PROJECT IN A NUTSHELL

STARTING DATE
01/11/2020

BUDGET
13.3 M€

CALL IDENTIFIER
H2020-ICT-2019-3

DURATION
30 MONTHS

TOPIC
ICT-53-2020, 5G PPP
5G FOR CAM

GRANT AGREEMENT
NUMBER 951725

The Future Railway Mobile Communication System (FRMCS), that will be materially proven by 5GRAIL, is seen by the railway sector as the enabler of train digitalisation, and consequently as one, if not the one, of the major "Game Changers" of DG MOVE strategy for railway Command-Control System evolution. The deployment of 5G FRMCS will open the possibility for railway operators to implement a non-limited list of new applications permitting to optimise train operations and maintenance on one side, and to increase the quality of service to passengers (security, availability, punctuality and information) on the other side, such as for instance:

- **Automated trains:** this major evolution of railway transport, for both freight and passengers, cannot be achieved without FRMCS;
- **New applications,** including video capacity, will become possible;
- **Remote monitoring and surveillance** of vehicle elements (TCMS applications) will be made possible only with FRMCS deployment;

AND MUCH MORE!

PROJECT MANAGEMENT

JEAN-MICHEL EVANGHELOU, Project Coordinator
Head of Telecom & Signaling, UIC

SOPHIE SÉRODON, Senior Advisor, UIC
serodon@uic.org

PROJECT DISSEMINATION LEADER

STEFANOS GOGOS, Technical Affairs Manager, UNIFE
stefanos.gogos@unife.org

HTTPS://5GRAIL.EU

PROJECT PARTNERS

- ALSTOM – France
- CAF – Spain
- DB NETZE – Germany
- DTU – Denmark
- Infraestruturas de Portugal – Portugal
- kontron S&T Group – Germany
- NOKIA – Finland
- ÖBB INFRA – Austria
- SBB CFF FFS – Switzerland
- SIEMENS – Germany
- SNCF RÉSEAU – France
- TELESTE – Finland
- THALES Building a future we can all trust – France
- UIC International Union of Railways – Association
- unife The European Rail Industry – Association
- Université Gustave Eiffel – France

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 951725.

5GRail

An additional milestone towards the digital journey

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 951725.

PROJECT OBJECTIVES

FRMCS will be the 5G worldwide standard for railway operational communications, conforming to European regulation as well as responding to the needs and obligations of rail organisations outside of Europe.

The work on functional & technical requirements, functional and system specification, standardisation in 3GPP as well as regarding harmonised spectrum solutions is currently led by UIC, in cooperation with the whole railway sector. A major challenge is the update by the European Railway Agency of the Technical Specification for Interoperability of Control Command and Signalling (CCS TSI) by the end of 2022 with a full description of FRMCS with respect to functionalities for interoperability.

Therefore, the main objective of 5GRAIL is to validate the first set of FRMCS specifications (also called FRMCS V1) by developing and testing prototypes of the FRMCS ecosystem, for both trackside infrastructure and on-board. Regarding on-board, 5GRAIL aims to reduce specific equipment costs and installation engineering time by combining all train-to-ground communications by enabling a modular on-board setup based on standardised interfaces and including mainstream 5G components, called TOBA (Telecom On-Board Architecture), in alignment with the sector's technical vision.

Prototypes will be developed based on agreed set of use cases (FRMCS V1) and tested in simulated and real environments, rolled out in various European sites (France, Hungary and Germany). This will be done in order to ensure compliances and validation for specification, standards and performance, and consequently guarantee the time to market for FRMCS products, planned for 2025 as per European timeline.

PROJECT STRUCTURE

5GRAIL will span a period of 30 months and is divided into 8 WPs, six of which will focus on research and development, test, field implementation and evaluation and two on coordination and dissemination.

- **WP1** FRMCS tests definition, tests results consolidation and specification review
- **WP2** TOBA prototypes development
- **WP3** Validation of ETCS, Voice, TCMS and CCTV/Video within TOBA – Laboratory tests
- **WP4** Validation of Data, ETCS, ATO and Cybersecurity within TOBA – Laboratory tests
- **WP5** Field Implementation and Evaluation
- **WP6** Rail and Road communication systems coexistence
- **WP7** Dissemination, Communication and Exploitation
- **WP8** Project Management and coordination

5GRAIL PROJECT STRUCTURE

FRMCS

In 1997, the railway sector decided to implement in Europe a unified system for Control-Command and signalling, ERTMS (European Railway Traffic Management System) in order to facilitate the train operations all over Europe and the cross-border traffic, in the perspective of the liberalisation of railway transport with the definition of major European corridors. ERTMS, made of two components, ETCS (European Traffic Control System) and GSM-R (GSM for Railways), was then fully specified and included in the European regulation (CCS TSI, Control-Command System Technical Specification for Interoperability), and national railway companies started to implement progressively both ETCS and GSM-R, replacing their legacy systems. Inside ERTMS, GSM-R has been clearly successfully adopted, with a deployment estimated in Europe around 140,000 km of tracks.

The European railway sector concluded these last years to the necessity to evolve the European Railway Traffic Management System (ERTMS). This evolution, as per the strategic plan of the DG MOVE, is based on the introduction of "ERTMS Game Changers", namely ATO (Automatic Train Operation), optimised braking curves, ETCS Level 3 (reducing the track side components of ETCS), enhanced positioning of trains, cybersecurity measures and FRMCS (Future Railway Mobile Communication System), the later one being the enabler for all the others.

All this is driven primarily by the announced obsolescence around 2030 of the radio technology currently used in ERTMS (GSM-R) and the necessity to study the conditions of migration of the European GSM-R installed base.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 951725.