

THE EGNSS4RPAS PROJECT

pursues the standardisation of EGNOS & Galileo services for drones, RPAS and UAV operations.

WHY EGNSS STANDARDIZATION FOR DRONES, RPAS AND UAVS?

EGNSS standardisation is necessary to develop the specific requirements for drones, RPAS and UAVs. Once these standards are defined, the added value of EGNOS & Galileo can be shown to the worldwide drone community.

KEY FINDINGS

- Higher availability and accuracy provided by Galileo and EGNOS ensure route and landing optimisation along the entire UAV operations.
- EGNOS' integrity enhances resilience to cybersecurity and promotes safety and the risk reduction impacts insurance costs for the operators.
- No additional cost is foreseen as Galileo and EGNOS are becoming standard in mass-market receivers.

Galileo and EGNOS add significant value across four distinct Global Satellite Navigation System (GNSS) user requirements:

- Multi-constellation including European GNSS provides better performances than GPS stand-alone in terms of accuracy, availability and continuity
- Multi-constellation provides enhanced robustness to potential GPS failures
- EGNOS provides integrity, which is necessary for Safety-of-Life applications such as those required in some drone operations
- Galileo and EGNOS will offer added value services such as the Galileo High Accuracy Service and the Galileo Authentication Service, that will address vulnerabilities to interference



More information:
www.gsa.europa.eu/segment/aviation



THIS PROJECT IS FUNDED BY
THE EUROPEAN UNION



**GALILEO & EGNOS
IN DRONES**

The EGNSS4RPAS
project

Implemented by:





The EGNSS4RPAS project consortium **contributed to the works in various standardisation bodies and Working Groups.**

Successful contributions led to the inclusion of EGNSS in upcoming documentation, issued by some of these standardisation bodies as shown in the table below:

Body – Document name	Consortium contribution	EGNSS technology
EASA – Risk assessment methodology (SORA)	Critical assessment. As a consequence, EUROCAE WG-105 SG62 was created to develop GNSS guidelines	Galileo and EGNOS
EUROCONTROL/EASA – Common Altitude Ref. System (CARS)	Trial results used an example how baroaltimeter and GNSS are used to ensure vertical separation	Galileo
ASD-STAN – EN 4709-001	Proposed modified test to the height limitation test using GNSS or other technologies	Galileo
EUROCAE – Geofencing and Geocaging MOPS	A GNSS-based acceptable mean to compute the margin where the system will provide an alarm or activate the FTS. SBAS receiver specifically mentioned for high grade of containment	Galileo and EGNOS
EUROCAE – GNSS guidelines for SORA	Active participation in its development with discussions on GNSS requirements for low, medium and high integrity	Galileo and EGNOS

UAVs equipped with Galileo and EGNOS are more cost-effective than GPS-only solutions for last-mile delivery:



Biomedical samples delivery with UAVs is at least 20% faster and almost 70% cheaper than with e-van under normal traffic conditions. GPS+EGNOS solution also would save up to €0.03 per delivery versus GPS-only.



In **food delivery**, GPS+EGNOS enabled UAVs is almost 50% cheaper than with e-bikes. This solution would save €0.02 per delivery versus GPS-only one.



Parcel's delivery with UAVs would cost less than EUR 1.50 per delivery and GPS+EGNOS solution is €0.01 cheaper than GPS-only. In a business where volumes are high, this could represent important savings. In Brussels alone, benefits could reach over €200,000 per year.



Three trials were performed throughout the EGNSS4RPAS project:



Trials 1 and 2 took place at the dedicated **ATLAS testing facility** in Spain



Trial 3 took place in the **urban environment** of Villacarrillo, Spain.

The GNSS performances when using GPS-only, Galileo-only, GPS+Galileo and GPS+EGNOS were analysed, including performance with static and dynamic geofencing and geocaging as well as a simulation of a C-2 link loss.

Key benefits demonstrated with EGNSS trails for drone operations:



Across all flights, **GPS+Galileo solutions showed superior performance in terms of accuracy** than single-constellation solutions or GPS+EGNOS



Galileo on top of GPS improves **drastically availability and robustness** of the navigation signal



For in-flight phases, **protection levels provided by EGNOS are a differentiator** vis-à-vis other GNSS solutions and are a potential enabler of **critical applications** requiring high levels of signal integrity



European GNSS solutions are a pivotal element for the **safety of drone operations in cities**, boosting the **public acceptance** and therefore business.