

# E-GNSS IN RAIL SIGNALLING ROADMAP



## GSA/ERA

Coordination of the roadmap with rail (e.g. CER, EUG) and GNSS stakeholders and support user and industry initiatives (e.g. UNIFE/UNISIG or Shift2Rail) from GNSS perspective through H2020, consultancy and involvement of experts and institutions from GNSS fields (ESA, JRC, ESSP...)

## ESA

Support GNSS and Rail stakeholders in coordination with GSA in the field of user requirements, architecture and system concept design, and laboratory testing, especially in connection with receiver development

## ERSAT EAV

Verification of E-GNSS suitability for safety railway application in the Low-density line scenario

## SHIFT2RAIL IP 2

Finalisation of GNSS-based Train Positioning architecture and support with testing and certification activities (through S2R Members and Open call projects).

## 3INSAT

Demonstration of SatNav & SatCom use on Low-density lines

## CBA

Preparatory activities for CBA in rail signalling

Independent cost benefit analysis based on final technical architecture and operational scenarios

## GALOROI/SATLOC

Definition of elementary concepts and architectures for potential E-GNSS based railway signalling applications.

User consultation platform for validation of user requirements and progress towards adoption of GNSS in rail signalling with participation of railway users and industry experts

Availability of GNSS enabled and certifiable train positioning system for ERTMS

## RHINOS

International collaboration project to develop a Railway High Integrity Navigation Overlay System for rail

## ERSAT GGC

Contribution to the certification process enabling EGNSS adoption through delivery of a certified enhanced functional ERTMS Architecture that includes the SIL 4 train positioning function also based on the Galileo constellation and the EGNOS Augmentation.

Application oriented H2020 projects in 3rd / 4th call

## NGTC

Definition and quantification of GNSS parameters relevant for the signalling application in railway environment

## STARS

The assessment of the E-GNSS performances achievable in the railway environment with the determination of the applicable requirements for the positioning system as well as the necessary evolutions of E-GNSS services and ERTMS/ETCS functions

## RECEIVER DEVELOPMENT

GSA Fundamental Elements programme-Receiver development, based on the requirements identified in frame of R&D activities carried out within GSA, S2R or ESA R&D programmes

## LABORATORY TOOLS AND TECHNOLOGY SUPPORT

- Activities for development of laboratory tools such as a GNSS simulation testbed and comprehensive multipath, EMI and intentional interference (spoofing and jamming) models to support testing in railway environments under nominal conditions and fault injection
- GNSS receiver technology support activities focusing on advanced integrity algorithms and techniques, and resilience against intentional interference
- System studies focused on broad PNT solutions (SBAS/GBAS/hybrid/ARAIM), in particular SBAS, to support attainment of required integrity performances for GNSS positioning in ERTMS

## CERTIFICATION

Development of the rail certification roadmap

Implementation of the certification roadmap, opening doors to potential certification of GNSS components of the train positioning subsystem in collaboration with the ERA

## DG GROW/DG MOVE

Establish a collaboration platform between DG MOVE and DG GROW to support E-GNSS inclusion in ERTMS

## UNISIG

Performance tests in frame of R&D and joint activities with UNISIG (H2020 2nd call STARS):

- Definition of railway environment regarding future use of E-GNSS
- Validation of E-GNSS performance in geofenced rail environment (focus on EGNOS & integrity)
- Analysis of multipath and its impact on safety

## UNISIG/RAIL SECTOR

Finalisation of user requirements on GNSS receiver

Finalisation of train positioning subsystem architecture using GNSS

## ERA/UNISIG/EUG

Implementation of technical solution into ERTMS specifications

2015

2016

2017

2018

2019

2020

2021

2022

### THE EUROPEAN GNSS AGENCY IS WORKING TOGETHER WITH RAIL AND SPACE INDUSTRY STAKEHOLDERS TO ENABLE THE USE OF SATELLITE-BASED POSITIONING FOR RAILWAY SIGNALLING

At the heart of this multi-stakeholder initiative lies the European Train Control System (ETCS), which is now being adopted both in Europe and beyond, as one of the components of the European Rail Traffic Management System (ERTMS). At present, in ETCS the positioning of the train is based on "balise", a physical element mounted at specific intervals along the railway track. The goal is to ensure that wherever possible, the physical balises can be replaced by virtual ones, based on precise, GNSS-based positioning without any operational or safety implications on the ETCS. The roadmap below summarises the main projects currently running and planned, as well as the involvement of the various stakeholders interested to achieve the objective of E-GNSS enabled ETCS together with the GSA.

