Vertical Innovations in Transport And Logistics over 5G experimentation facilities

Project Overview

Georgios Tsiouris
Cosmote S.A.

Infocom World 2022
29/11/2022

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 101016567.

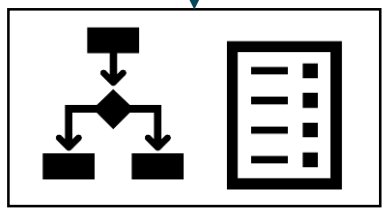
Agenda

VISION

To enable 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 will engage 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 (NetApps)

5G Testbeds

T&L Infrastructure

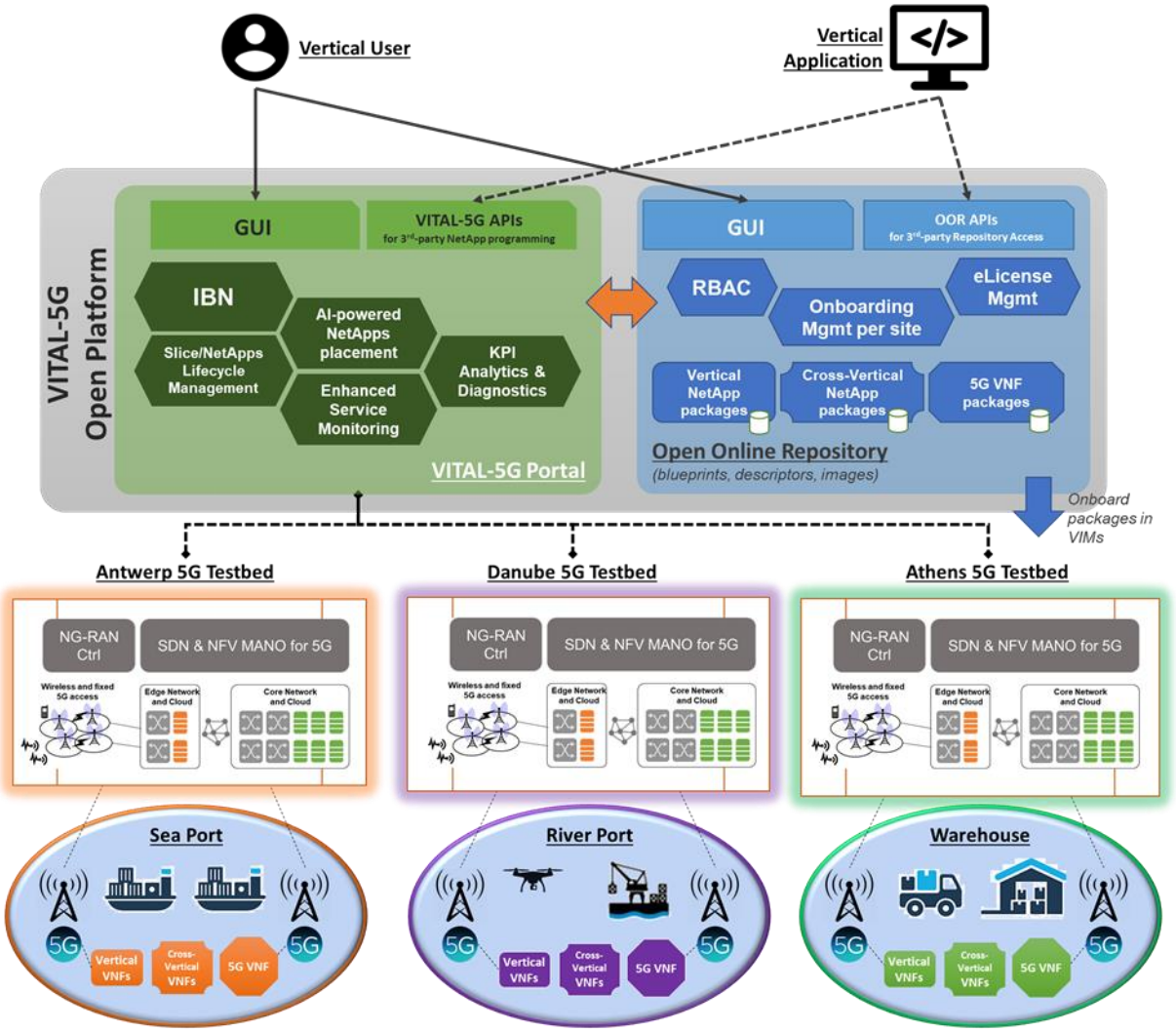


NetApps Development

Experimentation Platform

SME Experimenters

Concept



VITAL-5G Experimentation Platform & Open Online Repository

(NetApps Development, Onboarding, Deployment, Experimentation tools, etc.)

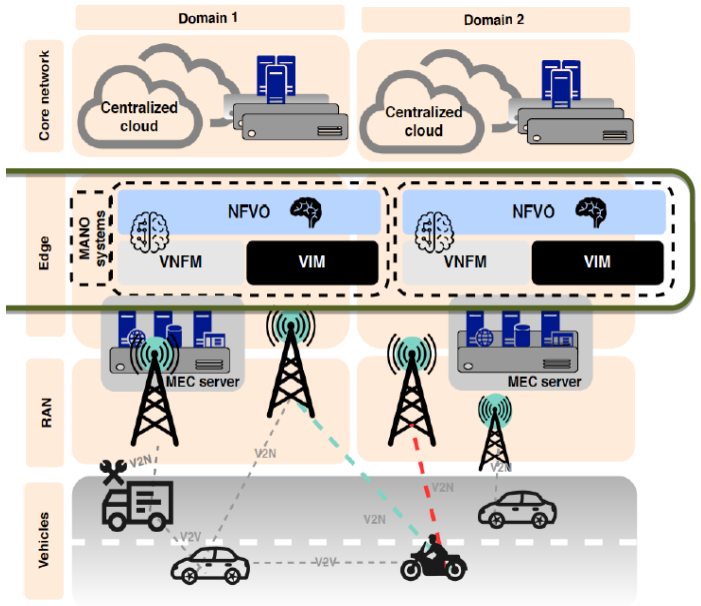
5G-Testbeds

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)

5G Testbeds

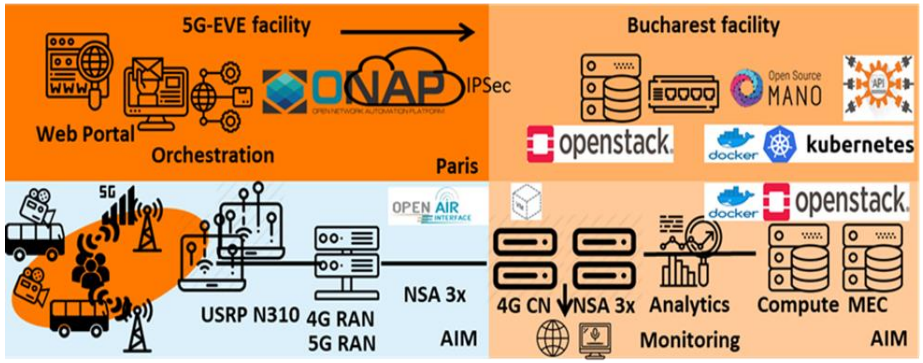


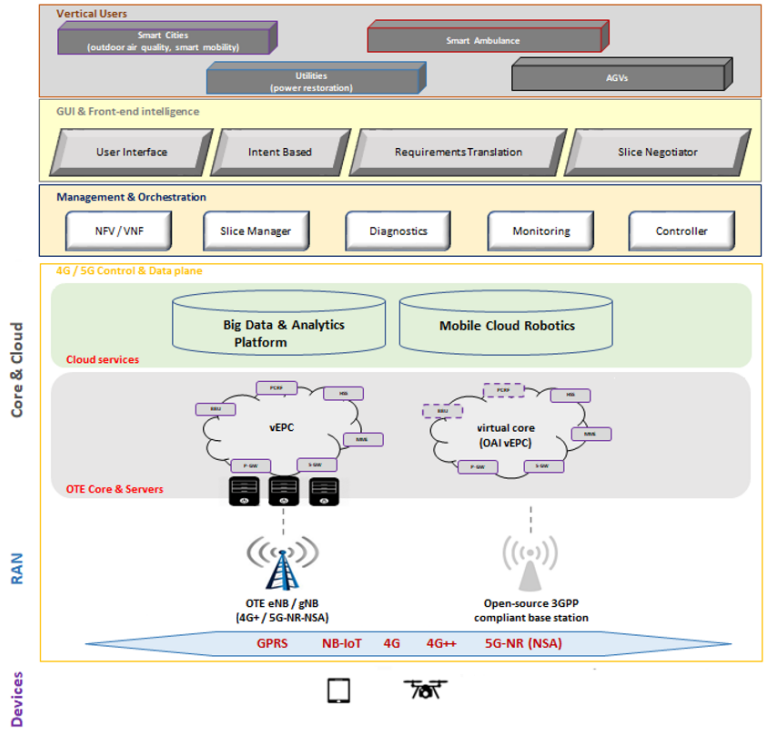
Antwerp 5G-Testbed

Based on i) Telenet's Innovation Center infrastructure, ii) Connectivity and components from 5G-Blueprint and iii) components from Telenet's commercial 5G network.
Upgraded to ***3GPP Rel.16 SA***

Galati (Danube) 5G-Testbed

Based on i) Orange Romania commercial infrastructure and ii) connectivity and components from the 5G-EVE testbed. Backhaul to be extended to Galati.
Upgraded to ***3GPP Rel.16 SA***

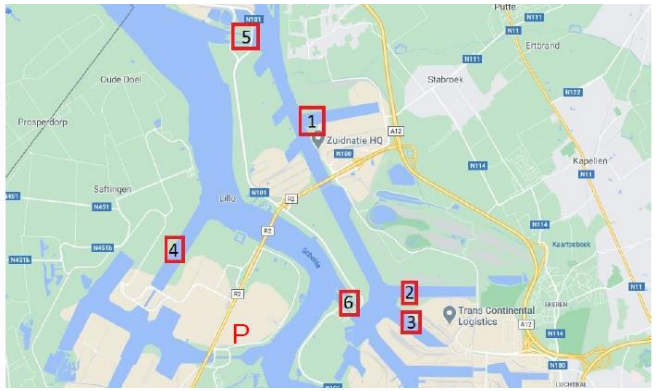


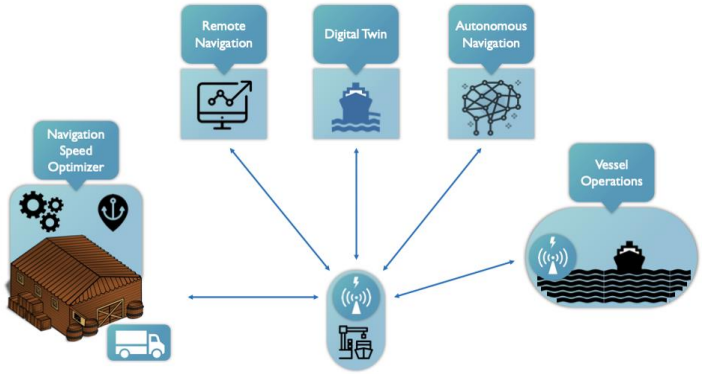


Athens 5G-Testbed

Based on i) OTE's backbone infrastructure and ii) connectivity and components from the 5G-EVE testbed. Indoor & outdoor connectivity over a fiber backhaul.
Upgraded to ***3GPP Rel.16 SA***

T&L facilities & 5G-enabled use cases



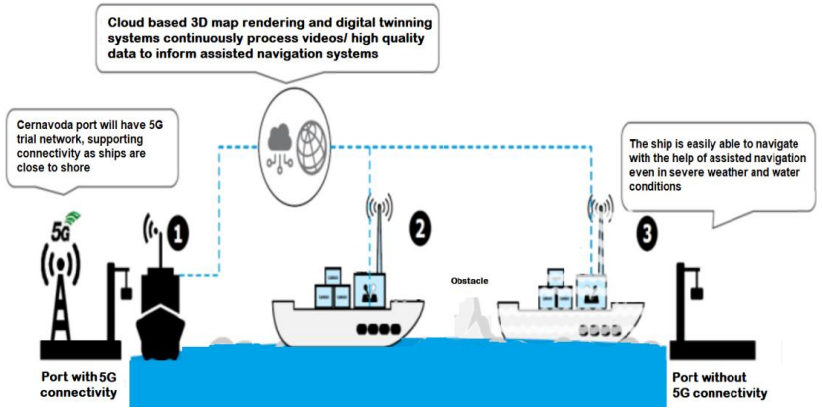


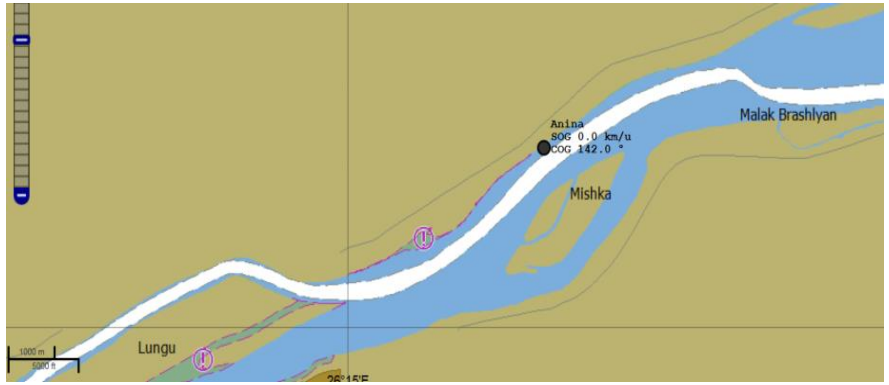
Antwerp T&L Facility & UC

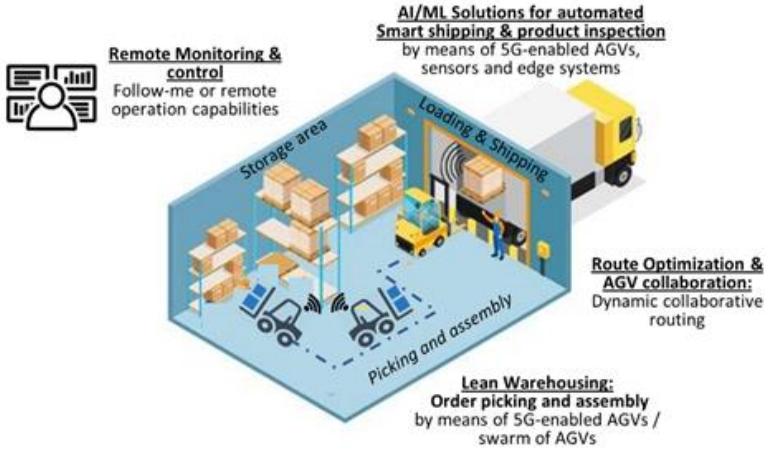
- ***Antwerp sea port (Mission critical)***
- Automated & Remote Vessel assisted navigation in busy port environment
- Port Digital Twin
- ***KPIs:*** Port safety, reduced dwell times, reduced personnel, etc.

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.







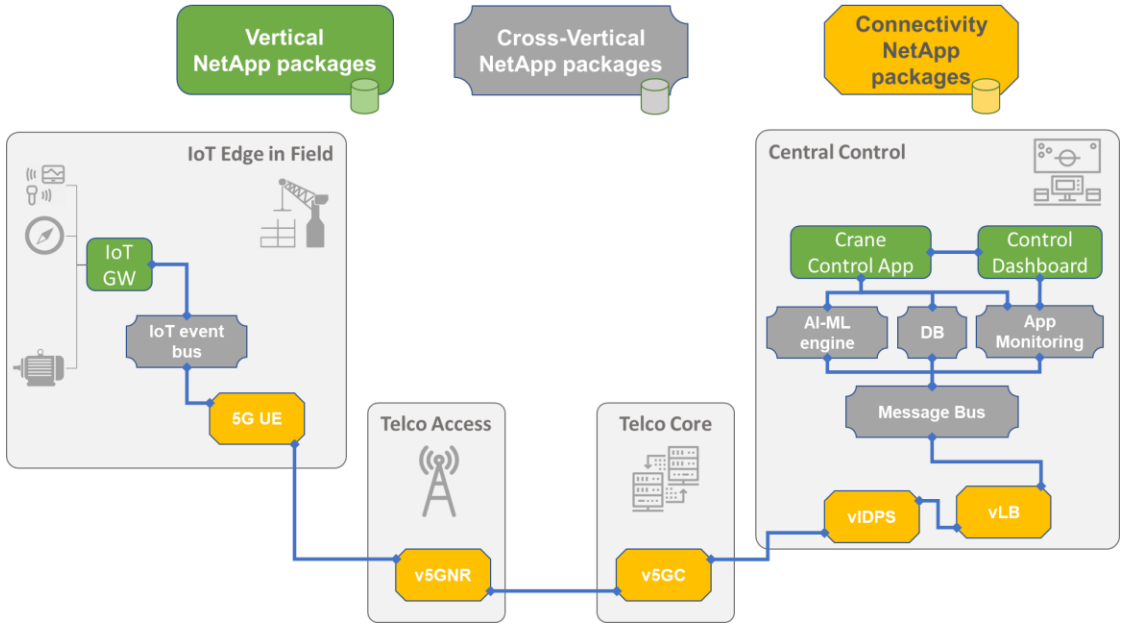
Athens T&L Facility & UC

- ***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.

NetApps

Network Applications (NetApps)

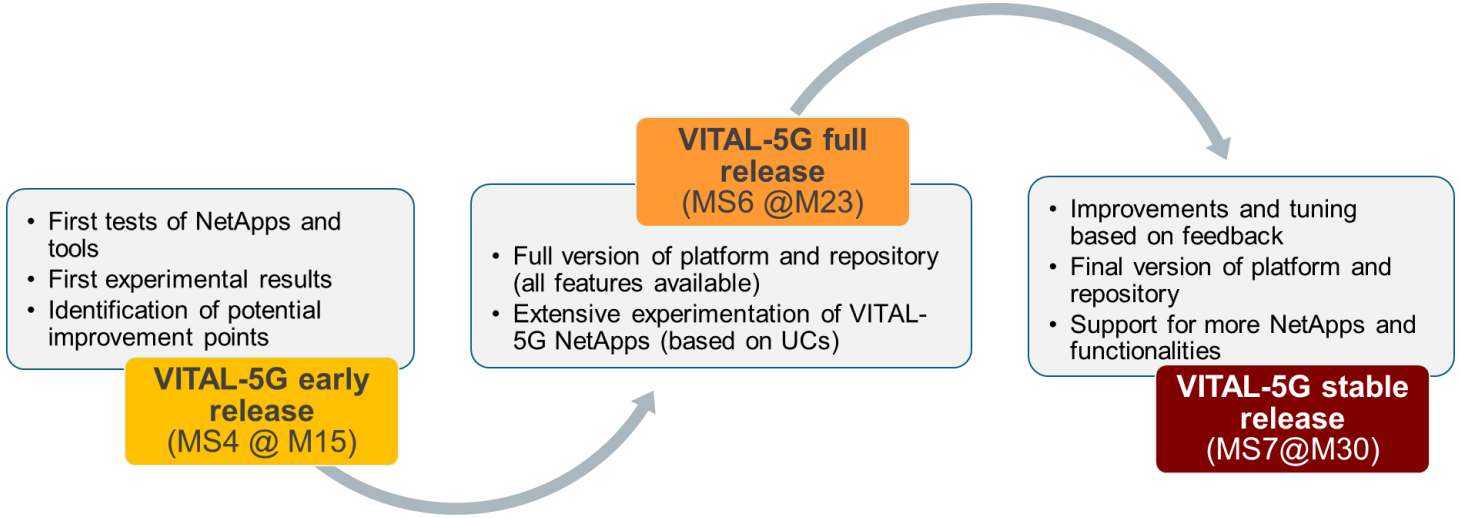
Packages containing NFV descriptors, software images, configuration scripts for service chains formed by virtual (VNF) and physical (PNF) functions.



- ***Application –specific NetApps (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 NetApps (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.
- ***NetApp implementation:*** Multiple NetApps (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

Experimentation Platform

***VITAL-5G** aims to minimize the knowledge/expertise gap between telecom providers, vertical industries and application developers through the promotion and validation of NetApps.*



- ***Service Portal***
  - Design, onboard, instantiate, monitor/manage and benchmark T&L NetApps (NetApp 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 NetApp packages
  - Based on Open-source Service catalogue (used in other 5GPPP projects) and providing Open Access to several NetApps

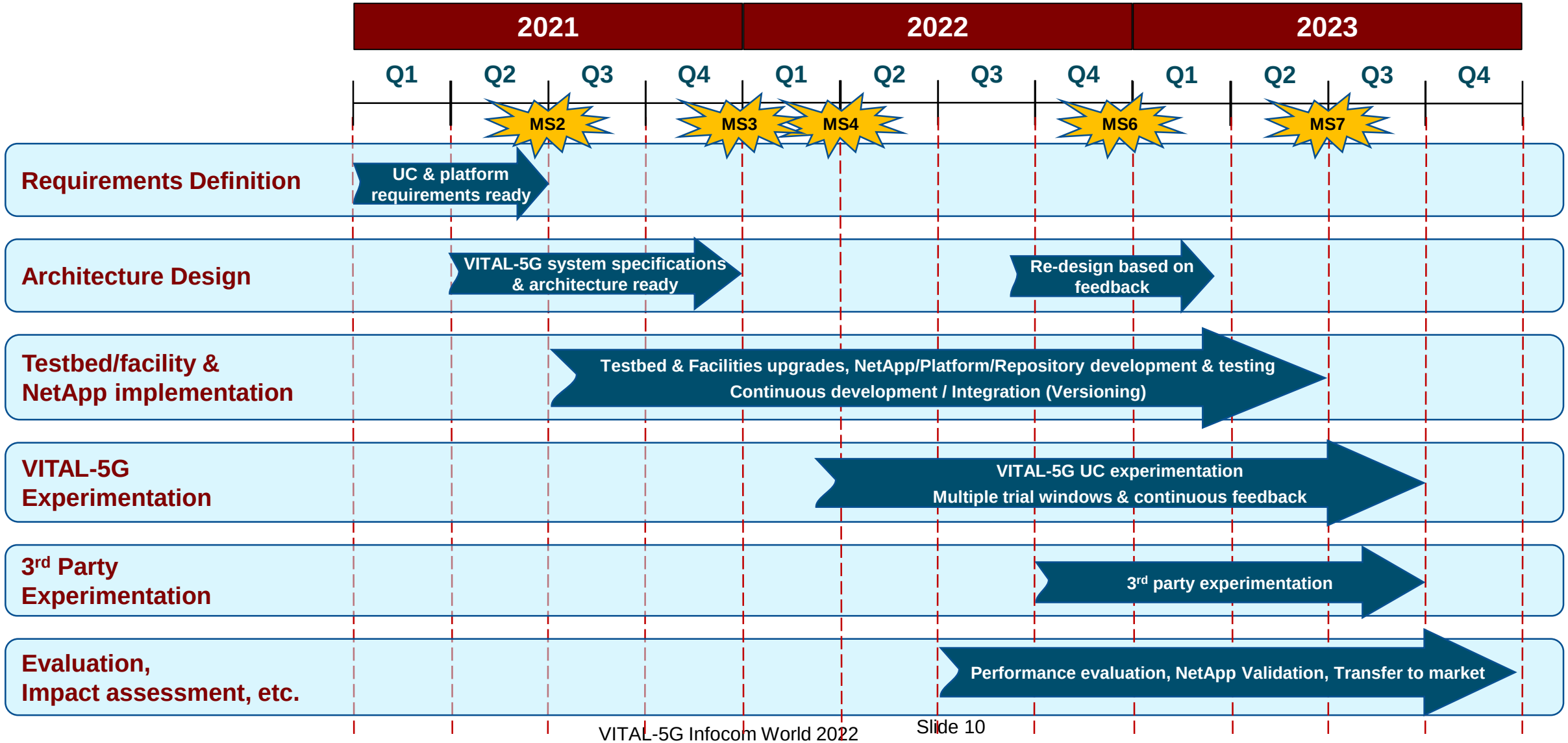
SME/Vertical Experiments

VITAL-5G extensive trialling campaign over state-of-the-art experimentation facilities targeting:

i. Validation of VITAL-5G & External NetApp functionality.
ii. Showcasing of the added value of 5G connectivity for the T&L sector
iii. Performance evaluation & benchmarking of results for various T&L services

- ***VITAL-5G Trials***
  - VITAL-5G partners to perform T&L services evaluations in real-life conditions (3 UCs)
  - Provide feedback based on early trials to further improve the design & functionality of the portal
- ***3rd party experimenters***
  - Originating from the network of commercial contacts of the trial facility owners
  - Possibility to re-use VITAL-5G NetApps or onboard and test proprietary NetApps in real-life conditions
  - Closer-to-market NetApp scenarios
  - Baseline for a T&L NetApp business ecosystem

Timeline


2021
2022
2023
Q1
Q2
Q3
Q4
Q1
Q2
Q3
Q4
Q1
Q2
Q3
Q4
MS2
MS3
MS4
MS6
MS7
Requirements Definition
UC & platform requirements ready
Architecture Design
VITAL-5G system specifications & architecture ready
Re-design based on feedback
Testbed/facility & NetApp implementation
Testbed & Facilities upgrades, NetApp/Platform/Repository development & testing
Continuous development / Integration (Versioning)
VITAL-5G Experimentation
VITAL-5G UC experimentation
Multiple trial windows & continuous feedback
3rd Party Experimentation
3rd party experimentation
Evaluation, Impact assessment, etc.
Performance evaluation, NetApp Validation, Transfer to market

Get Involved!

- VITAL-5G opens its unique 5G experimentation infrastructure to innovative SMEs, startups and researchers in order to develop and test their vertical services
- Three trial sites are available to third parties that will be supported by three 5G-PPP testbeds located in Belgium, Romania and Greece:
  - Antwerp (BE) trial-site: Automated vessel transport, which is tested in the port of Antwerp
  - Galati (RO) trial-site: 5G connectivity and data-enabled assisted navigation using IoT sensing and video cameras, which is tested in the Galati port
  - Athens (GR) trial-site: Automation and remote operation of freight logistics, which is tested in Athens logistics hub
- Please visit https://www.vital5g.eu/get-involved/

Thank you for you attention!

Cosmote S.A.

Georgios Tsiouris

gtsiouris@ote.gr

https://cosmote.gr

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 951867