R&D PROJECT

Figure 1-9: Road operator management levels

PROJECT PARTNERS
- RETEVISION I
- FUNDACIO PRIVADA I2CATSA
- EIGHT BELLS LTD
- ATHENS TECHNOLOGY CENTER
- ATOS IT SOLUTIONS AND SERVICES
- ABERTIS AUTOPISTAS ESPAÑA SA
- AXBRYD S.R.L.
- CELLNEX FRANCE SAS
- COMSA INDUSTRIAL
- CENTRE TECNOLOGIC DE CATALUNYA
- HISPASAT SA
- ANADOLU ISUZU OTOMOTIV S.ve T.A.S.
- FUNDACIO BARCELONA MOBILE WORLD CAPITAL FOUNDATION
- IRT ANTOINE DE SAINT EXUPERY
- NEARBY COMPUTING SL
- SNCF
- TERRA3D
- VALEO VISION SAS
- VODAFONE ESPAÑA,
- I NST. DU VÉHICULE DÉCARBONNÉ
- LINEA FIGUERAS PERPIGNAN S.A

BUSINESS AREAS
Technical and Innovation R&D Area COMSA INDUSTRIAL

DURATION
2020 – 2024

BUDGET
Consortium Budget: 15.717.821,75 €
COMSA Budget: 1.972.698,00 €

KEYWORDS
5G, Multi-tenant, CCAM and FRMCS, Network infrastructure

COORDINATOR
Manuel Alfageme

H2020 ICT FUNDING

Title of the project
Sustainable 5G deployment model for future mobility in the Mediterranean Cross-Border Corridor

Acronym
5GMED

Content of the project
5GMed brings together key stakeholders of the “Barcelona – Perpignan” cross-border section of the Mediterranean corridor, including MNOs, road and rail operators and neutral hosts, complemented with innovative SMEs developing AI functions, and selected R&D centers with a proven track record in 5G research and innovation. Given the proximity of the E15 highway and the high-speed rail track in the considered cross-border section, the 5GMed consortium will demonstrate how a multi-stakeholder 5G infrastructure featuring a variety of technologies, including Rel.16 5GNR at 3.5 GHz, Rel.16 NR-V2X at 5.9.GHz, unlicensed mm-wave, network slicing and service orchestration, can be used to jointly deliver CCAM and FRMCS services.

The considered CCAM use cases include Remote Driving in cross-border open roads to enable safe fallback operation in Level 4 autonomous driving, and the massive sensorisation of road infrastructures enabling AI-powered traffic management algorithms in the presence of legacy vehicles. The considered FRMCS use cases include performance services where AI-functions running on the infrastructure side analyze camera feeds from high-speed trains in real-time and business services providing high-speed internet to passengers and in-train neutral hosting capabilities to MNOs.

A Follow Me Infotainment use case will demonstrate live migration of media functions across cross-border scenarios both in automotive and railways environments.

General objectives
5GMed will demonstrate advanced CCAM and FRMCS services along the “Barcelona – Perpignan” cross-border corridor, enabled by a multi-stakeholder compute and network infrastructure deployed by MNOs, neutral hosts, and road and rail operators, based on 5G Rel.16 and offering support for AI functions.

Project tasks
I. Project Management
II. Use Case definition and Trial specification
III. Technological extensions for scalable and multi-tenant 5G Infrastructure in main transport paths
IV. Automotive use case technology development and initial validation
V. Railways use case development and initial validation
VI. Use case validation in cross-border corridor and small scale
VII. Enabling cross-border 5G deployment and business across Europe
VIII. Impact Maximization

R&D PROJECT

Figure 1-5: Road operator management levels

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Results and conclusions

The project has showcased the inter-PLMN handover in UC3 with both HRR and LBO roaming, demonstrating service interruption times reduced from minutes (in non-optimized legacy roaming) to hundreds of milliseconds in all UC3 services. In addition, the project has demonstrated the use of MEC, combined with LBO roaming and distributed UPF, for those delay-sensitive services that require lower latency when the train UE is connected to a visited 5G network, reducing also data traffic at the transport network.

The project has demonstrated the use of multiple Radio Access Technologies (RAT) to provide connectivity between train and ground, improving the performance of UC3 services in those areas where 5G is not available by using satellite and IEEE 802.11ad at 70 GHz. To this end, an Adaptative Communication System Gateway (ACS-GW) has been developed and evaluated to select the most suitable RAT. The features of the ACS-GW, such as the granularity of the forwarding tables, 10 Gbit/sec performance, minimum interruption time introduced during the inter-RAT handover process, or multiple units on ground, have been successfully demonstrated to provide railway communication services across cross-border corridors.

Furthermore, with the ACS-GW units, the network coverage and costs can be optimized combining radio access technologies when necessary, enabling flexibility in the deployment of network infrastructure along railway tracks.

802.11ad technology enables the possibility of providing 1 Gb/s capacity connection services between train and ground, allowing the provision of passenger services (Internet connection, MNO services) while still being able to use this connectivity capacity to provide additional resource-intensive rail services.