



EU SPACE

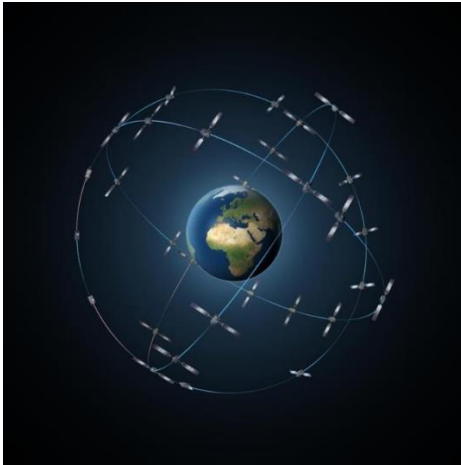
Galileo Programme Status

ICG 17

Madrid, October 2023

Juan Pablo Boyero, European Commission (EC)

GALILEO TODAY



Space Segment: 28 Satellites in Orbit

- 23 in Service for Navigation
- 2 Auxiliary
- 24 in service for Search and Rescue

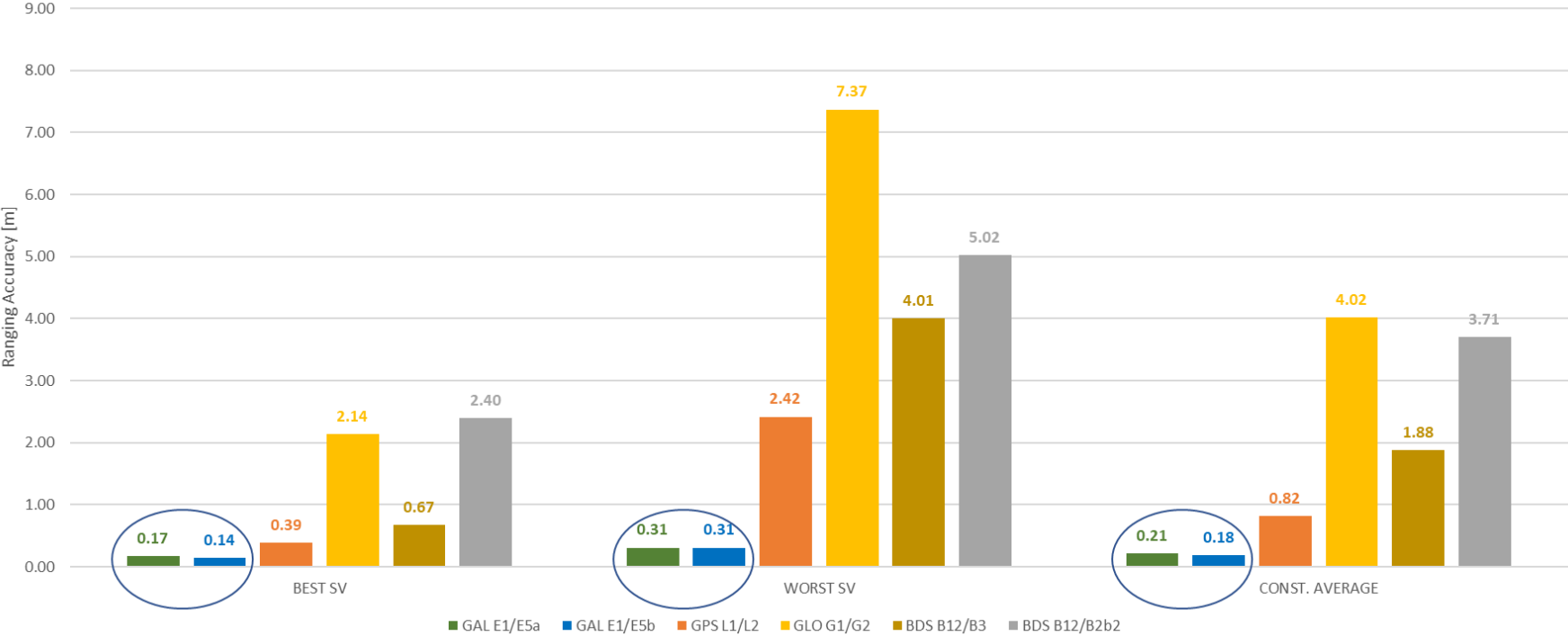
Programme Highlights

- Initial Services provision
- Remarkable performance
- Strong link with users, market and industry
- G2G Development on-going



GALILEO DELIVERS OUTSTANDING PERFORMANCE WORLDWIDE

Ranging Accuracy, 95% @ AUL - Dual-Frequency - June 2023



GALILEO SERVICES PORTFOLIO

Now, Then, & Next



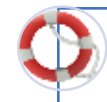
Open Service (OS)

- Free and Open Positioning Navigation & Timing (3 frequencies)
- Emergency Warning Satellite Service + Timing Service + Space Service Volume



Public Regulated Service (PRS)

- Encrypted, more robust, unlimited & uninterrupted access
- PRS evolutions



Search and Rescue (SAR) - contribution

- Forward link + acknowledgement "return link"
- Remote Beacon Activation + Two Way Communication + Distress Position Sharing



High Accuracy and Authentication

- High Accuracy Service
- OSNMA + Advanced signal authentication services



Safety-of-Life (SoL) - contribution

- Advanced Receiver Autonomous Monitoring (ARAIM)
- SBAS Dual Frequency (EGNOS Version 3)





Galileo Navigation Open Service Status

- Navigation Performance better than the Minimum Performance Levels defined in the Galileo OS Service Definition Document
- Enhanced Service Declaration end 2023/beg 2024
- Full Operational Capability (OS FOC) Declaration expected 2025

Search And Rescue Service Status

- Performance better than the levels defined in the Galileo SAR Service Definition Document
- Excellent Forward Link / Return Link Availability $\geq 99.9\%$ / 99.8%
- 4 Galileo MEOLUTs cover 20% world surface; further increase can be achieved through networking
- New Services under preparation
 - Remote Beacon Activation
 - Two-way communication (with predefined distress Q&A helping the rescue mission)
 - Distress Position Sharing: Emergency centers can contact Galileo to share the position of a beacon in distress with other nearby users. Enable quicker rescue.

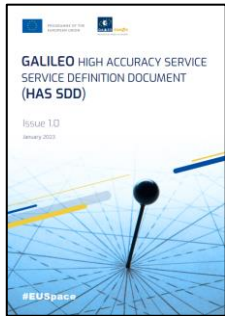


Performance Reports available at the European GNSS Service Centre website

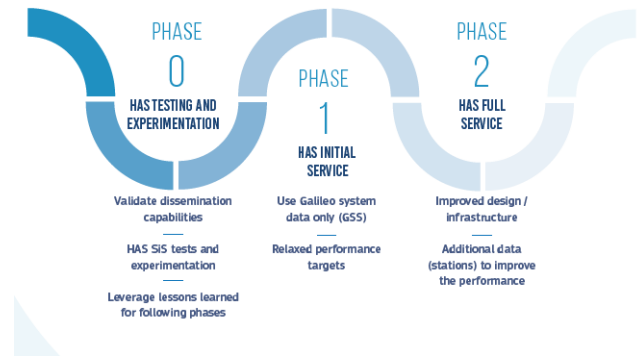
<https://www.gsc-europa.eu/>



High Accuracy Service Status



- Initial Service Declared in January 2023 – Service **Operational**
- HAS Service Definition Document available
[Galileo-HAS-SDD_v1.0.pdf \(gsc-europa.eu\)](https://gsc-europa.eu/Galileo-HAS-SDD_v1.0.pdf)
- Full Service Declaration expected in 2025



Initial Service



- Targets 20/40cm horizontal/vertical accuracy (95%)
- Very good performance since start of Service
- Increasing demand after the HAS Declaration - current status: 225+ registered users including (Google Inc., Broadcom US, Furuno, Kongsberg, Fugro, Trimble, U-Blox, etc.)



Open Service Navigation Message Authentication (NMA)

- OS NMA - Long awaited GNSS feature
- OSNMA SIS ICD and guidelines published in 2022
- Transition to final signal broadcast in July 2023
- Public Testing Phase ongoing
- Initial Service planned by beg 2024



Galileo Commercial Authentication Service (CAS)

- Allows derivation of user Position, Velocity and Timing solutions authenticated
- Initial Service: Assisted CAS (ACAS)
 - Testing in 2024
 - ACAS Initial Service in 2025



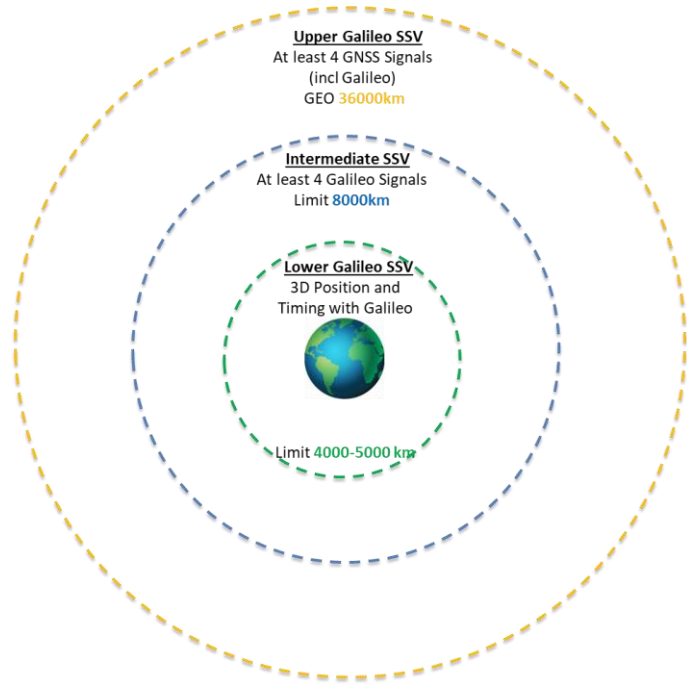
Galileo Contribution to **Safety of Life**

- Galileo already recognized for Civil Aviation
 - Formal adoption by ICAO of the Aviation Standards in March 2023
- Galileo will support Advanced Receiver Autonomous Monitoring
 - Initial Service, based on ARAIM parameters commitments, will follow OS FOC Declaration
- Galileo will support Dual Frequency Multiconstellation SBAS
 - Initial Service, based on Commitments needed for EGNOS v3, will follow OS FOC Declaration

Galileo **Emergency Warning Satellite Service**

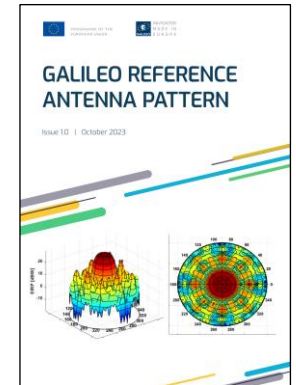
- Service offered to National Civil Protection Authorities to broadcast alerts and associated guidance to targeted areas within minutes
- Demonstration phase on-going to showcase the end-to-end concept: confirm user interfaces, functionalities, performance
- Support the adoption by the civil protection authorities: collect feedback in support of Initial Service
- Initial Service: 2025





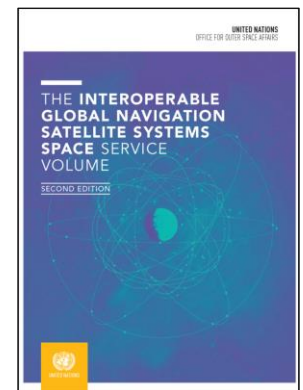
Galileo Space Service Volume

- Galileo stand alone 3D Position and Timing up to around 4500 km
 - Higher than GPS thanks to higher MEO orbits
- Unique Galileo services fully available in LEO
- Multi-constellation for higher orbits
- Publication of the Galileo Reference Antenna Pattern



International Cooperation

- UN International Committee on GNSS defines, promotes an Interoperable GNSS SSV for the benefit of GNSS space users
- “SSV Booklet”, 2nd Edition ICG-15, 2021. Executive Summary publication in multiple languages coming up



LEO PNT

R&D Actions launched to study options for LEO PNT, covering

Signals of Opportunity

- PNT measurements derived from 3rd party signals with Ad-hoc monitoring to support PNT service

Fused PNT with Satcom

- PNT measurements derived from satcom signals, tailored for PNT

Purpose-built LEO-PNT

- PNT measurements derived from PNT signals
 - Dedicated constellation
 - Hosted payload

LEO-PNT fully complementary & boosting Galileo



THANK YOU

<http://ec.europa.eu/galileo>