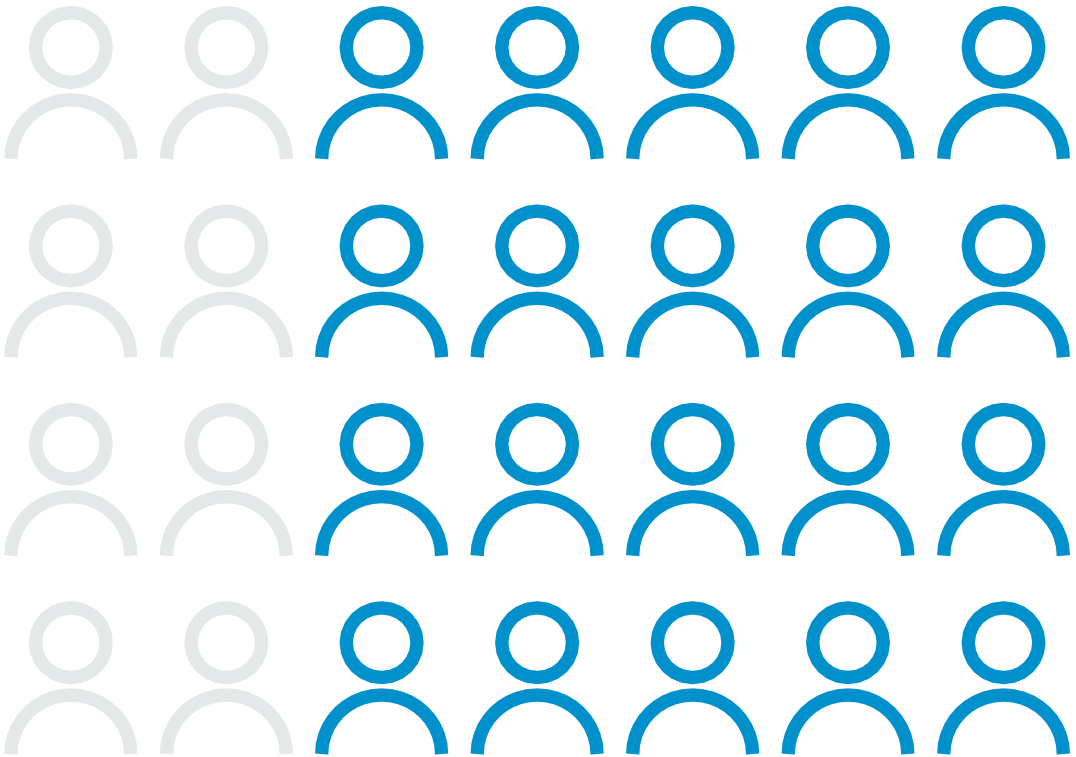
Need to Improve **Safety**

Desire to Increase **Efficiency**



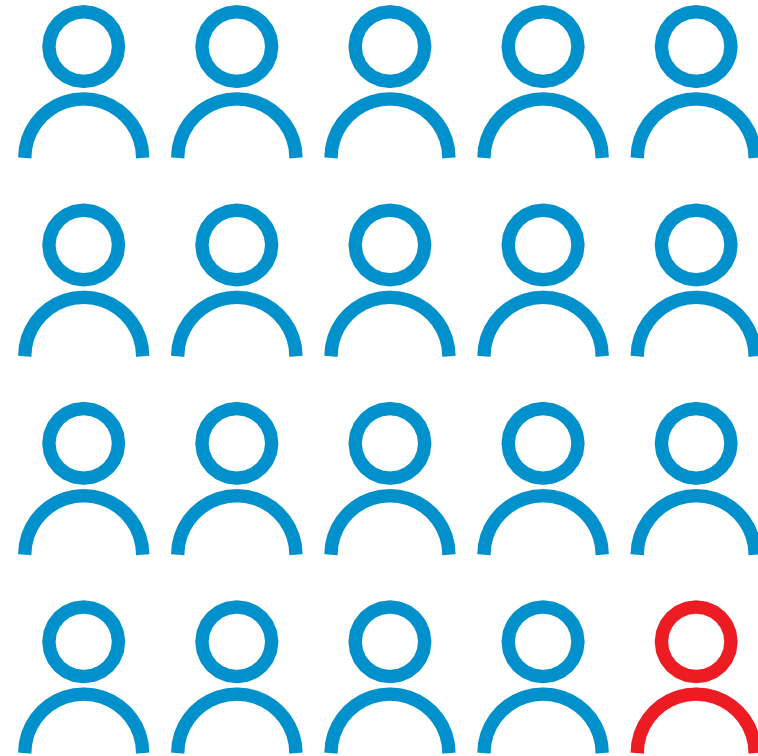
Labor Market **Tightening**

1,000,000 less workers in
labour market in UK



Need to Improve **Safety**

4 fatalities per 100,000
shipyard workers, highest rate
for all US workers.

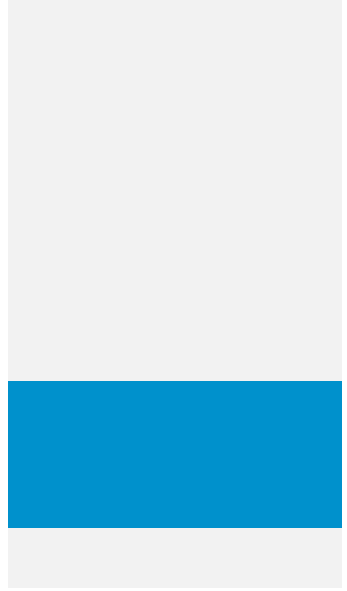


Desire to Increase **Efficiency**

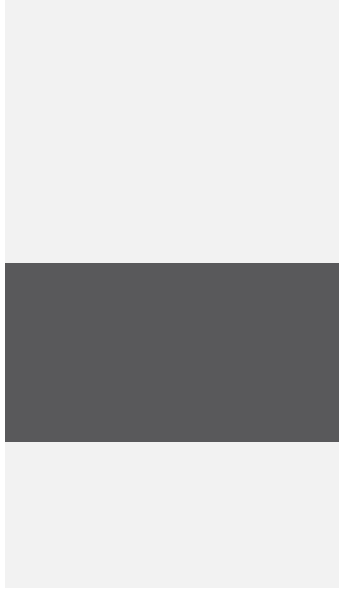


Successful automated ports operating expenses could fall by 25-55% and productivity could rise by 10-35% with properly planned automated systems.

McKinsey
& Company



10-35% rise in productivity



25-55% decrease in expenses

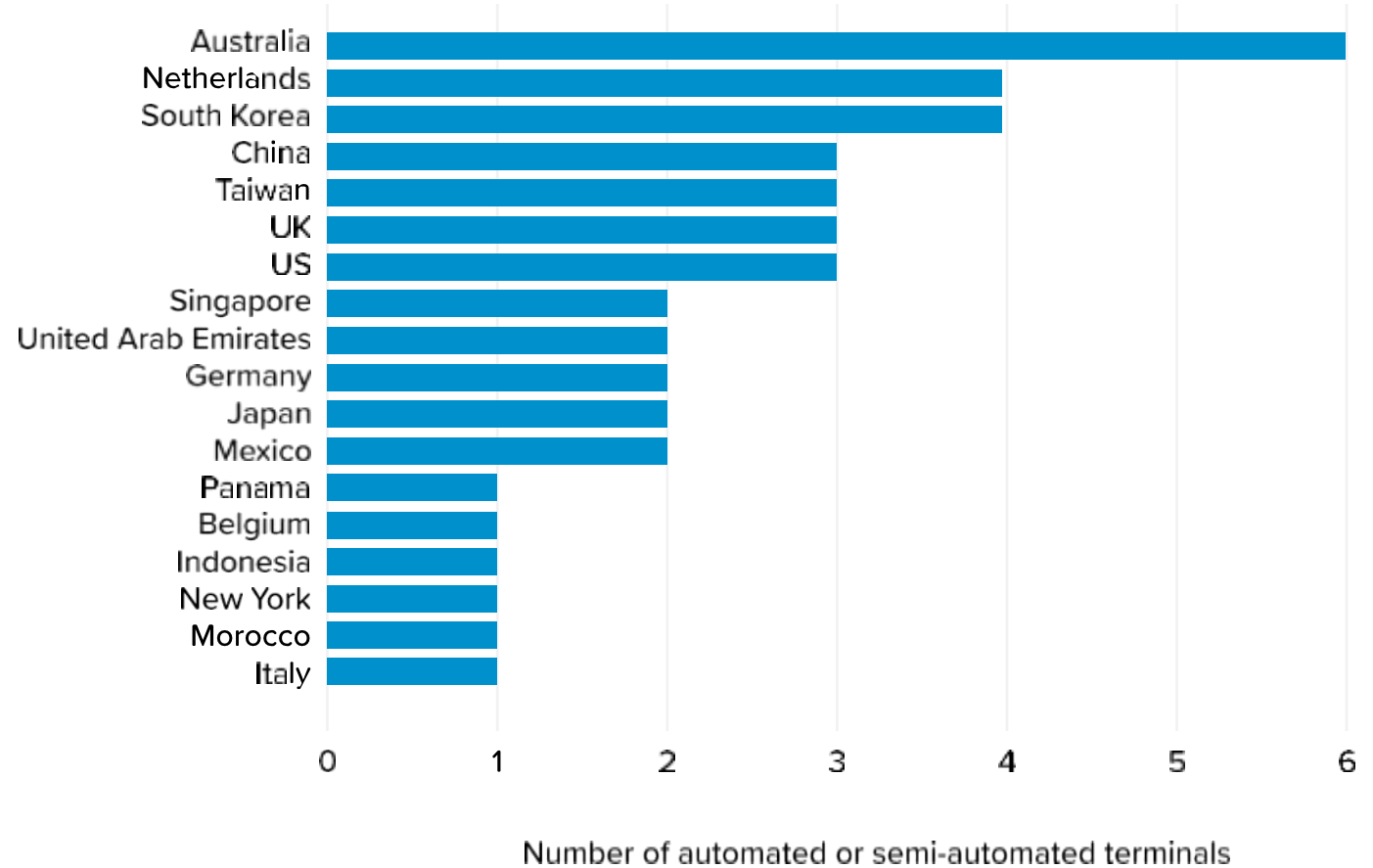
The Emergence of “Port 4.0”

Shift from **asset operator**
to **service orchestrator**



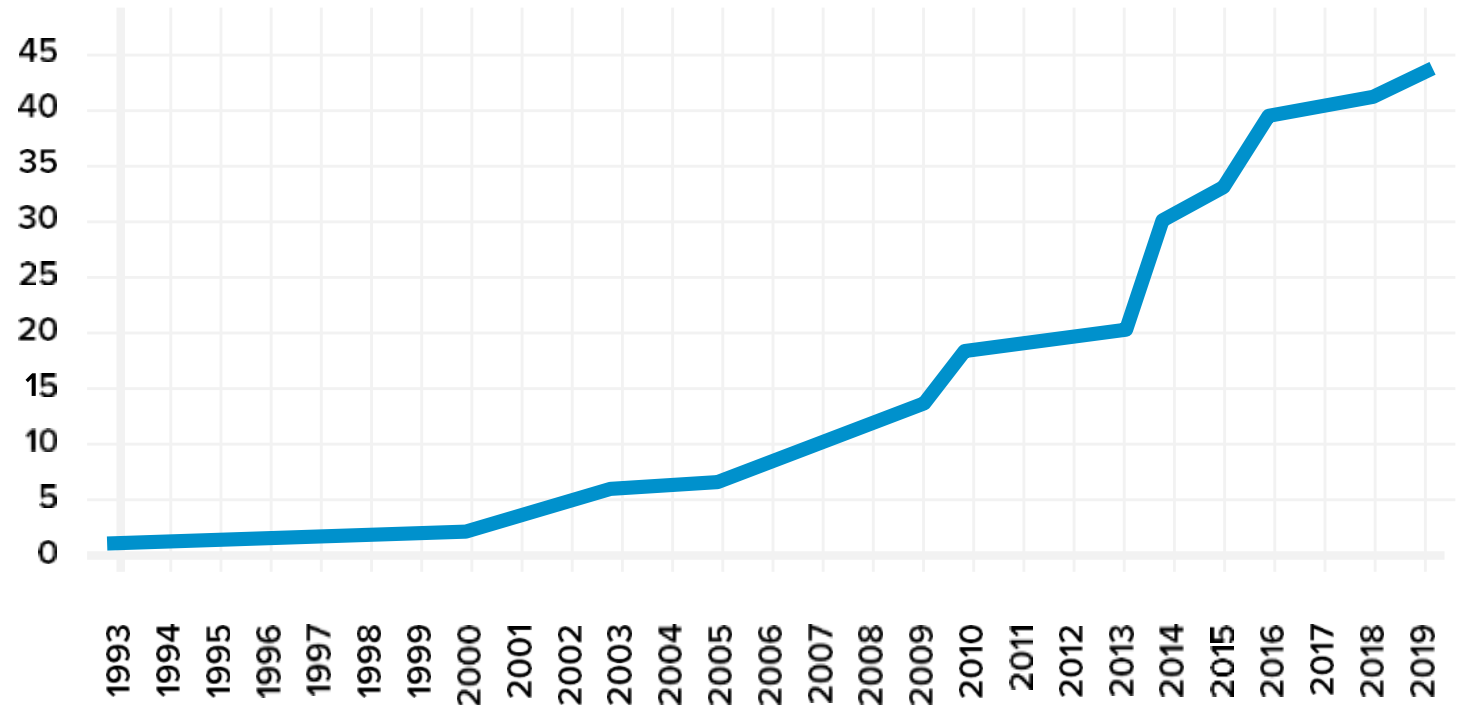
Major Ports Behind the Curve

- Only 5% of terminals are automated
- Behind other industries in adoption
- Australia/Netherlands leading



Growth Still Picking Up Steam

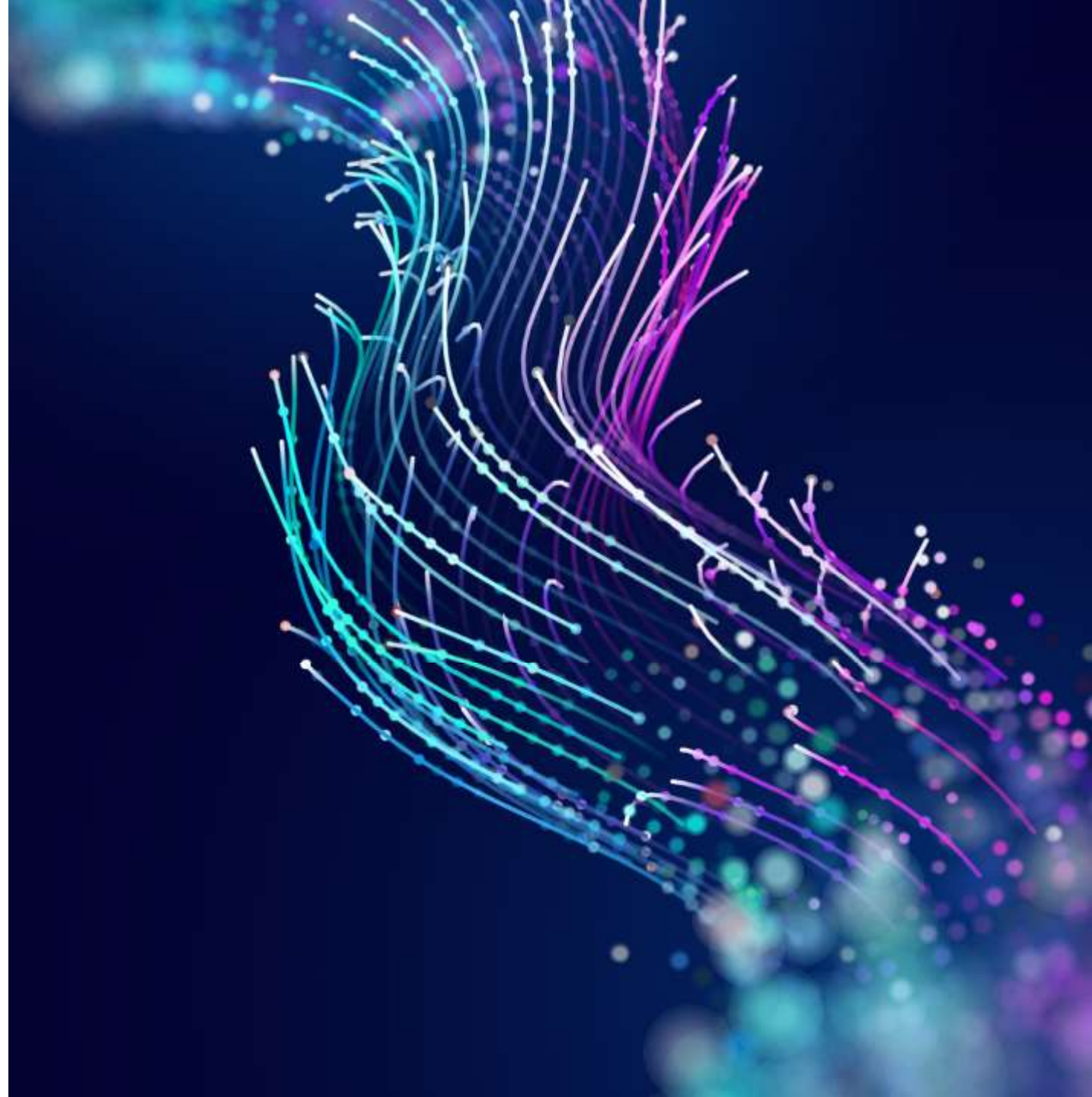
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Yearly and accumulated increase of automated and semi automated container terminals since their first appearance in the **1990's**.

Why Some Wireless Technologies are **Insufficient for Port 4.0**

- Wi-Fi Limitations
- LTE Limitations
- 5G Limitations



WiFi Limitations

- Connection strength is limited
- Client to Access Point
- Single frequency
- Ideal for nomadic devices
- Interference can be major hindrance



WiFi

LTE Limitations

- Larger coverage area
- Still mast to client device
- **Can't** go through metal
- Limited upstream capabilities
- Layer 3 architecture



5G Limitations

- Higher frequencies, much faster rates
 - Shorter range, again requires line of sight
 - Metal containers interfere
- Layer 3 architecture



High Costs of System Downtime

- Suez Canal Blockage **cost \$6.7 million/min**
- Average IT downtime **costs \$5,600/min**
- **Or \$336,000 per hour**

Gartner



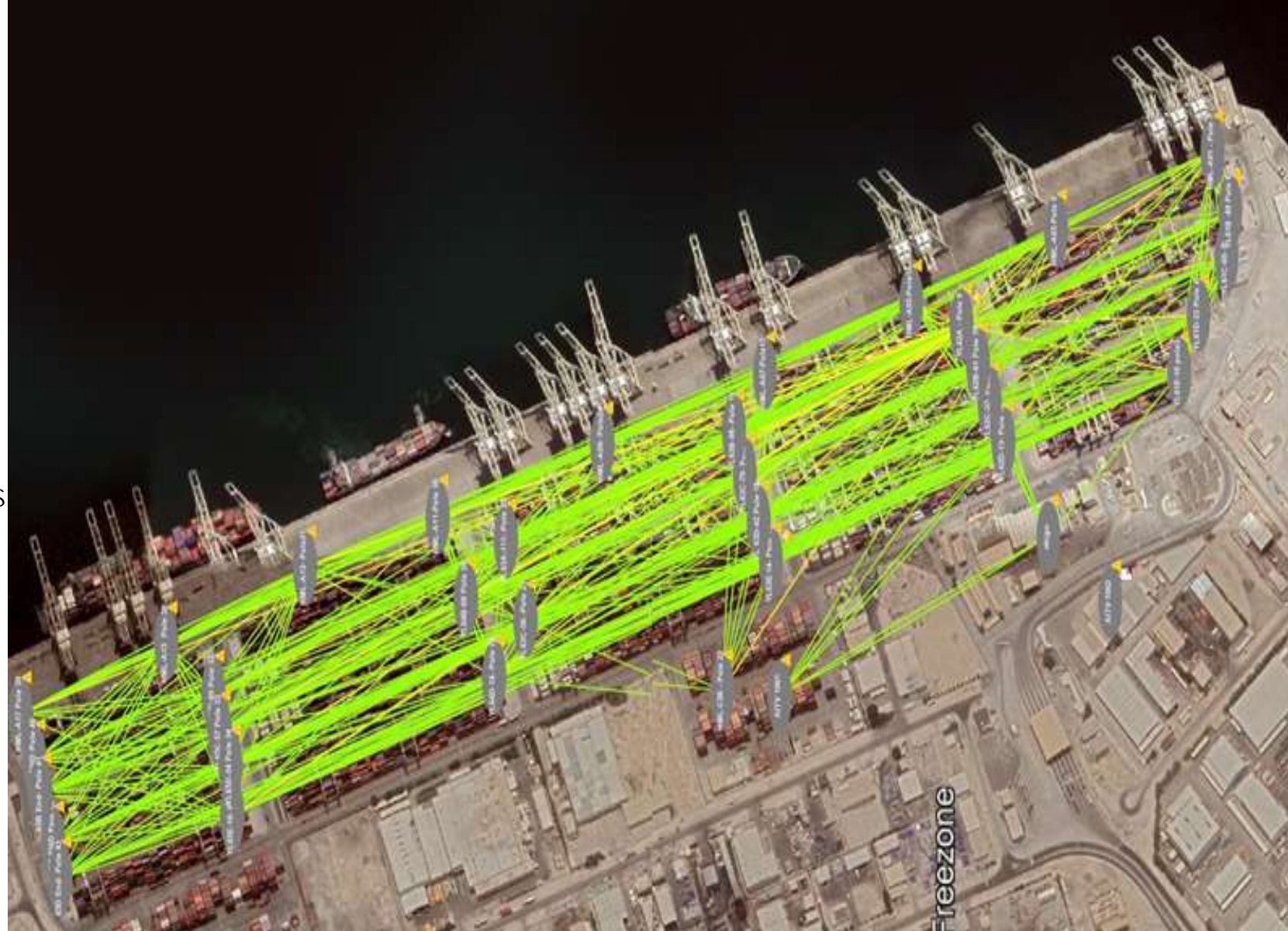
Our Solution **Kinetic Mesh Networks**

- Machine-to-machine communication
- Works in tandem with other networks
- Compatible with existing IoT Wi-Fi devices
- No routing changes needed
- Multi-radio
- Layer 2 Architecture



Rajant's Unique Approach **Flexibility and Mobility**

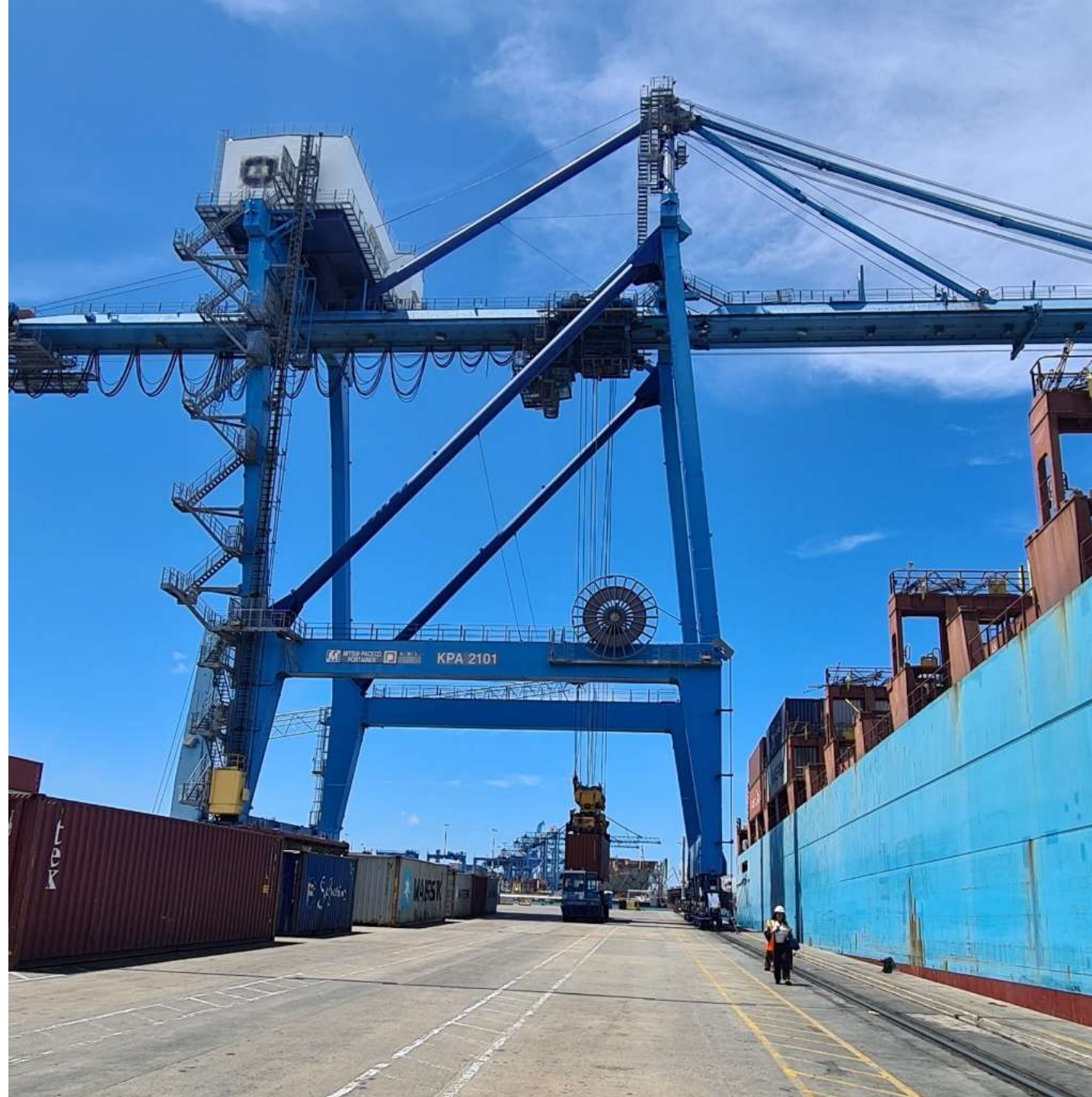
- Flexible and mobile nodes
- Endless combinations of connections
- Easily work around container stacks
- Extensible to other IoT devices like drones & robotics that extend network resiliency



Case Study

Kenya Ports Authority

- Mombasa, Nairobi ICD & Lamu (new kid on the block)
- Mombasa - 260 Network Nodes providing ubiquitous coverage:-
 - ~100 X Terminal Tractors
 - 14 X Ship to Shore Cranes
 - 48 X RTGs
 - 6 X RMGs
- 12 months total deployment incl. vehicle installs – during pandemic!
- Future proof for new models – safeguards RoI





Case Study

DP World Antwerp Gateway

- Dealing with Wi-Fi radio interference caused by radar, ships, and neighboring ports, plus large metal container stacks limiting the line of site.
- Rajant connected 80 straddle carriers, 5 cranes, and 7 light towers
- Applications include dispatch, operations, container location, fleet mgt., vehicle telemetry and health monitoring.



Conclusion

The Rajant Difference

- Routes round objects and interference
- Counteracts supply chain challenges with automation
- Supports automation with the most powerful proven network
- Reduces downtime and save \$336K/hour

