



**5G LOGINNOV**



**AFFORDABLE 5G**



# Accelerating 5G Innovation in Europe

Challenges and Opportunities for Private Networks focusing  
on CAD, Transport & Logistics, Smart City, Manufacturing

16 June 2022



European  
Commission

Horizon 2020  
European Union funding  
for Research & Innovation

# 5G-LOGINNOV Project



**5G**LOGINNOV



# 5G-LOGINNOV

**5G-LOGINNOV's vision is to optimise freight and traffic operations at ports and logistics hubs by using new innovative concepts, applications and devices supported by 5G technologies, Internet of Things (IoT), data analytics, next generation traffic management, Cooperative, Connected and Automated Mobility (CCAM) and the 5G logistics corridor.**

- **15 partners**
- **8 European Countries**
- **3 pilot sites (Hamburg, Athens, Koper)**
- **Duration: September 2020 – August 2023**
- **Budget: 7.9 M€**
- **<https://5g-loginnov.eu/>**

# Project concept



- **Deploy, evaluate and showcase** the added value of 5G technology for logistics and port operation in the three Living Labs
- **Involve** major telecoms industry stakeholders (MNOs, vendors, technology integrators)
- **Realise** port-driven technological and societal innovations
- **Important!**
- **Stakeholder driven approach**, considering the ports' and port-cities' main challenges in view of the major changes due to an evolving environment

# Project partners





**Project coordinator**  
**Dr Eusebiu Catana**  
ERTICO - ITS EUROPE  
e.catana@mail.ertico.com



Website: [5g-loginnov.eu](https://5g-loginnov.eu)

LinkedIn: 5G LOGINNOV Project

Twitter: #5GLOGINNOV



**AFFORDABLE 5G**

# BRIEF DESCRIPTION OF AFFORDABLE5G

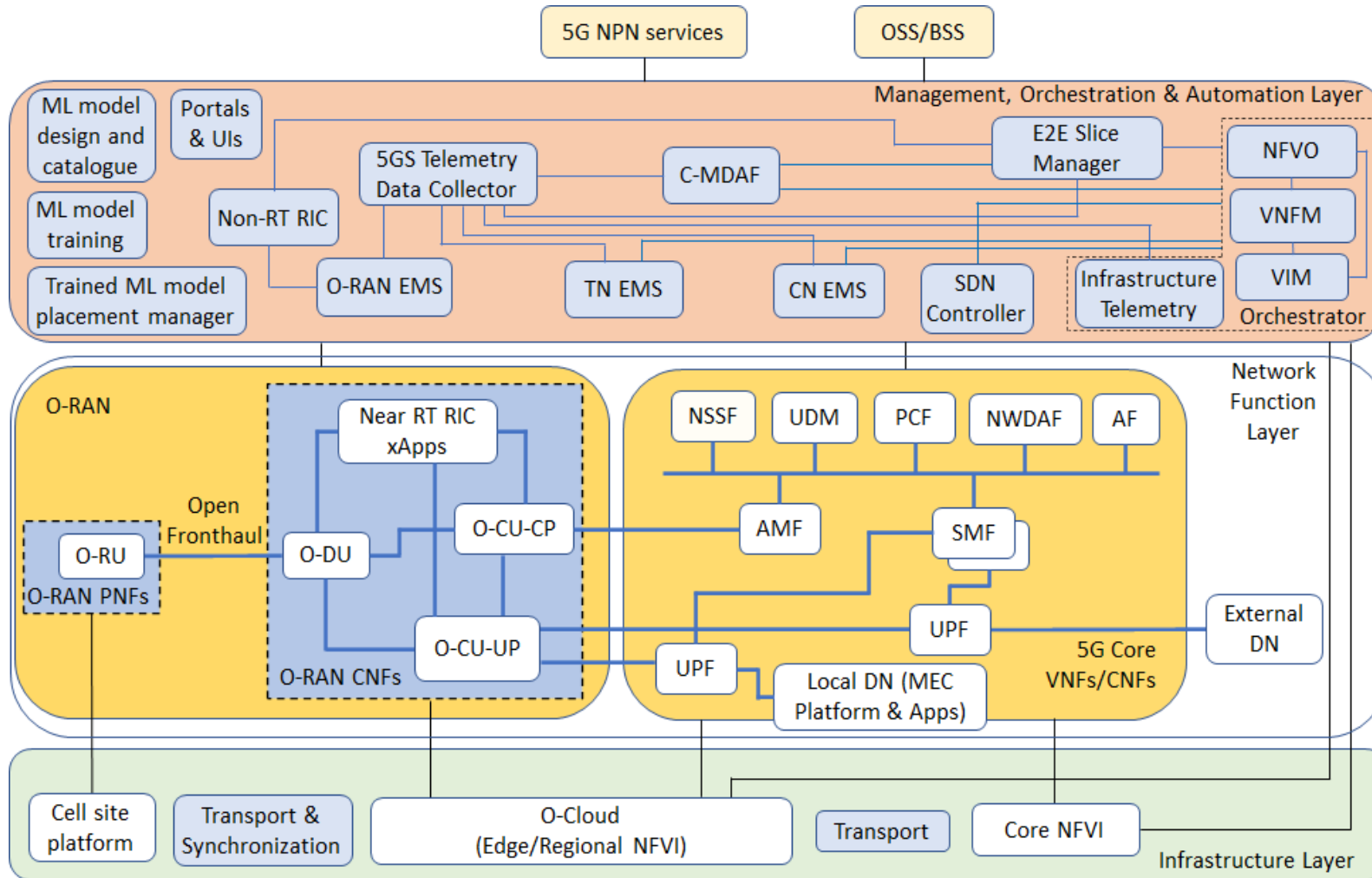
5G-LOGINNOV joint technical workshop

16/06/2022

PANAGIOTIS TRAKADAS

*NKUA*

# Affordable5G Architectural Approach



## Management, Orchestration and Automation Layer

- ✓ Orchestration, Slicing, Telemetry and Data analytics, AI/ML-based RAN optimization

## Network Function Layer

- ✓ NFs related to O-RAN and 5G Core

## Infrastructure Layer

- ✓ Core and Edge/Regional NFV Infrastructures, cell site platform and TN segments



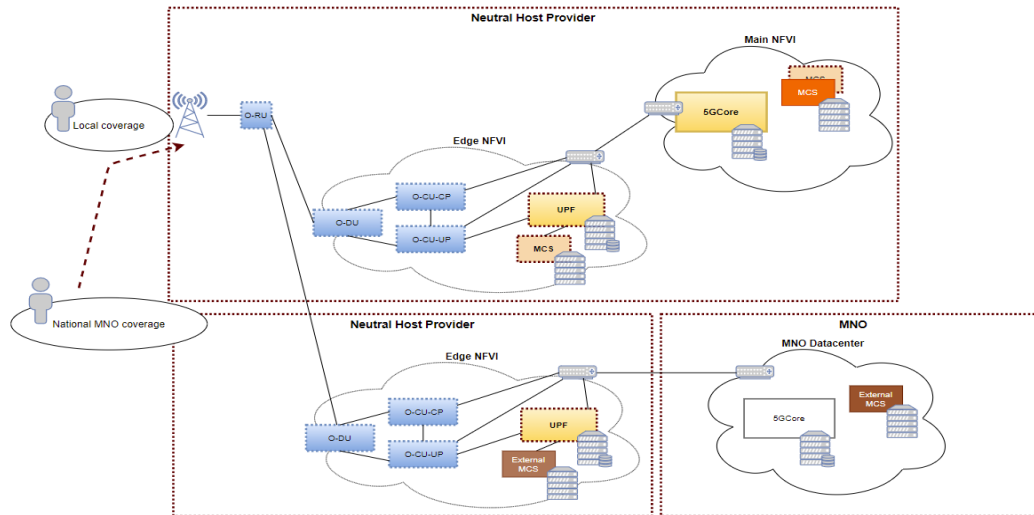
# Affordable5G Innovations and Pilots



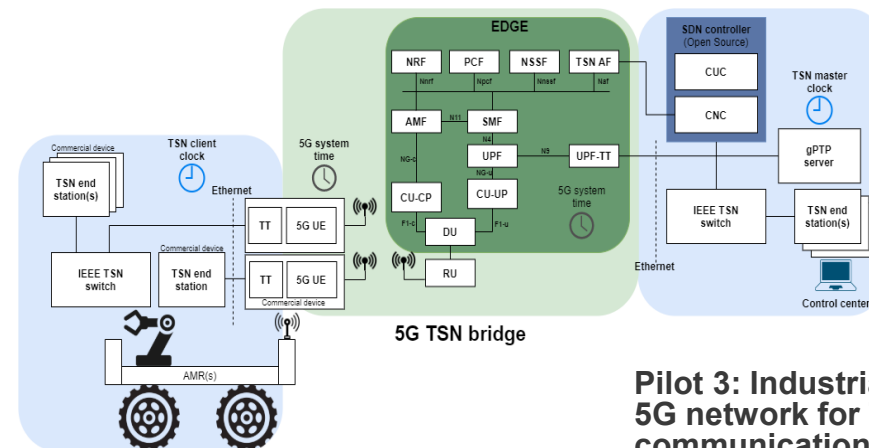
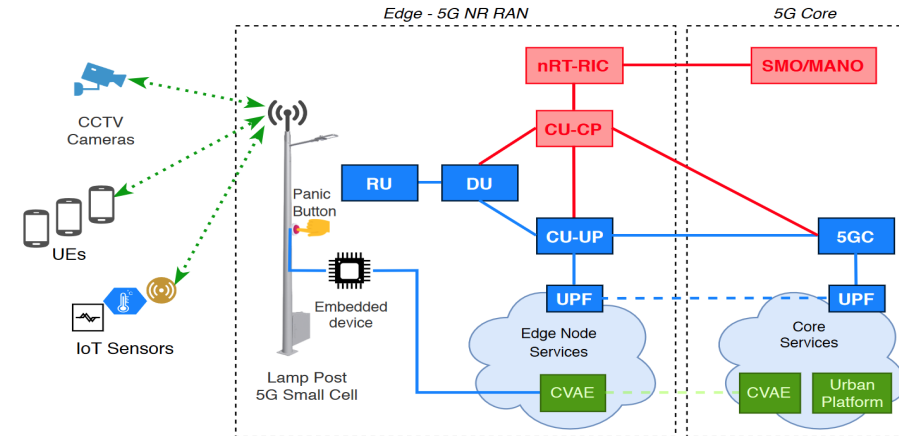
- Connectivity between disaggregated O-RAN components
- Support of AI/ML in O-RAN through xApps
- Management of Slice Life-Cycle
- TSN translators and time synchronization
- Infrastructure as Code for efficient OSM deployment
- Data analytics for Network Telemetry

# Affordable5G Pilots

## Pilot 1: Private 5G network providing Emergency Communication Critical System services



## Pilot 2: Demonstration of Smart City Video Surveillance in dense urban scenarios to identify objects and persons



## Pilot 3: Industrial/manufacturing private 5G network for Time Sensitive Network communications

# Partners



# GET IN TOUCH



[www.affordable5g.eu](http://www.affordable5g.eu)



[info@affordable5g.eu](mailto:info@affordable5g.eu)



[@affordable5g](https://twitter.com/affordable5g)

THIS PROJECT IS PART OF THE 5G PUBLIC AND  
PRIVATE PARTNERSHIP



*Affordable5G project is funded by the EU's Horizon2020  
programme under Grant Agreement number 957317.*



## AFFORDABLE 5G

# THANKS FOR YOUR ATTENTION



ICT-42-2020

5G Core Technology Innovations

The logo graphic for FUDGE-5G features a stylized network structure. It consists of three orange concentric arcs on the left, representing a signal or network range. To the right of these arcs is a vertical line with three square nodes at different heights, connected by horizontal and vertical lines. The text 'FUDGE-5G' is positioned to the right of this graphic.

# FUDGE-5G

**FULLy DisinteGrated private nEtworks  
for 5G verticals**

A decorative graphic in the bottom-left corner consisting of a series of orange and teal squares connected by lines, forming a staircase-like pattern that extends horizontally across the slide.

Prof. David Gomez-Barquero

Universitat Politecnica de Valencia (Spain)



# Main Technology Innovations for 5G Private Networks

- **5GC NFs as micro-services**
  - New cloud-native 5G NFs to be deployed anywhere (edge, on-premises and cloud)
- **LAN-Native Support in 5G networks**
  - Unified access across fixed LAN, WiFi and 5G (“all Ethernet” access), including 5G-Multicast
- **Interconnecting Standalone Non-Public 5G Networks**
  - Not supported by current 3GPP specifications
- **Unified Service Based Architecture for 5G NPNs**
  - SBA for the user data plane, in addition to the control plane
- **Integration between Public and Non-Public 5G Networks**
  - 5G-VINNI as public network and FUDGE-5G as non-public network
- **5G-TSN (Time Sensitive Networking)**
  - Time synchronization on top of 5GLAN
- **5GC deployments on Public/Private Clouds, hybrid, etc.**
- **Multi-vendor 5GC deployments**
- **Subscription concealed identifier (SUCI)**







# FUDGE-5G Platform Component Overview

5GC innovations

Evolution of NFV for location-aware cloud native orchestration of Enterprise Services

Novel service routing and resource scheduling for 5GC NFs

Support for SDN-based CP & UP

Unified all-Ethernet access

## Enterprise Services

### 5G Core

5GMC

5GTSN

Interconnected S-NPNs

5GLAN

### Vertical Applications

Media

Industry 4.0

PPDR

Virtual Office

Stakeholder-driven vertical applications

Service Layer

## Provisioning & Lifecycle Management

SFV Orchestrator

Vertical Application Orchestrator

## Routing

Service Routing

Resource Scheduling

## Telemetry

Vertical Application Monitoring

Cross Layer Monitoring

Analytics

## Slicing

Access Network

5GC NFs

Cloud Resources in DNs

Cross-layer monitoring and analytics for lifecycle management purposes of Enterprise Services

Programmable and flexible Service Slicing

F5G platform orchestration into NFV-enabled infrastructures

Platform Layer

Unified Access Domain


SDN

Infrastructure Orchestration

Infrastructure Layer



# FUDGE-5G Use Cases




## Concurrent Media Delivery

This Use Case will provide multimedia content using Multicast in Unified eSBA and 5GLAN. Showcase Interoperability between NFs



## PPDR

The PPDR Use Case will showcase the customization and flexibility capabilities of all-in-one 5GC, as standalone (5G "bubbles") or with 5G Backhaul



## 5G Virtual Office

This Use Case will unify the devices and services inside an hospital and make them accessible via 5G, ensuring data isolation.




**ABB**



## Industry 4.0

This Use Case will deploy a 5GLAN featuring 5G-TSN for robotics in a factory environment, providing low latency and high precision clock synchronization across the 5G network



## Interconnected NPNs

This Use Case will illustrate the benefits of 5G + WiFi for private Networks. Devices access privileged content and services across access networks



**Fraunhofer FOKUS**



**telenor group**



# Consortium

x12 Partners, x10 Countries

## High-Tech SMEs (x6)

- ATHONET
- CumuCore
- ONE2MANY
- UBITECH
- OneSource
- FIVECOMM

## Technology Vendors (x3)

- THALES
- InterDigital
- HUAWEI

## Research Institute (x1)

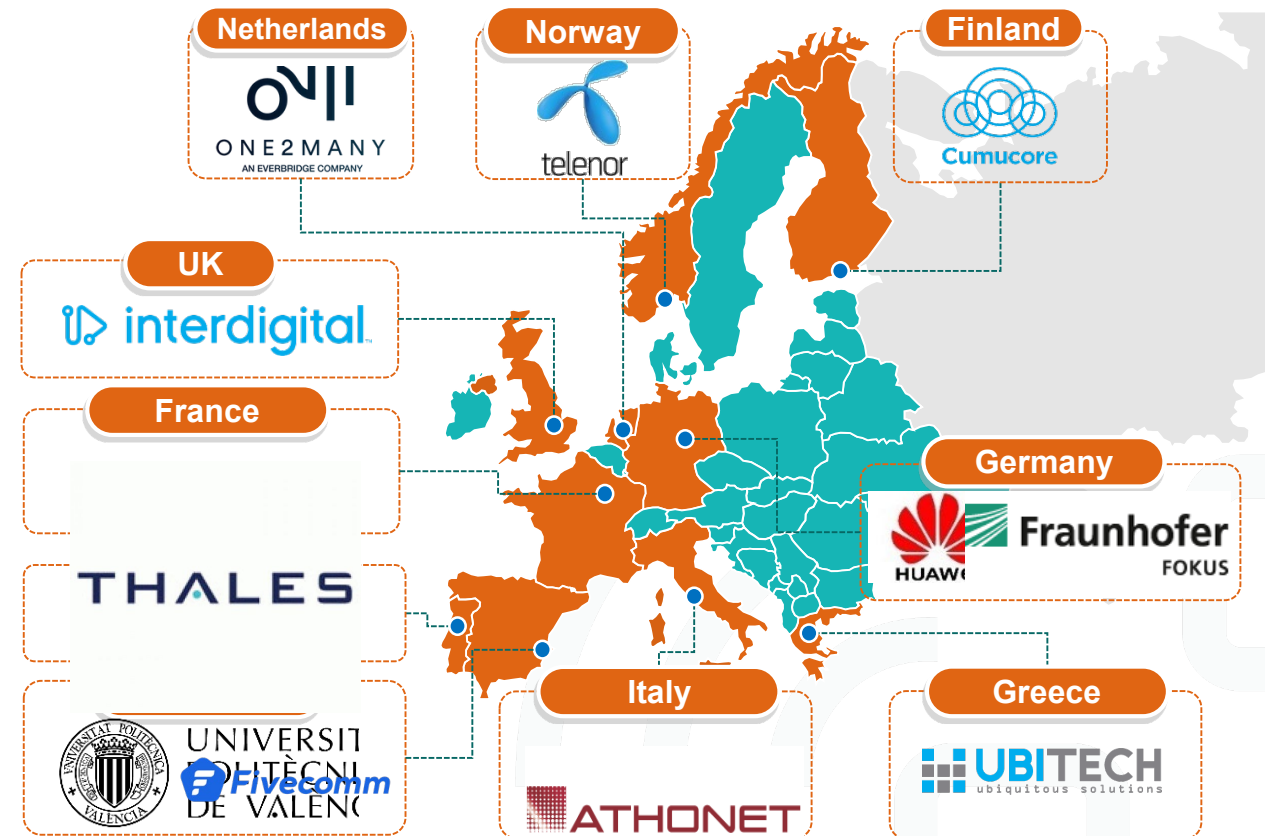
- Fraunhofer FOKUS

## Public University (x1)

- Universitat Politècnica de Valencia

## Mobile Operator (x1)

- Telenor



Advisory  
Board



Vertical  
Stakeholders

Technology  
Experts

Cloud-Edge  
Solution  
Providers

Vertical  
Solution  
Providers



**Thanks for your attention!**  
**Any questions?**