



GEARS

GalilEo Authenticated Robust Timing System

Orolia has been selected by the European Commission on several occasions to coordinate the development and commercialization of Galileo related applications.

This document will provide you with more details about the GEARS project, led by Orolia to provide a Galileo based timing receiver for Critical Infrastructure using Galileo's open service navigation message authentication (OS-NMA) system.



European
Global Navigation
Satellite Systems
Agency

Why a New Timing Receiver?

Precise timing is critical for a wide variety of economic activities around the world.

Communication systems, electric power grids, and financial networks all rely on accurate and reliable timing for synchronization and operational efficiency.

In order to protect residents and strengthen economic security and resilience, the EU applies a systematic process to identify Critical Infrastructure and improve their protection.

Dedicated studies have highlighted Critical Infrastructure's dependence and reliance on GNSS services, and the resulting weakness. They stress that increasing the resilience of timing and synchronization services is an essential requirement for industries such as energy, finance, communication, transportation, utilities and defense.

The market expects new features that are not currently available today.

The Galileo Authenticated Robust Timing System (GEARS) solution.

The GEARS project aims at providing a Galileo-based timing receiver for Critical Infrastructures using Galileo's open service navigation message authentication (OS-NMA) system to protect the receiver against jamming and spoofing attacks.

The prototype to be developed and validated will embed relevant new technologies and innovations already identified as strong candidates by the GNSS community to reach the necessary level of security and robustness.

About OS-NMA

Galileo's open service navigation message authentication (OS-NMA) system enables GNSS receivers to ensure that the satellite signals they receive are, indeed, from Galileo satellites, and that they have not been modified. The approach makes it more difficult for hackers and other bad actors to spoof GNSS receivers by feeding them fraudulent signals.



GEARS – New safety and security architecture for timing

GEARS will enable the enhancement or creation of several new elements of safety or security at different layers with a focus on three new building blocks:

1. GUARD: CRPA technology for RFI suppression specially designed for infrastructure
2. IDM Receiver: reinforced, secure Multiple Constellation and Multiple Frequency (MCMF) Galileo and other GNSS receivers with NeQuick correction (when used in single frequency) and OS-NMA authentication
3. Secured and Safe Clock: can be used to build a fully redundant timing system with no single point of failure and high availability.



Focus on GEARS IDM Receiver

Resilience:

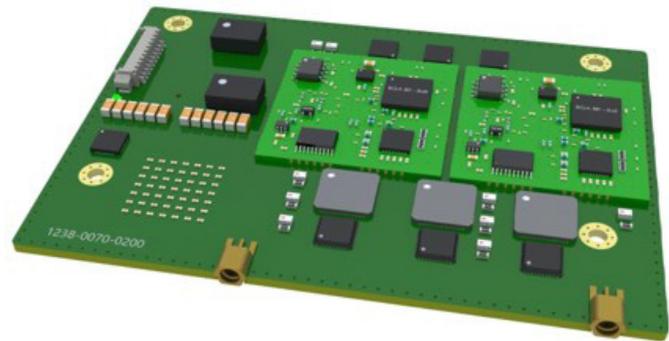
- Digital filtering of most RFI before correlation
- Filters the top five main types of jamming: Wide Sweep (fast repeat rate), Multiple Narrow Band, Triangular, Tick Type and CW
- Supports Galileo, other constellations and three frequency bands

Integrity:

- Dual receivers use two constellations simultaneously but separately i.e. Galileo and GPS for example
- Supports OS-NMA authentication mechanism

Ease of Use:

- Can be integrated in Orolia clocks and GUARD but also works with any other applications
- GNSS signals and data sent fully digitalized in high resolution





The GEARS Project

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Abstract

Orolia has been awarded an up to €1.7 million grant by the European Global Satellite Navigation Systems Agency (GSA) to develop a resilient time and frequency server to protect critical Global Navigation Satellite System (GNSS)-reliant systems. The Galileo Authenticated Robust Timing System (GEARS) project will deliver accurate and highly robust Galileo-based time and frequency data for critical infrastructure.

Objectives

The prototype to be developed and validated through the GEARS project will embed relevant new technologies and innovations already identified as strong candidates by the GNSS community to reach expected security and robustness.

Thanks to performance and economic criteria shared throughout the project between the consortium (Orolia, FDC, NLR, NLS-FGI and NavCert) and a large committee of stakeholders, a new mature timing receiver will be ready for operators soon.

The key objectives of the GEARS project are:

- OBJ# 1 Improve performances and resilience of Galileo and GNSS Timing receiver
- OBJ# 2 Develop and demonstrate the effectiveness of unique Galileo services to operators
- OBJ# 3 Strengthen market adoption through standardization measures



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