Galileo Programme Status

ICG-16 2022
Abu Dhabi

European Commission (EC)
European Space Agency (ESA)
European Union Agency for the Space Programme (EUSPA)
Visit the GNSS Service Centre website [www.gsc-europa.eu](http://www.gsc-europa.eu) for more details on Galileo Services performance.
• Roadmap to Open Service Full Operational Capability
• Two additional launches required (L12/L13) to ensure one spare satellite per plane, initially planned using Soyuz Launcher
• Consolidation of launch plan on-going with Arianespace based on development plan for Ariane 6-2 Launcher
• Service availability already 98-99%
• New ground segment deployed
• New satellite software to bring INAV message improvements (Faster acquisition and data robustness)
• Improvements do not depend on completion of the constellation
• Target Q1 2023 for New OS Service Definition Document including extended operation mode, faster incident notification and other improvements
• **Long awaited GNSS feature becoming a reality!**

• **OSNMA SIS ICD and receiver guidelines for Public Observation ready since Nov’21**

• **OSNMA stably transmitted worldwide in E1B for almost one year**

• **Initial Service declaration foreseen for first half of 2023**

• **First OSNMA receivers in the market available**
High Accuracy Service

- HAS SIS ICD available since May ‘22

- Since July ‘22, HAS signal also available worldwide with orbit and clock corrections and biases for Galileo (E1, E5a/b, E6) and GPS (L1C/A, L2C)

- Still in validation phase, but very high performance already!

- Initial Service declaration foreseen for end ’22, including an internet-based correction distribution service
Search and Rescue

– Service performing extremely well
  • *forward link* (since Dec 2016)
  • *return link* (since Jan 2021)
– EU Coverage with 3 MEOLUT
– Extension to Indian Ocean with 4th MEOLUT in Q1 2023 (Reunion Island)

New features coming:
• EUROCAE approved *remote beacon activation* from 2023
• Quicker rescues enabled via *distress beacon position sharing*
• Two-way communication possible using return link feature
Emergency Warning Service

- On-demand broadcast (L1 band) of alerts and guidance to population at risk
- Alert activation decided by national civil protection
- Public demonstration phase Q1 2023 to Q3 2023
- Service declaration 2024

Advantage of Galileo EWS:
- Reaches population at large scale in ~ 1 minute
- No specific equipment needed. Simply a user terminal with Galileo chipset in it
- Available also when terrestrial alert systems are down (collapsed or saturated)

COMMON STANDARD NOW AGREED WITH JAPAN
Other Services coming

- Advanced timing service
- Space Service Volume
- ARAIM for safety of life application
- Contribution to ionosphere prediction
Support to Users

Market development & User Consultation
EUSPA

- Performance monitoring and reporting
  - Galileo Reference Centre

- Testing lab for new features
  - Joint Research Centre

- Service notice, NAGUs, Helpdesk, training, support to startups
  - Galileo Service Centre

- Receiver developments
  - Fundamental elements programme
  - Bilateral agreements with manufacturers
• Legal basis and requirements baseline in place
• Budget available
• Fast Track towards Galileo 2\textsuperscript{nd} Generation
• R&D activity in parallel to maintain security of supply and study emerging concepts for GNSS (LEO-PNT)

From R&D....

2013-2019
EGEP & H2020 Technologies and System Studies

2020
System, Satellite and Ground Procurements

2025-2026
First G2G Satellites & G2G IOV

2028
G2G Initial Operational Capability

2031+
G2G Full Operational Capability

...to launch and exploitation !
Resiliency Above All

- GNSS applications are ubiquitous and need additional resilience
  - Resiliency of GNSS (signals modulation/power, authentication, receivers, antenna, ..)
  - Interference / Spoofing detection capability (on ground, inside receiver, through space)

- LEO PNT -> target new missions and exploit synergies with EU Secure Connectivity initiative
- Alt PNT -> Testing and Demo Day in Joint Research Centre
- New version of European Radio Navigation Plan
- Regulatory actions in Europe and at ITU
Galileo Constellation Status:

Navigation (23 in service)
Search and Rescue (25 in service)

- 28 satellites in orbit
- 3 not usable
- 1 spare
- 1 unavailable
- 2 no SAR (by design)

GSAT 104 (Spare, NAVANT failure), relocation from C05 to C14 completed on 12/05/2021

GSAT 204 (Spare, SAR off), relocation from B03 to B14 completed on 06/05/2021 (NAGU 2017045)

GSAT 201/202 (set to unhealthy)

GSAT 210 currently Not Usable ((DVS=WWG), NAGU2022035)

L11 slots on Plane B: B03, B15

GSAT223/224 entered into Service on 29 August
As-observed Ranging Performance

STABLE

• Very stable Signal In Space Ranging Error (SISE) trend → 0.22m (95%) all satellites, in July (FNAV)
Galileo Timing Accuracy

STABLE

- Evaluated with calibrated timing GPS/Galileo receiver operated in UTC(k) laboratory (PTB, INRIM)

Broadcast UTC offset

- 5.0ns (95%) < 30ns IS target

GGTO accuracy

- 3.0ns (95%) < 20ns IS target
Working together as a team