

5G Networks for Future Railway Communications and Media Industries



VERTICAL DEMOS OVER COMMON LARGE SCALE FIELD TRIALS FOR
RAIL, ENERGY AND MEDIA INDUSTRIES

Presenter: Ioanna Mesogiti, MBA, MSc

Senior R&D Engineer, COSMOTE A.E.



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5G-VICTORI In Brief



ICT-19 Project

“Conducting large scale trials for advanced 5G use case verification focusing on:



Transportation



Energy



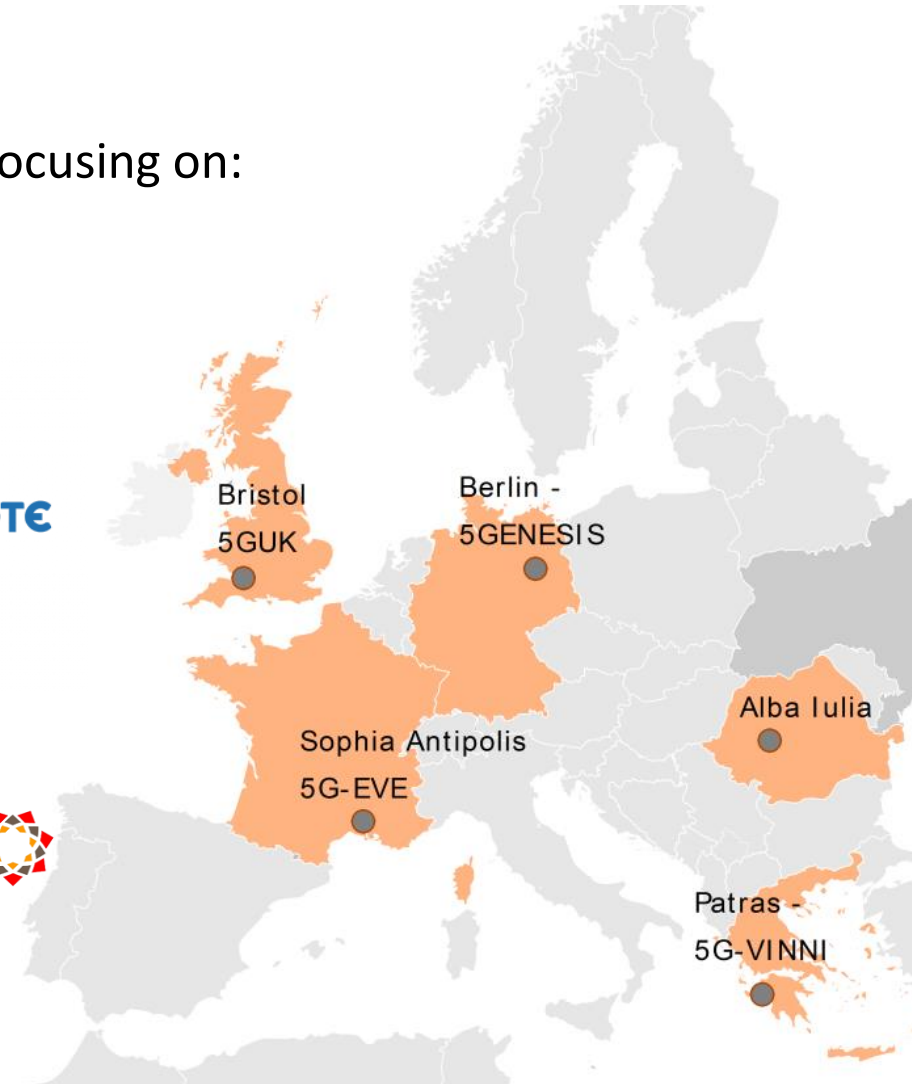
Media



Factories of the future



Cross-vertical use cases



5G-VICTORI Key Objectives



- 5G-VICTORI aims at conducting **large scale trials for advanced vertical use case** verification focusing on **Transportation, Energy, Media & Factories of the Future**, as well as **cross vertical use cases**.
- Design & deploy an open 5G infrastructure:
 - Capable of instantiating challenging vertical Applications even on a single 5G network deployment; substituting multiple legacy vertical specific networks (telecom, rail, energy), moving to "network as a service" model vision
 - Adopting the concepts of slicing and virtualization
 - Enabling flexible deployment of vertical-specific network functions based on service requirements (capacity, latency and reliability).



5G-VICTORI Key Focus Areas

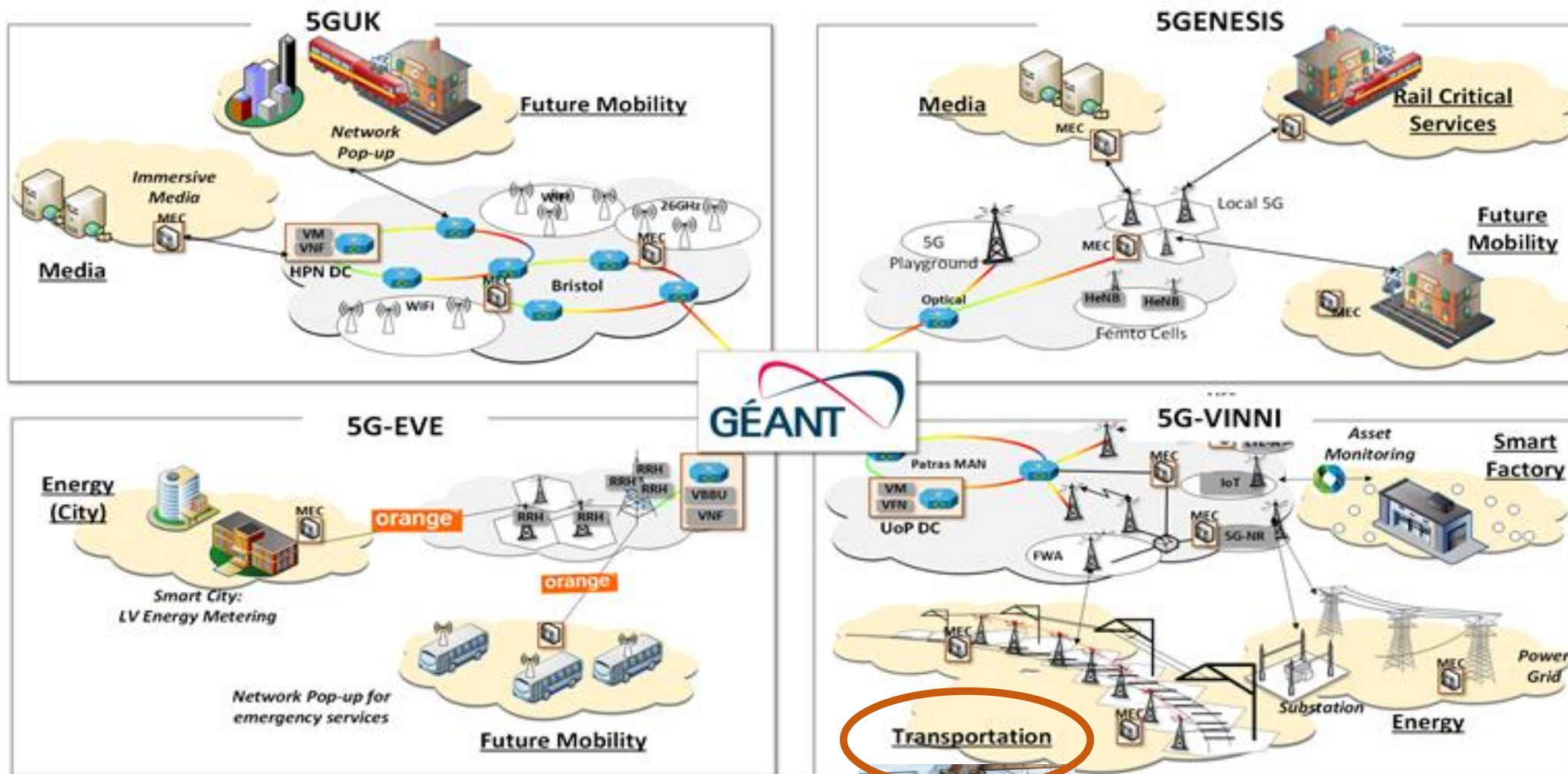


5G-VICTORI will **extend and interconnect** main sites of all **ICT-17 infrastructures** & the **5G UK test-bed** in a Pan-European Network Infrastructure; also with technologies developed in **5G-XHAUL** & **5G-PICTURE** Projects.

- 5G-VICTORI will extend these sites integrating **commercially relevant, operational environments**.
- The 5G-VICTORI will deliver **5G open environments where resources & functions are exposed** to the telecom & vertical industries **through common repositories**.
- 5G-VICTORI will build:
 - **a thin inter-domain orchestration layer** on top of the sites' orchestration solutions for dynamic inter-site connectivity as well as
 - **a more complete inter-domain orchestration solution** providing on-boarding of inter-domain services, end-to-end slice monitoring & management for the deployed end-to-end services.



5G-VICTORI Sites and Vertical Use Cases



Advancements in Railway Communications

Railways Telecommunications Standards (ETSI) focus on:

- Development & maintenance of **GSM-R** standards
- Introduction of the new **Future Radio Mobile Communication System** -  **FRMCS**.



Is a key enabler for rail transport digitalization.

Considers the enablement of specifically defined **Network Services** for:

- **Business Services**, e.g. applications for passengers including advanced guiding services, real time travel information, infotainment services, etc.
- **Performance Services**, e.g. train telemetry and maintenance services, non-critical real-time video (e.g. surveillance) services, etc.
- **Critical Services**, e.g. railway emergency voice communication services (between driver and control centre/dispatcher), train automation etc.

to be met over a technology neutral infrastructure deployment.



Railway Communications Current Environment

- **Various end- users** require multiple, versatile network services.
 - **Railway & Train operators (ROs/TOs)** require performance & critical communication services
 - **Passengers** require business services.
- These services are delivered over multiple networks by a number of national Telecom operators and private networks.
 - **Pushing existing networks** deployed in the railway environment **to their limits**
 - Making it **difficult to guarantee coverage** with national network deployments **along the thousands of Km-extended railway tracks**
 - Taking also into account the **high propagation losses inside the train environment.**



Railway Communications Vision

- ROs/TOs and passengers require even more demanding services in view of FRMCS.
- **A multitenant multi-technology approach is required** for sustainable & efficient deployment in this environment:
 - **Network services over** a network solution, comprising **multiple underlying technologies, integrated with the railway infrastructure.**
 - **Network resources to be shared** between multiple Service Providers e.g. Content Providers, Train Operators, Telecommunication Providers.
- Providing lower Total Cost of Ownership, service flexibility & deployment speed.



5G-VICTORI Solution Specific Aspects

- Converged Deployment comprising:
 - **mmWave**
 - **Sub-6**
 - **Fiber**
 - **3GPP 5G (NR, NSA/SA)**
 - mmWave & Fiber to provide the 3GPP 5G transport layer
 - mmWave, Sub-6 & 5G NR to provide access network connectivity to train
- Network Services (incl. slicing) provided on top.
- **Business Services include Media services** -bridging the two vertical industries:
 - Public networks/ Internet streaming services
 - Content Data Network integrated with the network infrastructure using:
 - **Edge Computing principles**, and
 - **the “Data Shower” concept for VoD services.**



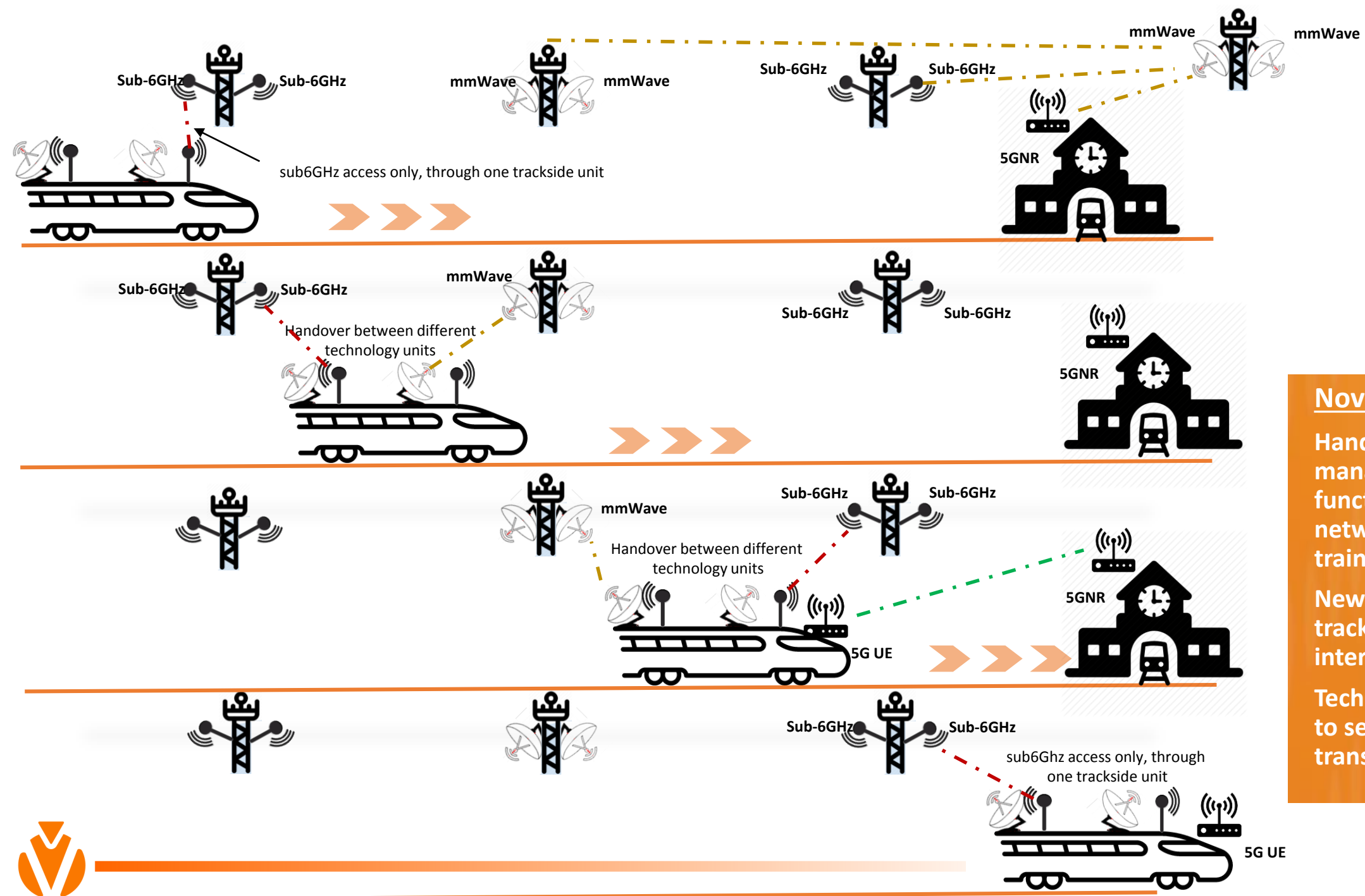
Solution Principles

Novelties

Handover management functions to preserve network sessions as train moves

New technologies for track to train wireless interconnection

Technologies capable to serve as 5G (3GPP) transport network.

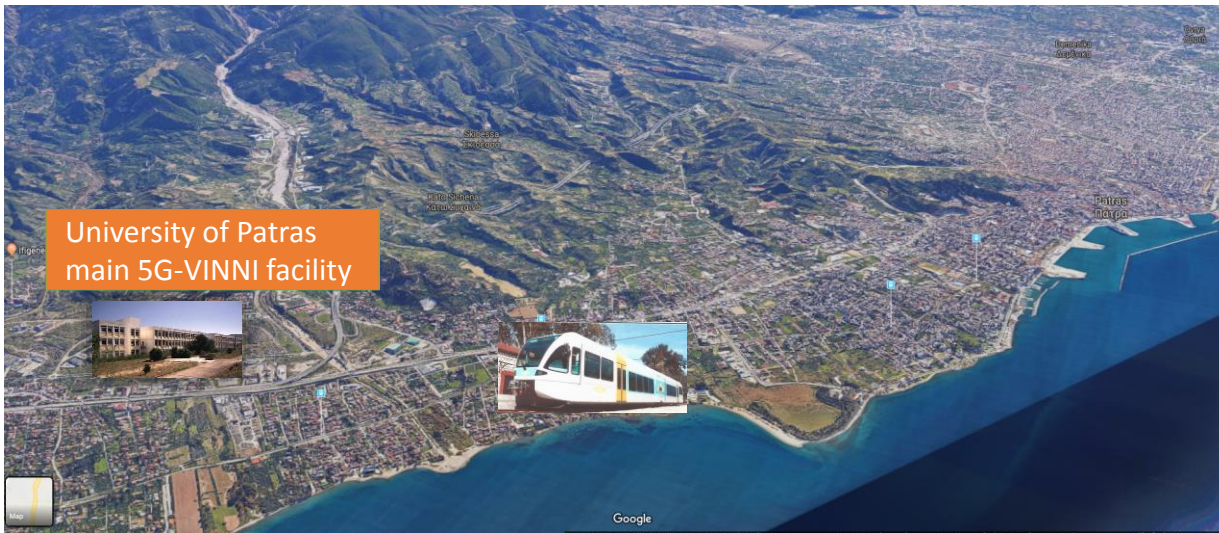


5G-VINNI Facilities in 5G-VICTORI: Patras Site

Demonstration of Transportation and Media (CDN) use cases at the railway demo environment (on-board train) of TRAINOSE in Patras over 5G-VINNI platform.

Services to be demonstrated:

- Rail operation Non-critical services;
 - Track Monitoring with Onboard camera video streaming to Office
- Rail operation Critical services;
 - Mission Critical Push-To-Talk (MCPTT) for Rail services
- Communication services for passengers
 - 5G data services (e.g. TV streaming)
 - VoD services.



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Project Partners



5G-VICTORI's uniquely strong consortium brings together major players from ICT including operators, equipment vendors academic and research organisation and SMEs as well as main players from vertical industries.

Learn more



5G-VICTORI

VERTICAL DEMOS OVER COMMON LARGE SCALE FIELD TRIALS FOR RAIL, ENERGY AND MEDIA INDUSTRIES

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5G PPP

About 5G-VICTORI

5G-VICTORI will conduct large scale trials for advanced vertical use case verification focusing on Transportation, Energy, Media and Factories of the Future and cross-vertical use cases.

It leverages 5G network technologies developed in 5G-PPP Phase-1 and Phase-2 projects 5G-Xhaul and 5G-PICTURE and exploits extensively existing facilities interconnecting main sites of all ICT-17 infrastructures i.e. 5G-VINCI, 5GENESIS and 5G-EVE and the 5G UK test-bed in a Pan-European Infrastructure.

The project will provide enhancements of existing infrastructures towards integration of a large variety of vertical and cross-vertical use cases. 5G-VICTORI's platform aims to transform current closed, purposely developed and dedicated infrastructures into open environments where resources and functions are exposed to ICT and vertical industries through common vertical and non-vertical specific repositories. These functions can be accessed shared on demand and deployed to compose very diverse set of services in a large variety of ecosystems.

Objectives

- Design and prototype an open 5G infrastructure capable of instantiating and co-hosting various vertical sectors. This will be based on leading industry and open source technologies supporting very diverse service requirements with guaranteed QoS adopting the concepts of slicing and virtualization.
- Multiple-5G platform integration to facilitate cross-border operation of vertical industries involving various EU member states, substantially reducing the life-cycle cost of transportation, energy, media and factories of the future.
- Flexible network architecture enabling function deployment and relocation of vertical-specific network functions based on the requirements in terms of capacity, latency and reliability.
- Purposely extend the three 5G-PPP Platforms developed under the ICT-17-2018 and the 5GUK platform with appropriate HW/SW in support of the Transportation, Media, Energy, Factory of the Future verticals.
- Encompass new business model definitions supporting the shift from "network as an asset" to "network as a service" model vision. Replace vertical specific networks (telecom, rail, energy) with public networks supporting in parallel several vertical industries use cases.
- Impactful contributions towards standardisation bodies, involving vertical actors, for what concerns the second phase of 5G standardisation. Participation of key European industrial partners with high standardisation impact is desired.

Verticals



Transportation Energy Media

Factories of the Future Cross-vertical use cases

Use Cases

- "Enhanced Mobile broadband under high speed mobility"
- "Digital Mobility"
- "Critical services for railway systems"
- "Smart Energy Metering"
- "Digitization of Power Plants"
- "CDN services in dense, static and mobile environments"

Website: <https://www.5g-victori-project.eu/>
Linked In: <https://www.linkedin.com/company/5gvictori/>
Twitter: <https://twitter.com/5gVictori>





Thanks for your attention!

5G-VICTORI Project

Project Coordinator:

Jesús Gutiérrez (teran@ihp-microelectronics.com)

Technical Manager:

Anna Tzanakaki (Anna.Tzanakaki@bristol.ac.uk)

