



Vertical Innovations in Transport And Logistics over  
5G experimentation facilities

## VITAL-5G 3<sup>rd</sup> party Experimentation Opportunities

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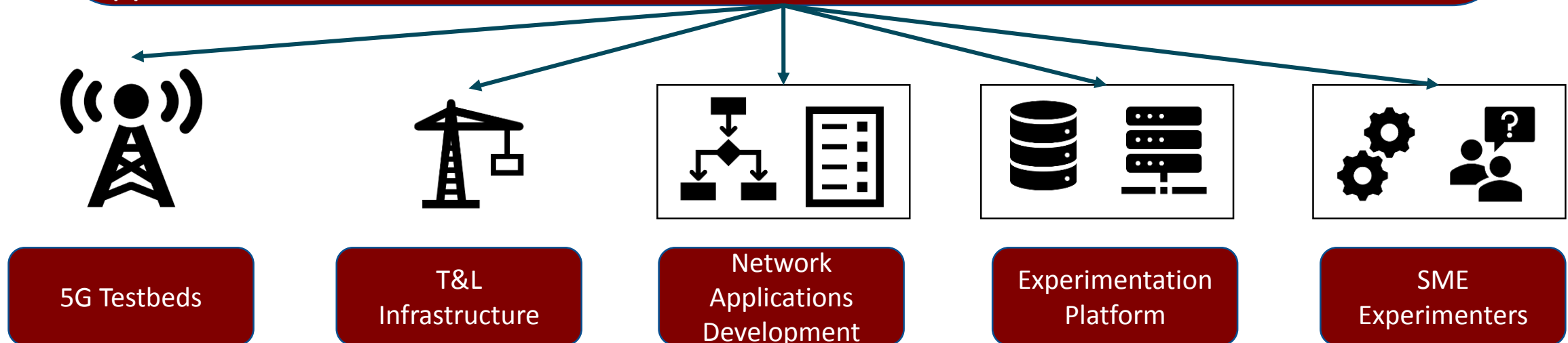
Benefits for third-party experimenters

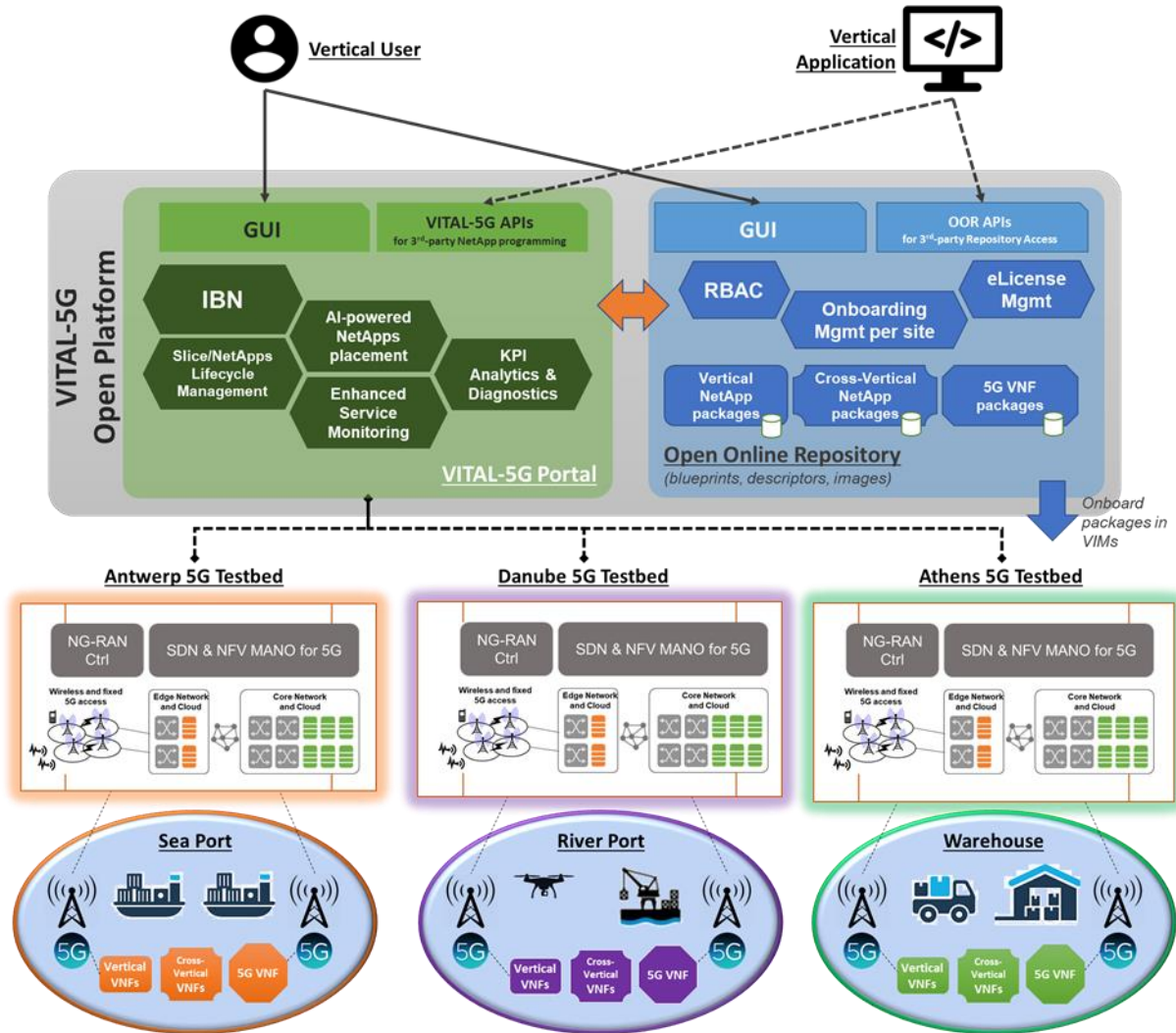
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## VISION

To enable the creation of 5G-enhanced services for the Transport & Logistics (T&L) industry by bridging the knowledge/expertise gap between the T&L sector, telecommunication experts and application developers. Vital-5G has engaged key logistics stakeholders (sea and river port authorities, road logistics operators, warehouse/hub logistic operators, etc.) and innovative SMEs, offering them an open and secure virtualised 5G environment to test and validate their T&L-related, cutting-edge Network Applications





## VITAL-5G Experimentation Platform & Open Online Repository

(Network Application Development, Onboarding, Deployment, Experimentation tools, etc.)

## 5G-Testbeds

3GPP Release 16 Stand Alone testbeds @ Antwerp, Athens and Danube (Galati)

## T&L facilities & 5G-enabled use cases

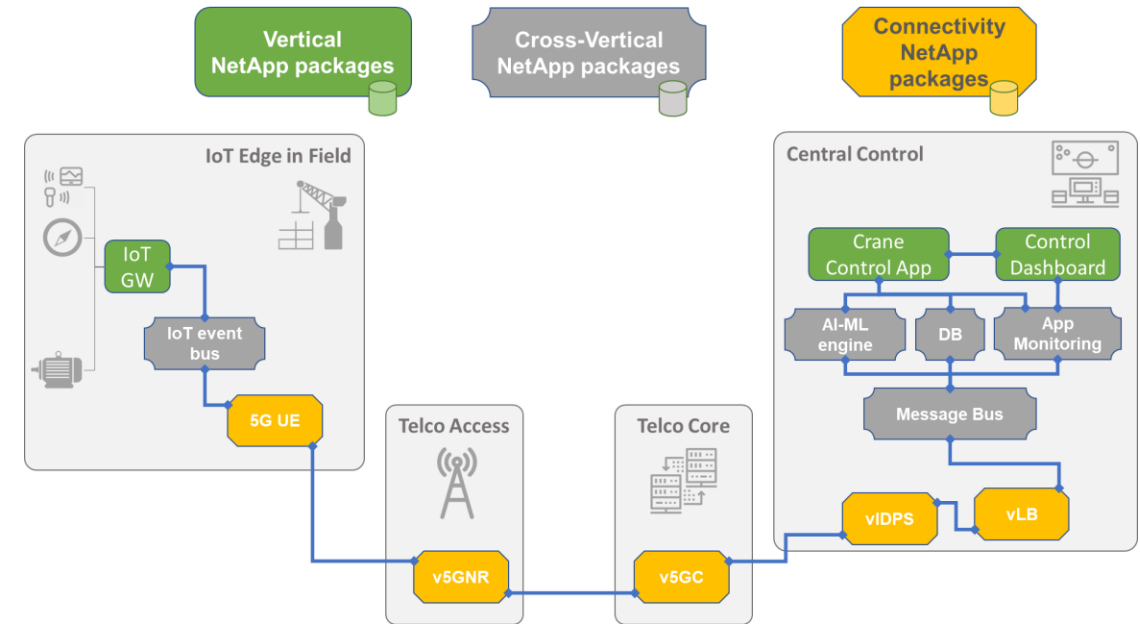
(Automated vessel transport, Warehouse/freight logistics, Data-enabled assisted navigation)

*VITAL-5G has released the **final version of its Experimentation Platform**, providing a stable environment for testing*

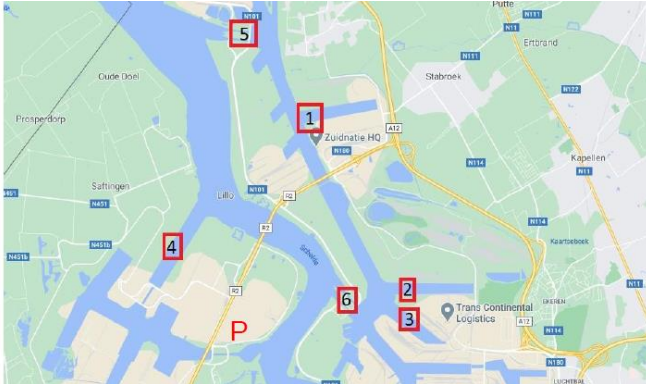
- **Service Portal**
  - Design, onboard, instantiate, monitor/manage and benchmark T&L Network Applications (Network Applications Life-Cycle Management)
  - AI/ML-assisted placement of VNFs/VxFs
  - Experiment execution via Dashboards / GUI, programmatic APIs, Intent Based Interfaces
  - KPI monitoring and analysis
- **Open Online Repository**
  - Catalogue service supporting programmable APIs and GUI to on-board, query, retrieve and update VxF packages, Network slice templates, Network service descriptors, Service blueprints
  - Role / Attribute Based Access Control (RBAC/ABAC) to regulate access, view and actions
  - License Management for Network Applications packages
  - Based on Open-source Service catalogue (used in other 5GPPP projects) and providing Open Access to several Network Applications

## Network Applications

*Packages containing NFV descriptors, software images, configuration scripts for service chains formed by virtual (VNF) and physical (PNF) functions.*



- **Application –specific Network Applications (Green):** Address specific industry challenges for the T&L sector. They can be specific to the connectivity layer implemented at the target T&L premises, e.g., autonomous/remote vessel control, human-robot collaboration application, etc.
- **Application – agnostic Network Applications (Gray):** Used to implement core primitives for data processing at the application layer. They include functionalities that can be used in a variety of vertical applications and T&L services, e.g., generic IoT management platform, data ingestion, fusion and processing engine, etc.
- **Network Applications implementation:** Multiple Network Applications (specific & agnostic) will be “chained” together in a flexible and reconfigurable manner to provide advanced E2E services.
  - Autonomous Vessel Navigation = Digital twin + Monitoring sensor data + Obstacle detection & tracking + Path prediction & vessel control



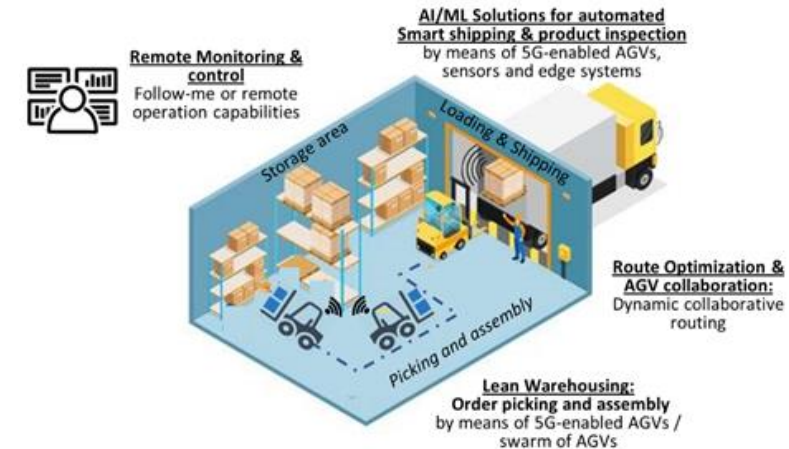
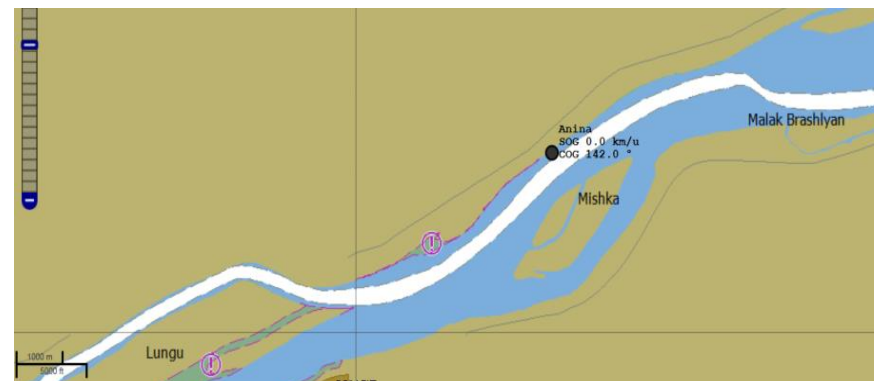
### Galati (Danube) T&L Facility & UC

- **Galati river port (Danube)**
- Data-enabled assisted navigation in severe weather/water conditions
- Remote inspection, fraud detection, insurance
- **KPIs:** Increased safety, electronic map accuracy, etc.

Cloud based 3D map rendering and digital twinning systems continuously process videos/ high quality data to inform assisted navigation systems

Cernavoda port will have 5G trial network, supporting connectivity as ships are close to shore

The ship is easily able to navigate with the help of assisted navigation even in severe weather and water conditions



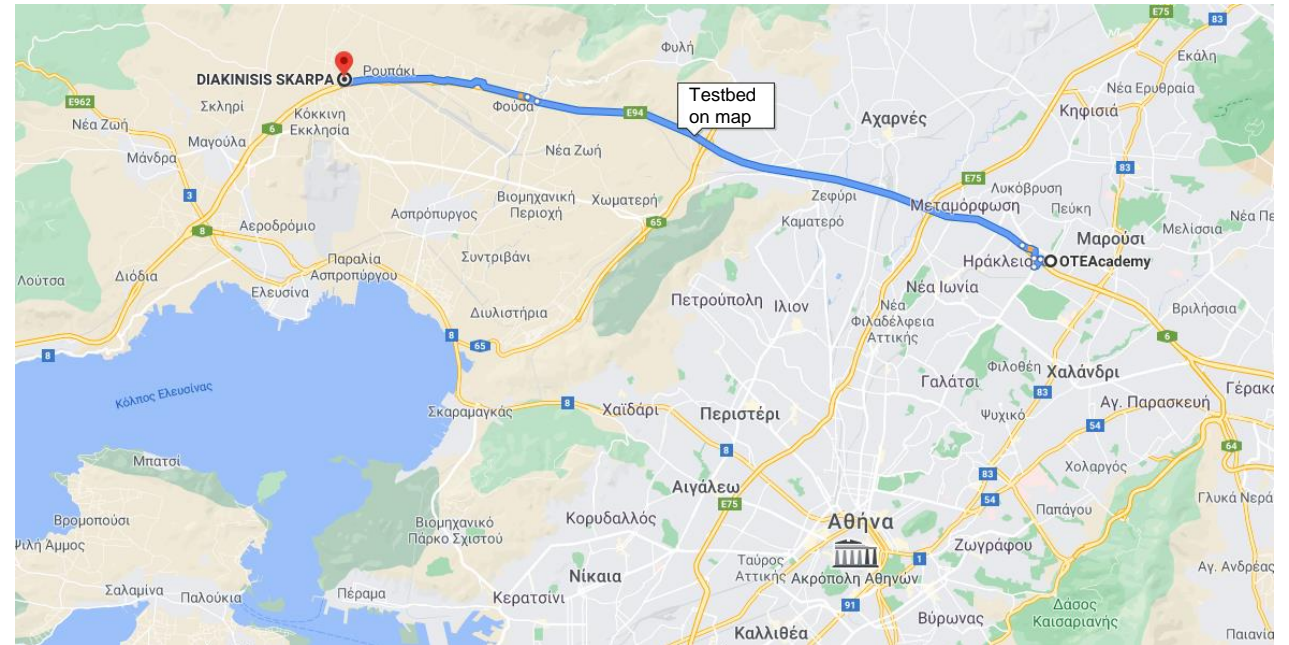
### Antwerp T&L Facility & UC

- **Antwerp sea port (Mission critical)**
- Automated & Remote Vessel assisted navigation in busy port environment
- Port Digital Twin
- **KPIs:** Port safety, reduced dwell times, reduced personnel, etc.

### Athens T&L Facility & UC

- **Athens Logistics hub (3PL warehouse)**
- Smart warehouse / freight logistics
- Lean warehouse, human-AGV collaboration, remote monitoring & control, etc.
- **KPIs:** Increased operational efficiency, productivity, warehouse capacity, etc.

- **DIAKINISIS Warehouse in Aspropyrgos**
  - Actual location of the use case
  - 5G Standalone with 5G slicing
- **OTE Academy in Marousi**
  - Availability of a similar 5G setup with the same capabilities for rehearsing and testing.
  - Location of the backend equipment
  - 3<sup>rd</sup> Party Experimenters can also use this site





VITAL-5G has opened its unique 5G experimentation infrastructure to innovative SMEs, startups and researchers to develop and test their vertical services for the T&L sector.

## Operations

Optimization of warehouse operations via intelligent optimization algorithms

Controlled access to and experimentation with Automated Guided Vehicles (**AGVs**)

Extensive evaluation and testing of warehouse optimization mechanisms in fully-fledged simulation of warehouse environment

Evaluating the impact of 5G and network slicing on optimizing warehouse operations

## Athens warehouse pilot assets

### Available assets

#### Facilities

Digital Twin & simulated warehouse environment which includes virtual AGVs

Access to Automated Guided Vehicles (AGVs)

#### Network Applications

Create and configure an instance of vertical-agnostic data ingestion and post-processing Network Applications

#### Data

Data from mounted sensors in the warehouse

Data from warehouse and AGV operations

#### 5G testbed

Pre-configured 5G slices available at the Athens facility

New 5G slices to be provisioned at your request

#### Results

Network KPIs from monitoring solution on the 5G testbed

## What can the 3rd party experimenters leverage?

- ▶ Use a 5G Standalone Network dedicated to you with slicing capabilities!
- ▶ Explore our cutting-edge platform with expert guidance for a top-notch experience!
- ▶ Use our Network Applications chained with your own with expert guidance!
- ▶ Use of provisioned 5G slices or request new ones to test your Network Applications!
- ▶ Collect network-related KPIs!
- ▶ Experiment with our advanced AGVs!
- ▶ Anything you can think off! We are open to suggestions!

# Contact us now at our Booths!



GROUP OF COMPANIES

- Contact us **now** at Wings and OTE booths
- Discuss **now** with colleagues from WINGS ICT Solutions, Diakinisis and OTE about your involvement
  - Nelly Giannopoulou (Project Manager) & Christina Karousatou, WINGS
  - Makis Stamatelatos, DIAKINISIS
  - Giorgos Tsiouris, OTE
- Please visit: <https://www.vital5g.eu>



Thank you for you attention!



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GROUP OF COMPANIES



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# Athens trial site – Available Assets description



Asset	Type of asset	Availability (from)	Description
Distributed sensor data ingestion fusion & automation (VA1)	Network Applications	September 2022	Responsible for the data ingestion and two-way communication with on-site equipment, decision support using rules and inference, monitoring and field assistance.
Digital Twin & simulated warehouse environment which includes virtual Automated Guided Vehicles (AGVs)	Facility	2023	Experiment execution using the digital twin and simulated warehouse environment with virtual AGVs.
Partial access to AGVs	Facility	2023	Agreed and coordinated access to the AGVs (indoor robotic platform) in the Athens trial facility will be possible.
Data from mounted sensors in the warehouse	Data	2023	The Environmental Sensors pack provides data from sensors (temperature, humidity, vibration, luminosity) deployed on various locations in the warehouse environment. The data will be available in the form of open datasets.
Non-sensitive historical data from warehouse and AGV operations	Data	2023	Open datasets with non-sensitive historical data from warehouse and AGV operations to be available on Zenodo.
Pre-configured 5G slices	5G testbed	2023	5G slices provisioned during the third-party experimenters' trials. Different network slices (eMBB and uRLLC) to be provisioned in a pre-configured manner.
New 5G slices to be provisioned	5G testbed	2023	5G slices provisioned during the third-party experimenters' trials. Different network slices (eMBB and uRLLC) to be provisioned in a dynamic manner.
Network KPIs from monitoring platform on 5G testbed	Results	2023	Measurement logs on network KPIs from executed experiments provided through the Vital-5G monitoring platform.

# Interaction with trial sites (Athens)

