Advanced connectivity transforming **Europe´s ports**

5G and Europe's ports
Europe's ports are strategic multimodal hubs and gateways. They link the region's transport corridors to the rest of the world and secure the supply of raw materials, as well as semi-finished and finished products across the EU. The digital and green transformation of ports, underpinned by advanced connectivity, will be critical to the region's future competitiveness, resilience and sustainability.

The European Commission's Work Programme[1] has identified ports as a strategic priority and is committed to developing a new EU Port strategy with a focus on security and competitiveness.

To realize 5G's full potential to support competitive, sustainable and secure ports, Europe must prioritize advanced and trusted connectivity and promote policies that incentivize investment, drive adoption and enable innovation.[2]

"Our ports are the EU's gateways to the world and as such play a crucial role in its economy, providing wealth and jobs, by facilitating external trade, connecting to the hinterland, ensuring growth in the blue economy and industrial production, the energy transition and security of energy supplies, as well as the EU's strategic autonomy."
European Parliament, Building a Comprehensive European Port Strategy[3]

5G use cases for ports

Automation
Improved automation of port machinery, including automated rubber-tired gantry (RTG) cranes and vehicles; smart gates and logistics systems; remote control ship-to-shore and stacking cranes, and optimized vessel berthing. Reduces congestion and turnaround times.

Real-time monitoring
Monitoring, tracking, processing and visualization of data using multiple 5G-enabled sensors to optimize cargo handling, container tracking and vessel traffic management. Improved environmental management through real-time data on air and water quality, noise levels and energy consumption.

Digital twins and AR/VR
More effective planning and testing using digital replicas that integrate real-time data from across a port's physical operations. AR/VR-enabled training and predictive maintenance to improve worker safety and reduce downtime.

[1] European Commission, "Commission work programme 2025".
[2] Ericsson, "Ericsson in Europe: 5G, innovation and collaboration".
[3] European Parliament, "Building a Comprehensive European Port Strategy" (2024).

5% improved loading efficiency per hour
At Tianjin Port, crane automation led to a reduction of 7 percent in berthing times, and cargo loading and uploading times from a single ship were reduced by 80 percent, while loading efficiency per hour was improved by 5 percent.[4]

75% reduction in maintenance costs
The Port of Livorno used condition-based monitoring of cranes to reduce maintenance costs by as much as 75 percent. Further details about their 5G-enabled operations can be read in the case study below.[5]

The 5G Port of the Future **Livorno, Italy**

About the program
The 5G Port of the Future project at Italy's Port of Livorno uses 5G, AI and augmented reality/virtual reality (AR/VR) to enhance efficiency, competitiveness and sustainability. Developed by Ericsson and CNIT since 2016, the initiative aligns with the 17 Sustainable Development Goals (SDGs) adopted by the United Nations in 2015.

Benefits of 5G
- **Real-time data exchange:** 5G enables instant communication between port operators, allowing seamless coordination of cargo movements, reducing delays and optimizing logistics.
- **AI and IoT automation:** AI-driven analytics, combined with IoT sensors, cameras and connected machinery, enables forklifts, trucks and cranes to work together intelligently, reducing human intervention and increasing safety and precision.

5G connectivity supports remote operation of cranes, increasing productivity by 25 percent.

25%

- **Remote-controlled cranes:** 5G connectivity supports remote operation of port cranes, increasing productivity by 25 percent. Controlling machinery from a safe distance with minimal latency improves container handling speeds and reduces workplace hazards.
- **AR/VR for operations:** AR/VR applications enable remote training, predictive maintenance, and real-time monitoring of port infrastructure. Technicians can inspect equipment virtually, reducing downtime and improving worker safety.

Impact of 5G
- **Sustainability:** 5G reduces unnecessary cargo movements, optimizing logistics and lowering fuel consumption and CO_2 emissions by 8.2 percent per terminal operation, contributing to SDG 13 (Climate Action). Additionally, improved automation and real-time monitoring minimize energy waste, supporting greener transportation.
- **Cost savings and efficiency:** Enhanced coordination and automation result in EUR 2.5 million in annual savings, primarily through optimized vessel berthing, reduced machine working hours, and improved operational speed, making port operations more sustainable, productive, and economically viable.

5G´s capabilities

5G's transformational impact
Advanced and trusted mobile connectivity is critical infrastructure that will underpin electrification, automation and digitalization across economies and societies. It is pivotal to scaling cloud and AI innovation, driving industrial competitiveness, enabling decarbonization and supporting digital inclusion in rural areas.

High performing, programmable networks
The foundation for advanced mobile connectivity today is the deployment of transformative 5G at speed and scale, with mid-band spectrum to boost capacity and 5G standalone (SA) for new functionality. This delivers high-performing, programmable networks with a step change in capabilities and performance.

Differentiated connectivity
While "one-size-fits-all, best-effort" mobile broadband powered the consumer app economy, the full digital transformation across industries and public services requires differentiated connectivity. Transformative 5G provides an innovation platform that unlocks network capabilities, tailoring connectivity to different users and use cases.

[4] Riviera – The digital transformation of Tianjin Port (2023).
[5] Ericsson – The 5G Port of the Future (2020).