

COLLABORATIVE INNOVATION DAY  
4<sup>th</sup> October 2022 | Virtual Event

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

Joan Meseguer Llopis  
R&D Project Manager  
Fundación Valenciaport



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

- **4<sup>th</sup> maritime port in Europe and 1<sup>st</sup> 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



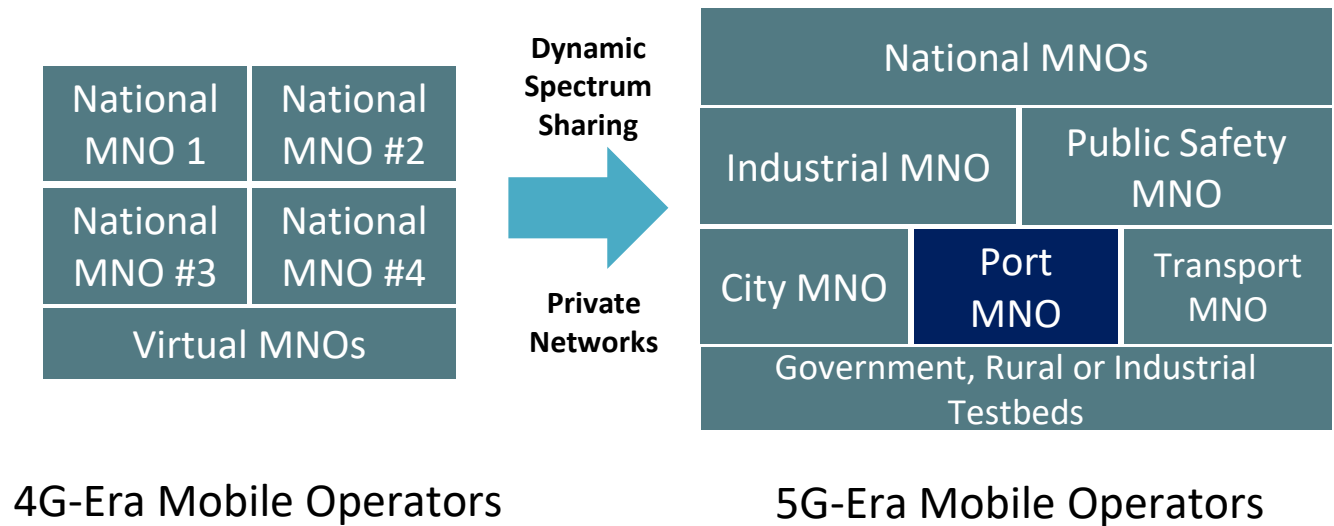
# Fundación Valenciaport: The R&D centre of the Port of Valencia

- **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

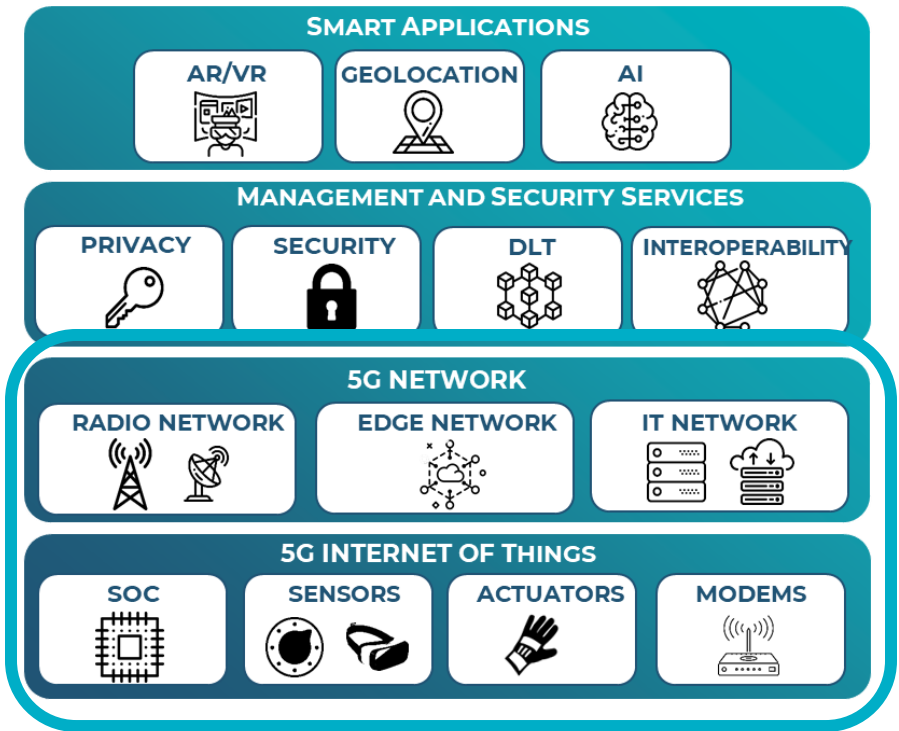


# 5G Era: Key Insights and Expected Impact

## Transformation of telecoms and ISPs



## Synergies with other disruptive technologies



# 5G Technology: Readiness Level

## ○ 5G commercial deployments:

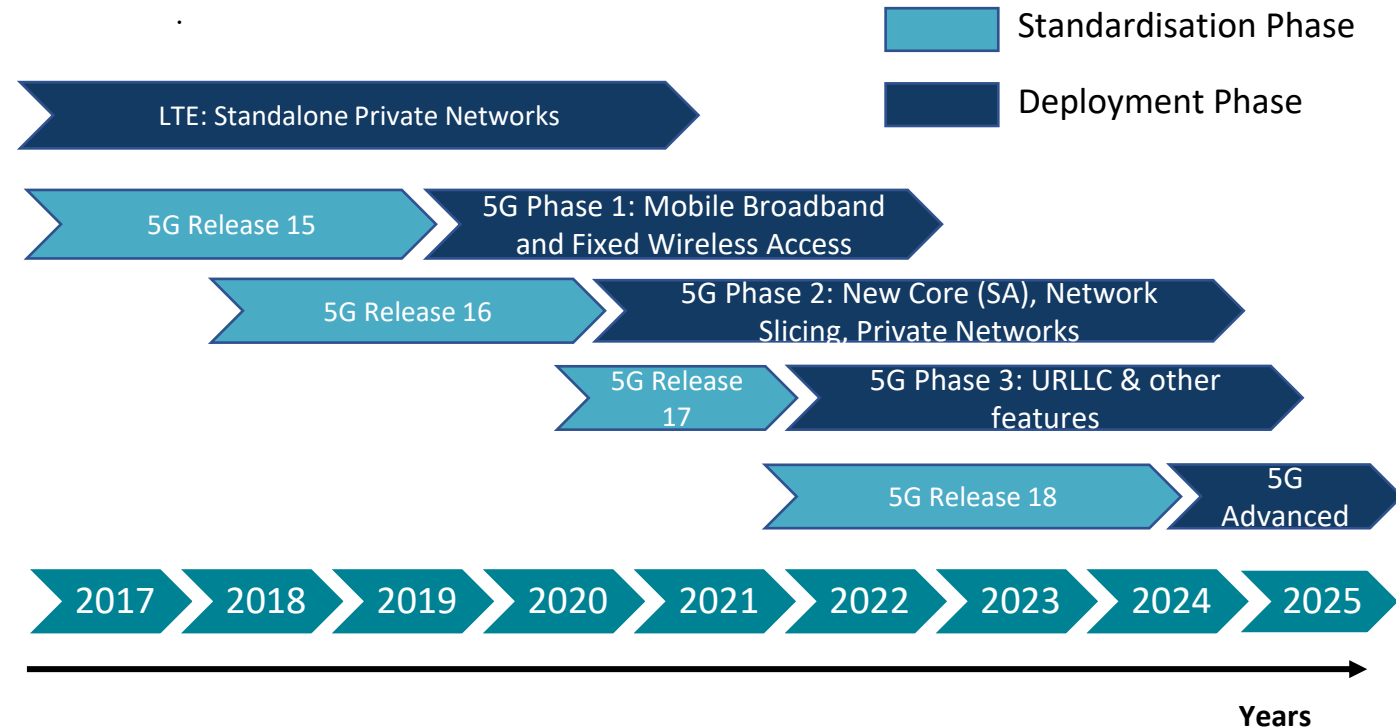
- First NSA commercial deployments in US, China and South Korea by the end of 2018.
- In Europe: UK, Finland, Austria and Italy deployed the first networks in the first-half of 2019.
- First SA commercial deployments in China and US available by the end of 2020.

## ○ 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



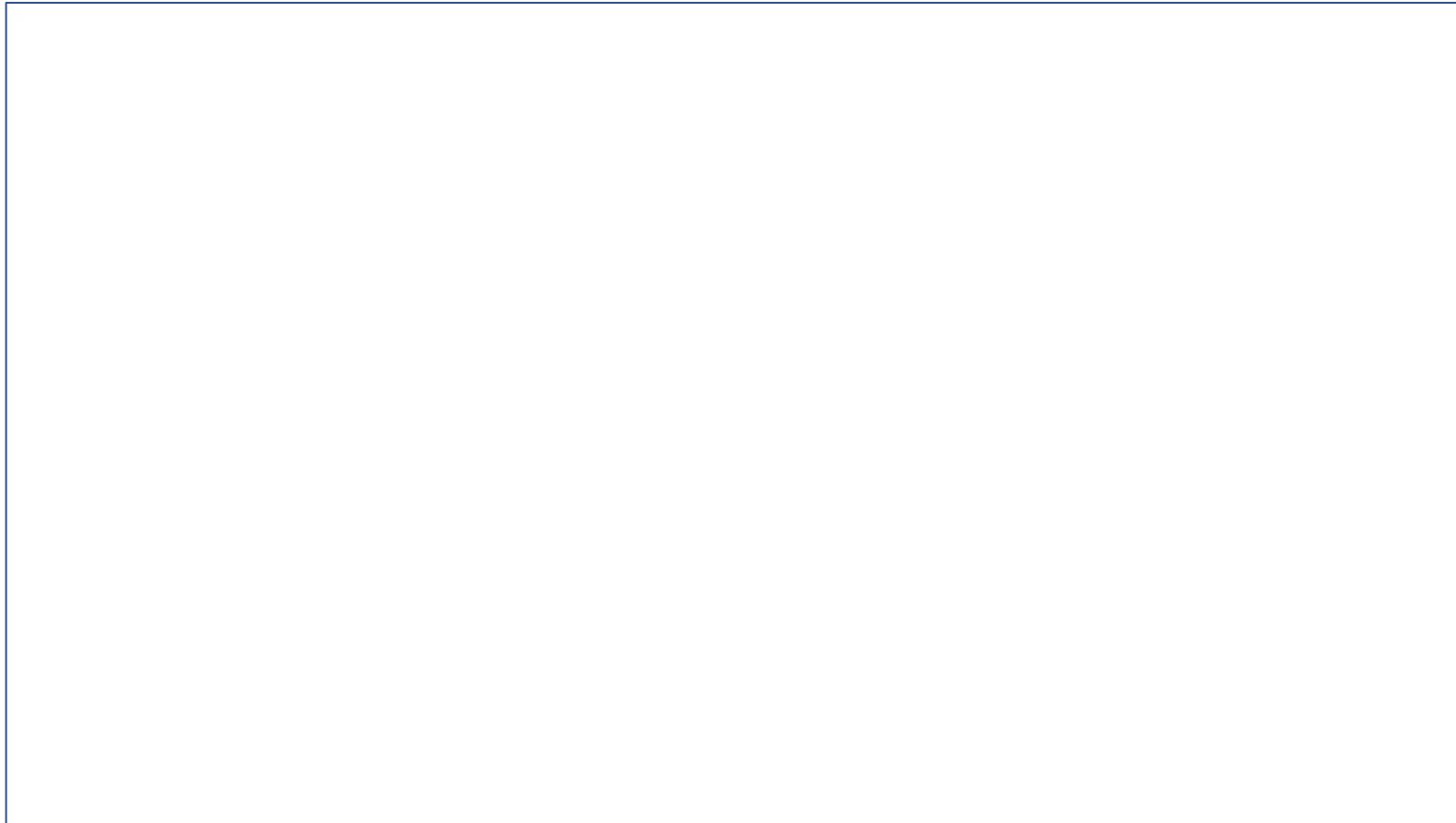
4G mRRH & 5G mmW Active Antenna already installed, front side

NOKIA

# Port of Valencia: 5G Research Projects - iNGENIOUS



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

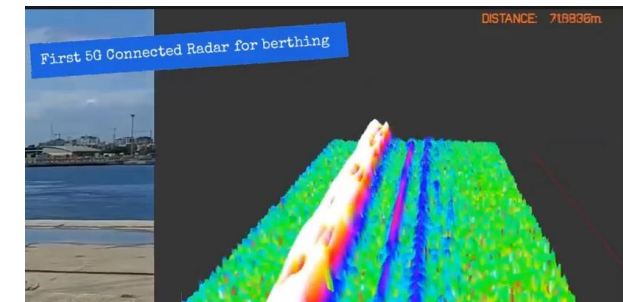
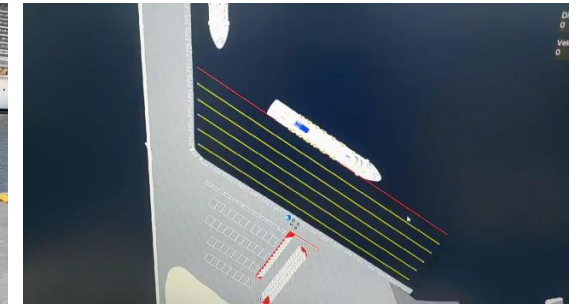


# Port of Valencia: 5G Research Projects - PORTWIN

## 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

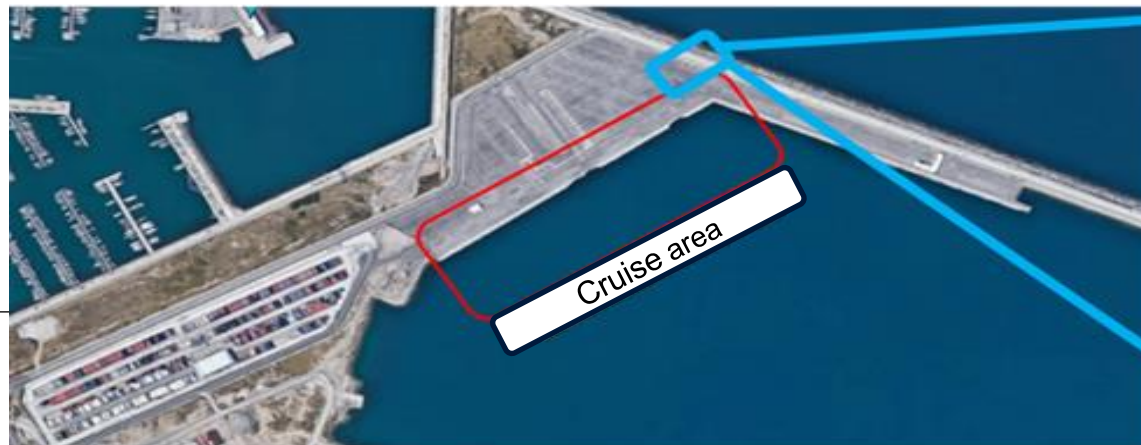




# Port of Valencia: 5G Research Projects - PORTWIN

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





**Thanks for your attention  
Any questions?**

**[jmeseguer@fundación.valenciaport.com](mailto:jmeseguer@fundación.valenciaport.com)**

