

COLLABORATIVE INNOVATION DAY

4th October 2022 | Virtual Event

5G in Maritime Ports and Terminals: Port of Valencia case

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ORGANIZED BY:

- Port of Valencia & Fundación Valenciaport
- 5G Era: Key Insights and Expected Impact
- 5G Technology: Readiness Level
- 5G in Maritime Ports and Terminals: Use Cases
 - iNGENIOUS
 - PORTWIN
 - IMAGINE

Port of Valencia: A leader port in the Mediterranean Sea

- ❑ **4th maritime port in Europe and 1st in Mediterranean Sea** in container traffic volume (5,604,478 TEU in 2021*).
- ❑ Key node in **TEN-T Mediterranean Corridor**.
- ❑ **Main gateway in Spain** for trade with China and USA.
- ❑ **Multi-purpose hub for passengers and freight** (containers, Ro-Ro, dry, liquid bulk)
- ❑ Connections with 1000 ports in 168 countries.
- ❑ **Managed by Valencia Port Authority.**



* Source: Alphaliner Top 30 Ranking 2021

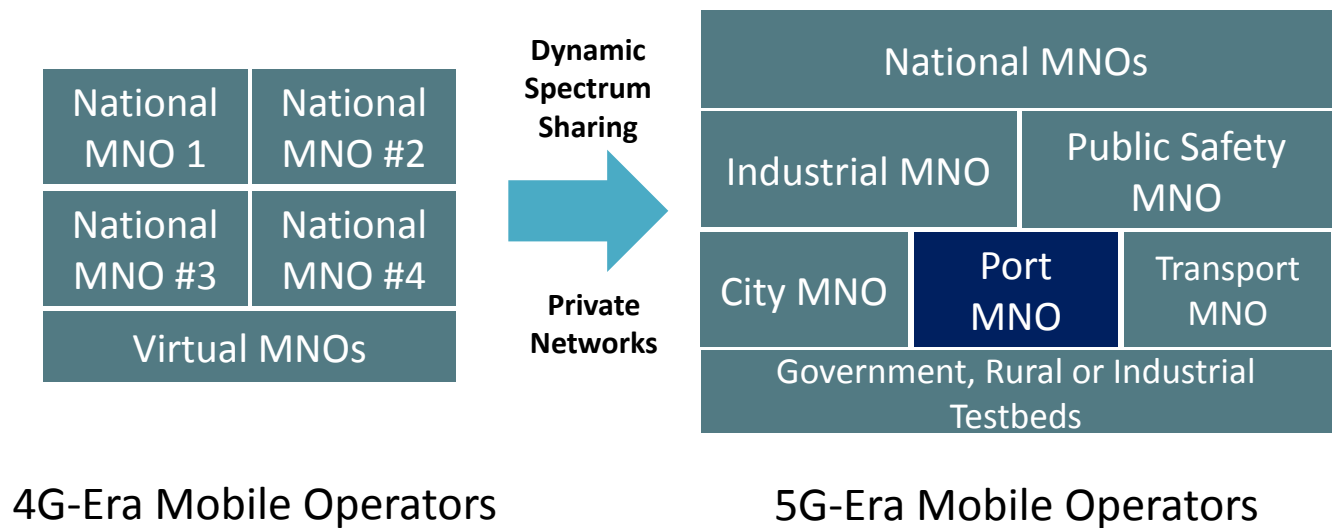
Fundación Valenciaport: The R&D centre of the Port of Valencia

- **Fundación Valenciaport** is the applied research, innovation and training centre of the Port of Valencia.
- **Strong presence in EU and national research programmes.**
- **Digital transformation expertise** in disruptive technologies such as:
 - Internet of Things
 - 5G
 - Cybersecurity
 - Artificial Intelligence
 - Big Data
 - Blockchain

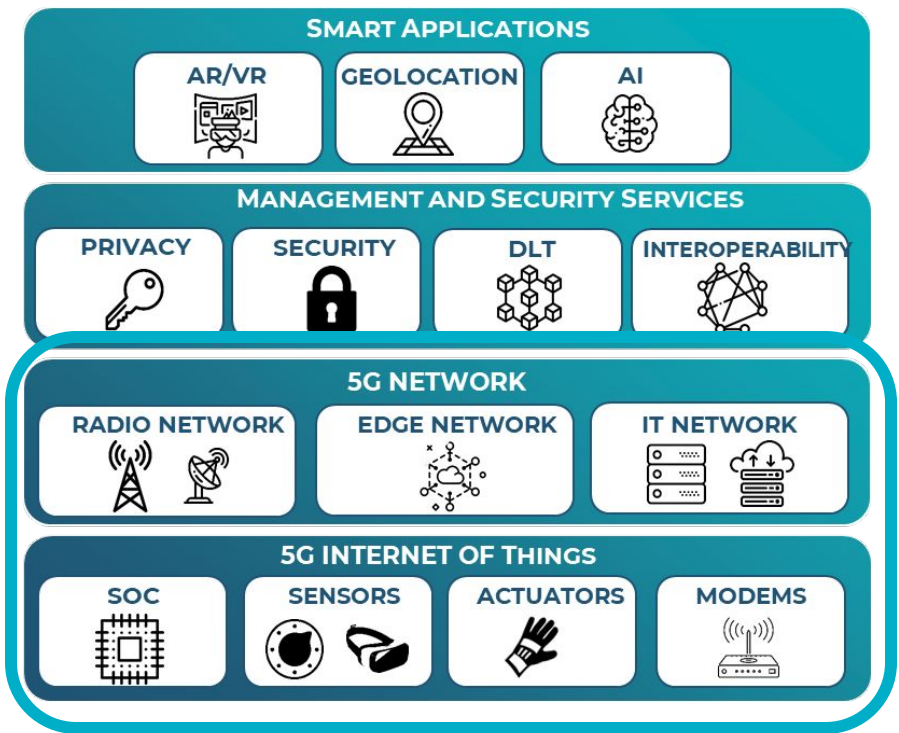


5G Era: Key Insights and Expected Impact

Transformation of telecoms and ISPs



Synergies with other disruptive technologies



5G Technology: Readiness Level

5G commercial deployments:

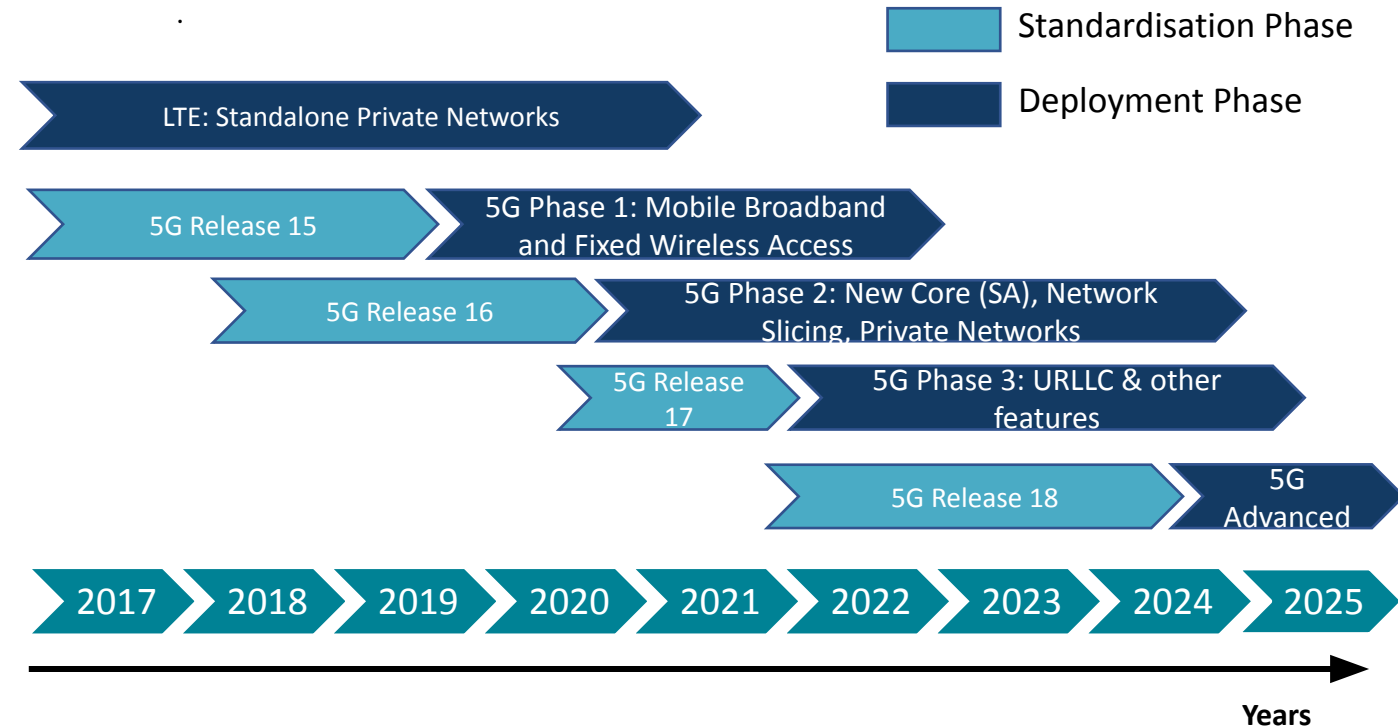
- First NSA commercial deployments in US, China and South Korea by the end of 2018.
- In Europe: UK, Finland, Austria and Italy deployed the first networks in the first-half of 2019.
- First SA commercial deployments in China and US available by the end of 2020.

Few 5G deployments focused on industrial verticals, just mobile services.

Existing industrial 5G deployments rely on Non-Standalone (NSA) architecture (Core: LTE, Radio Access: 5G-based)

5G standardisation progress:

- 3GPP Release 16 completed in second half of 2020.
- 3GPP Release 17 in the first half of 2022.
- 3GPP Release 18 content approved in December 2021.



Standardisation and industry adoption have different paces!

5G in Maritime Ports and Terminals: Use Cases in Maritime Ports

Potential 5G-Enabled Use Cases



Port of Valencia: 5G Research Projects - iNGENIOUS

iNGENIOUS 5G Use Case

Use Case for Improving drivers' safety with MR and haptic solutions

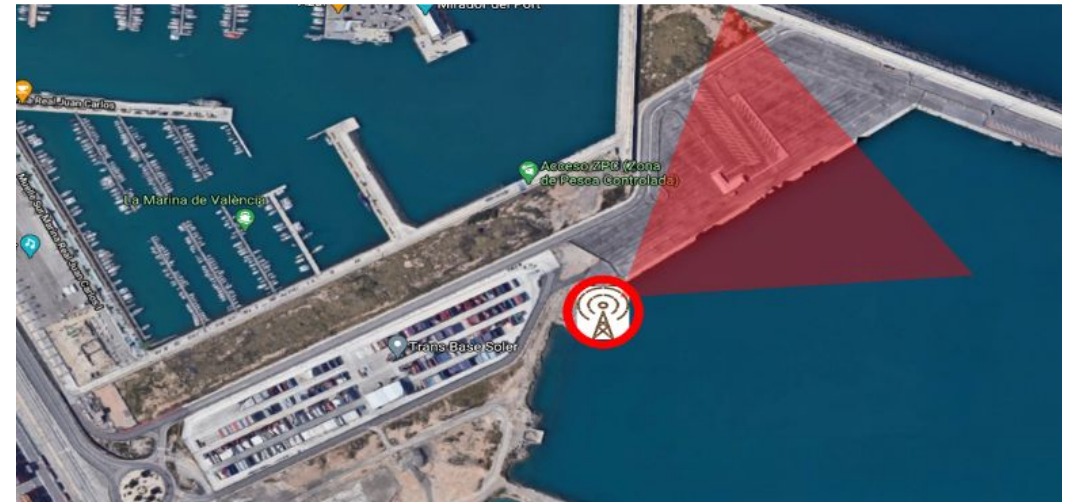
- ❑ **Objective:** Demonstrate that port employees would be able to work safely and away from hazardous working locations such as fuel terminals by **remotely controlling immersive AGVs**.
- ❑ **Technical Outcomes:**
 - ❑ To deploy **5G node at the port of Valencia leveraging mmWave spectrum bands**.
 - ❑ To implement a remote cockpit with **immersive Mixed-Reality (MR) HMDs and haptic gloves** to give alarms to the remote AGV driver in case of any detected risk.
 - ❑ To ensure **B5G Broadband IoT uplink and downlink connectivity** for all the cameras installed on the AGV and the hosting of the *edge* applications.
- ❑ **Partners:** Nokia Bell Labs Spain, Fundación Valenciaport, ASTI, Neurodigital, Universitat Politècnica de Valencia



Port of Valencia: 5G Research Projects - iNGENIOUS

5G mmWave deployment at the port of Valencia as part of iNGENIOUS project

- **5G NSA deployment:**
 - LTE anchor relies on Telefonica's spectrum on 2.6 GHz.
 - 5G radio working on 26 GHz (mmW band).
- 'Private' network with LTE dependence.
- Nokia's **radio, core and edge equipment** already available, and deployed at the port.
- Currently **covering use case on remote driving of an AGV with Mixed Reality and Haptic Solutions.**



INGENIOUS - Installation Phase 14/12/2021



Crane elevator on the DC & optic fiber cabling installation working



4G mRRH & 5G mmW Active Antenna already installed on a new pole, back side



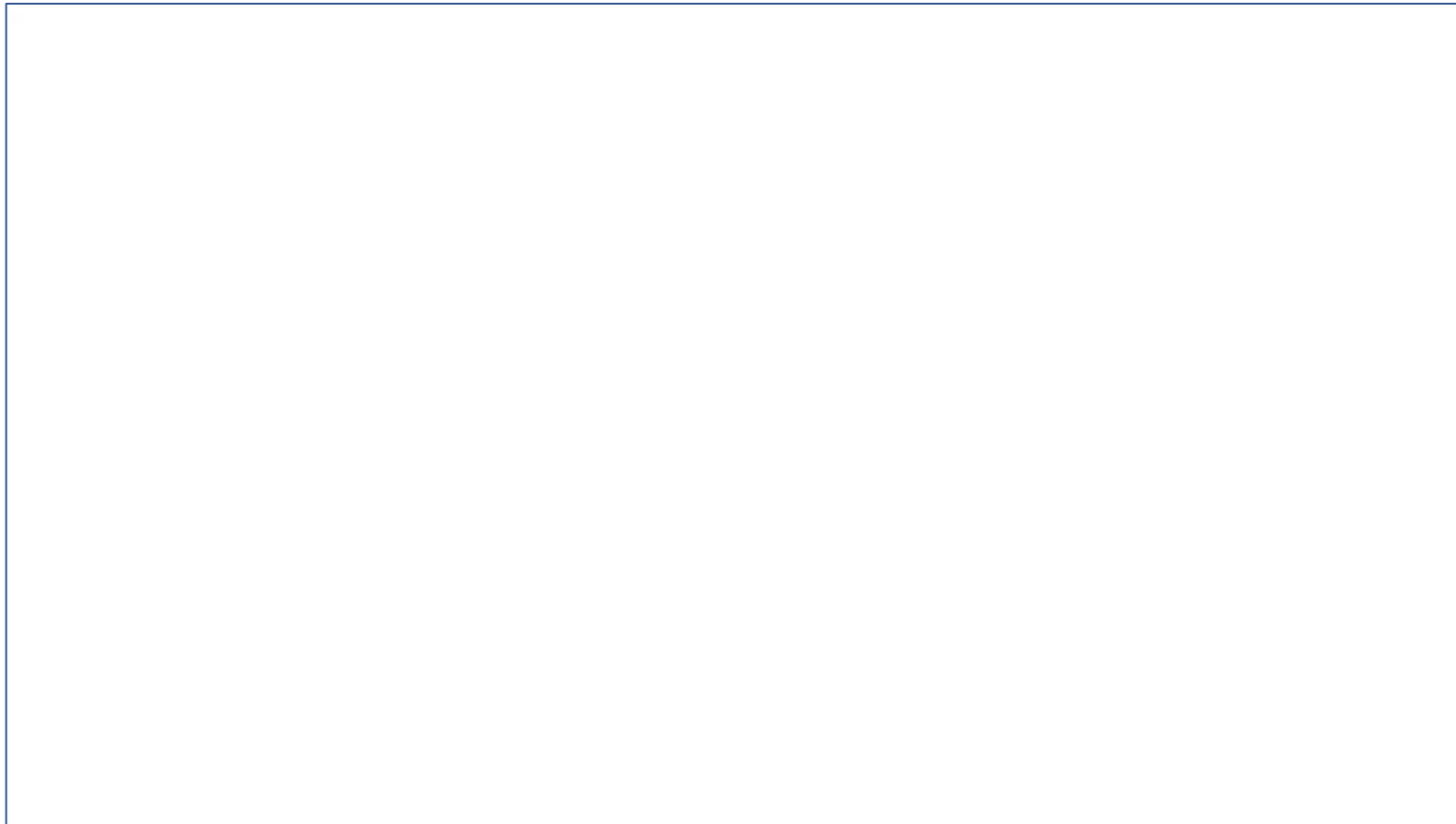
4G mRRH & 5G mmW Active Antenna already installed, front side

NOKIA

Port of Valencia: 5G Research Projects - iNGENIOUS



Use Case for Improving drivers' safety with MR and haptic solutions

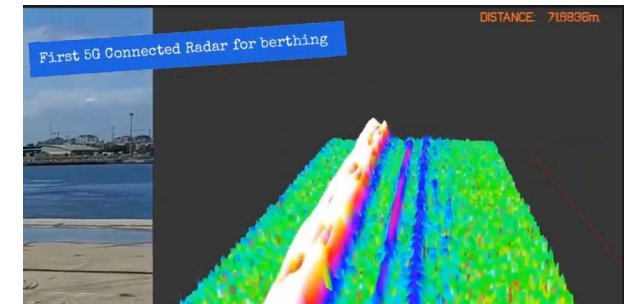
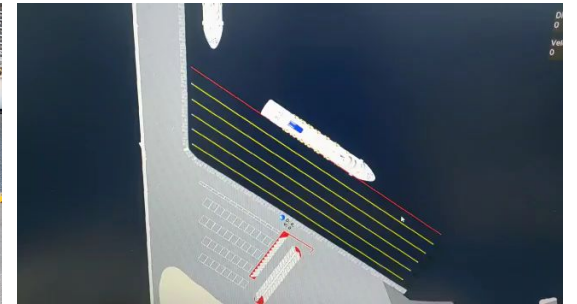


Port of Valencia: 5G Research Projects - PORTWIN

PORTWIN Use Cases

Use case on Berthing Assistance

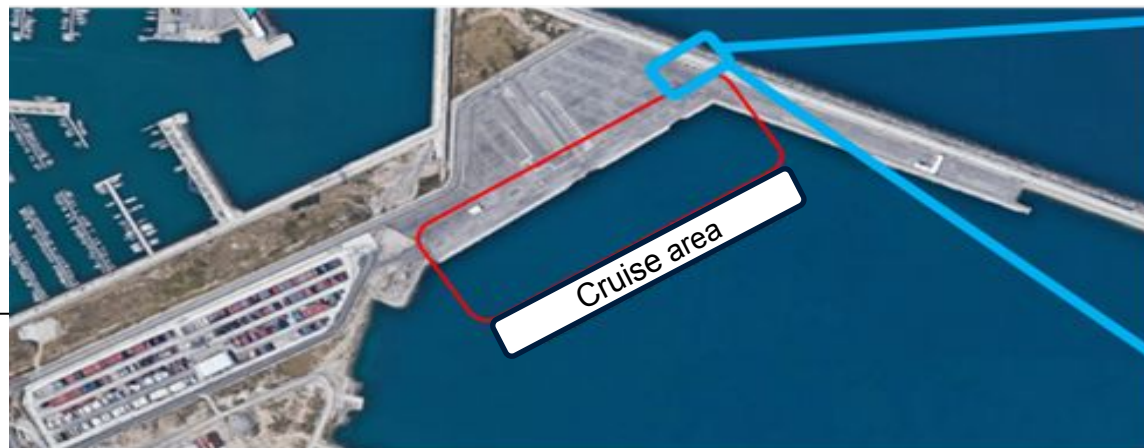
- **Objective:** To provide assistance and guidance to vessels when berthing operations are carried out.
- **Technical Outcomes:**
 - Explore 5G **operations in real-time mixing 5G & Edge Computing capabilities.**
 - Explore **the use of Berthing Radar Systems (BRS)** in berthing operations in different operational and environmental conditions.
- **Partners:** Fivecomm, A4Radar, Cellnex, Fundación Valenciaport



Port of Valencia: 5G Research Projects - PORTWIN

5G mid-band deployment at the port of Valencia as part of PORTWIN project

- **5G SA deployment working on 2.3 GHz band.**
- Private network to be deployed by Cellnex at the port by March-April 2022.
- **Radio site location agreed:** 5G antennas to be placed at the top of an existing pole in Valencia Port.
- Covering **use case on berthing assistance with 5G Radar solutions. Potential extension with digital twin.**



Use Case 1: Critical Surveillance and Inspection with UAV

- **Surveillance and inspection** are crucial to ensure safety and protection in maritime ports and terminals.
- **Unmanned Aerial Vehicles (UAV)** can be used to perform infrastructure inspections and surveillance safer, faster and with more accuracy than traditional methods.
- **Potential applications:**
 - **Surveillance:** Maritime rescue support (e.g. man overboard).
 - **Inspection:** Anchoring area inspection, oil spill detection.
- **5G communications** needed considering the **URLLC requirements** related to the remote operation of drones.
- Optimal **coverage and broadband** capabilities are needed to transmit real-time video streams with high definition orders.
- **Proposed Solution:** 5G SA deployment in 2.3 GHz band.



Use Case 2: Multi-functional remotely operated boat

- *Over 70% of marine casualties and incidents in Europe take place in ports or coastal areas*
- **First-aid rescue operations** at the port's waters (e.g. man overboard)
- **First evaluation and signalization** in case of accidents (oil spills, fire, collisions, etc.)
- **Under-water inspection** to detect hazards
- Need for **URRLC communications for Beyond Line Of Sight** boat operation conditions
- Need for **broadband communications** for HD cameras and LIDAR systems on board in high mobility conditions
- **Proposed Solution:** 5G SA deployment in 2.3 GHz band.

Advanced Emergency Control Centre



Unmanned Surface Vehicle



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Thanks for your attention
Any questions?

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