EGNOS BULLETIN

Issue 42, Autumn'24 Edition

BIEG, Egilsstaðir Airport. Credits: Isavia ANS

EUSPA European Union Agency for the Space Programme

#EUSpace

https://egnos.gsc-europa.eu/
https://edas-maritime.gsc-europa.eu/

ESSP

https://www.essp-sas.eu/

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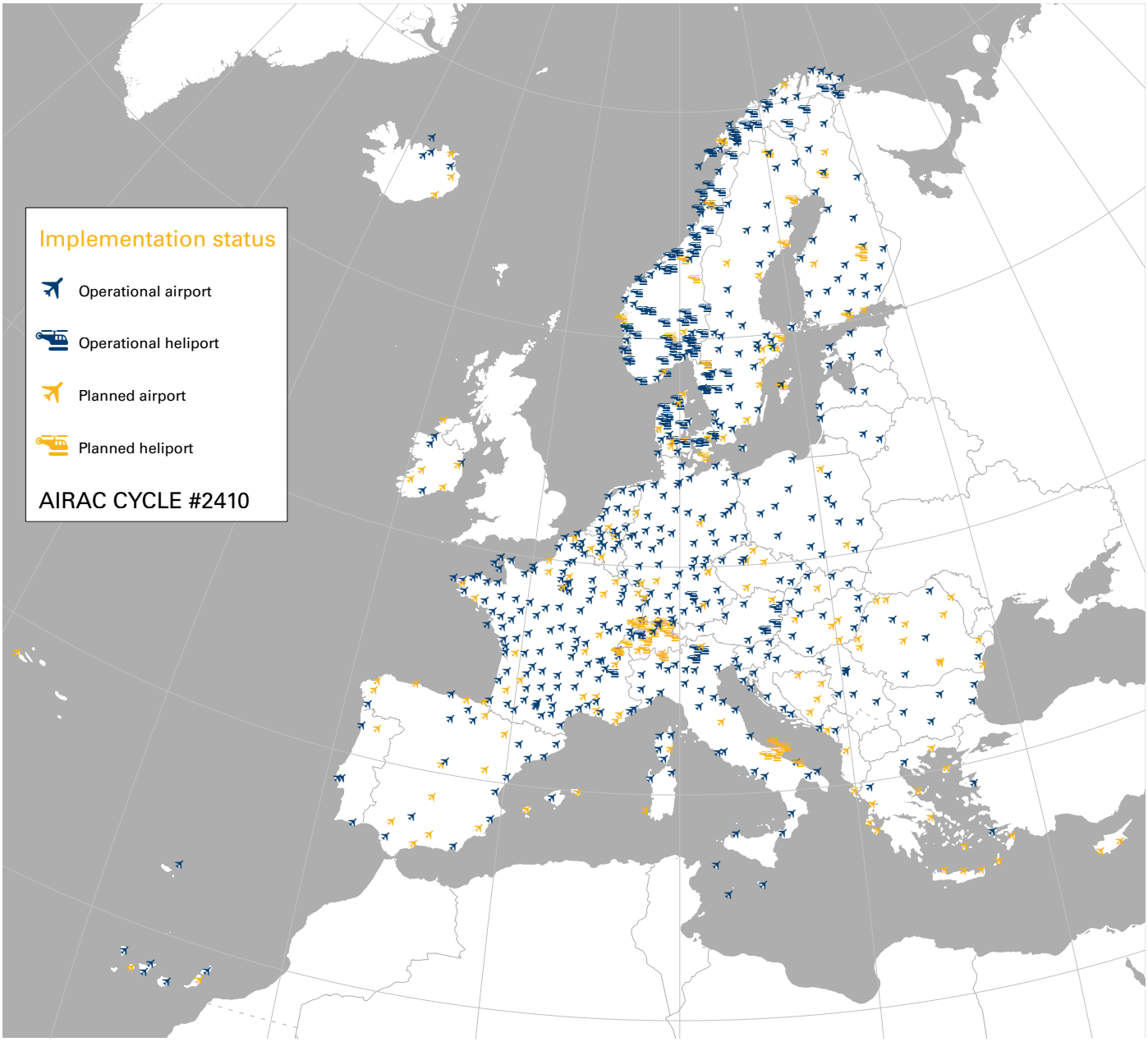
EGNOS implementation



EGNOS Success Stories

EGNOS IMPROVEMENT WITH THE SYSTEM RELEASE 2.4.2B: ISAVIA

ESSP engaged with Isavia ANS, the Icelandic Air Navigation Service Provider (ANSP), to highlight how the latest version of the EGNOS system has enhanced its performance at Icelandic airports with LPV procedures in place.

Credits: Isavia ANS

In November 2023, EGNOS System Release 2.4.2B, the latest version of the EGNOS system designed to offer improved performance, entered into service. Among the most notable advancements are increased expanded coverage and greater overall system reliability.

A significant highlight of version 2.4.2B is its increased robustness against the effects of Solar Cycle 25, which is expected to peak in 2025. Over the past two years, EGNOS has suffered from underperformance caused by ionospheric disturbances that are not only more recurrent but also have a deeper impact. This cyclical behaviour of the sun's geomagnetic activity is repeated over 11-year periods. For this reason, this update has focused on strengthening ionosphere monitoring and adding the RIMS KUU in Kuusamo (Finland), significantly improving the signal performance in the north.

Since its deployment, performance has improved noticeably, particularly in the northern regions of the EGNOS Service Area, for both APV-I and LPV200 service levels. Iceland, in particular, has seen significant enhancements in these areas.

ESSP spoke with Steinunn Arna Arnardóttir, Manager for ATS Procedures and a former Air Traffic Controller at Isavia, to evaluate these improvements.

Isavia ANS, the designated Air Navigation Service Provider (ANSP) for Iceland and its Control Area (BIRD CTA), oversees a wide range of critical services. These include air traffic control (ATC), Aeronautical Information Services (AIS), Meteorological Services (MET), flight procedure design, flight inspection and validation, as well as communications, surveillance and navigation. The organisation manages a vast airspace, extending from 61°N in southern Iceland, encompassing the Icelandic national region, and providing services over Greenland and the Faroe Islands. This area covers approximately 5.4 million square kilometres and reaches as far as the North Pole.

Five LPV procedures are currently published at four different aerodromes: BIVO, BIGR, BIHU and BIAR. All of them are located east of the 18°W meridian, which is the current Icelandic limit for

Credits: ESSP

publishing LPV due to the EGNOS service area defined in previous versions of the Safety of Life (SoL) for the Aviation Service Definition Document (SDD).

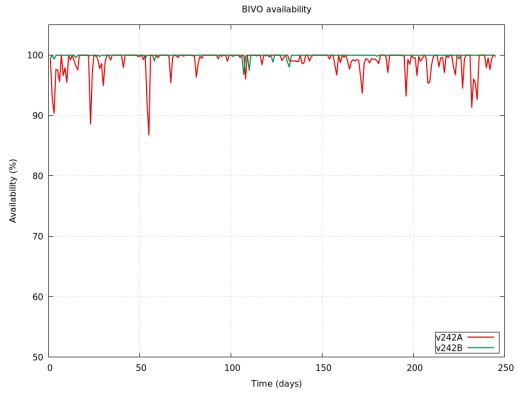
When asked about signal availability and continuity improvements since the deployment of version 2.4.2B, Steinunn pointed to a significant reduction in the number of NOTAM publications related to EGNOS degradation. Over the last few months, these incidences have been reduced to almost zero.

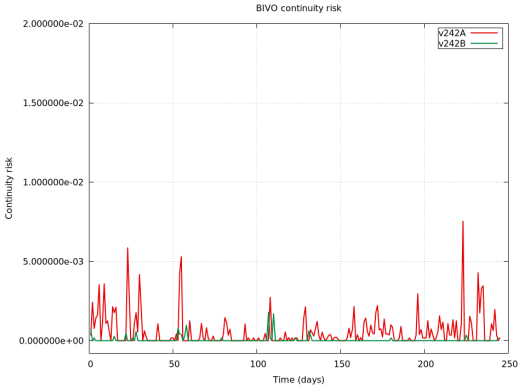
ESSP carefully analysed the improved signal availability and continuity values at the four airports where LPV procedures are currently in place, confirming that system performance has improved since the last EGNOS System Release. As an example, below is a comparison of the continuity and availability values between system versions 2.4.2A and 2.4.2B for the BIVO aerodrome. The red values represent the performance with version 2.4.2A from March until October 2023, while the green values show the improvements achieved with the new EGNOS system release from December 2023 until July 2024. The advancements are evident, as fewer incidents have been recorded over time.

With these improvements and future developments in mind, Isavia will evaluate the publication of new EGNOS-based procedures with the Icelandic Transport Authority, especially in the western part of the country. Furthermore, with the deployment of EGNOS 2.4.2B, ESSP and EUSPA reaffirm their commitment to continuously monitoring and improving the system to ensure the highest service standards.

The latest version of the EGNOS Safety of Life Service for Aviation SDD v3.6, released in September 2024, includes all the new enhanced commitments.

Credits: ESSP





CARGOLUX PREPARES FOR THE FUTURE WITH LPV CAPABILITY ON NEW B777-8F

Credits: Cargolux

As one of the world's largest freighter airlines, Luxembourg-based Cargolux is preparing for the future with an ambitious fleet transition. Starting in 2027, the airline will begin retiring its flagship Boeing 747s and integrate the Boeing 777-8F into its fleet. The aim is to improve operational efficiency, sustainability and performance. In a forward-thinking decision, Cargolux has chosen to equip all its new aircraft with LPV (Localizer Performance with Vertical guidance) capability, a commitment to adopting the latest precision navigation technology. This strategic shift represents a key milestone in the airline's long-term growth and modernisation strategy.

The idea of integrating LPV capability into Cargolux's new fleet emerged a few years ago during the Aerospace TechWeek in Munich. This industry event brought together aviation experts, and it was there that Cargolux began to consider the benefits of LPV technology seriously. Discussions with ESSP during the event allowed Cargolux to understand the future potential of LPV in improving operational efficiency, reducing reliance on ground-based infrastructure, and enhancing approach accuracy. This meeting served as one of the catalysts for Cargolux's decision to adopt LPV as part of its long-term fleet modernisation strategy.

To support the airline's decision-making process, ESSP conducted a comprehensive study assessing the potential impact of LPV integration on Cargolux's daily operations at its European and North American destinations. The study revealed that 85% of Cargolux's destinations in these regions already have at least one LPV approach procedure in place, while 99% of its flights land at

Did you know...?

Instrument Approach Procedures at Non-Controlled airports

At European level, only Finland has implemented applicable regulation to the use of aerodromes and other areas for manned aviation aircraft take-offs, approaches and landings in IFR operations without air traffic control service (ATC) or aerodrome flight information service (AFIS).

Nevertheless, IFR operations in such scenarios are regulated and part of the normal operation of non-controlled airports in other countries all over the world such as Australia, New Zealand, United States or Canada for decades already.

airports with at least one published LPV procedure. These results were pivotal in demonstrating the feasibility and operational benefits of adopting LPV technology.

For this article, ESSP had the opportunity to speak with Captain Christophe Klees, an experienced aviation professional with 19 years at Cargolux, to discuss the reasons behind the airline's decision to adopt LPV.

Captain Klees, who began his career as a First Officer at Luxair in 2000, joined Cargolux in 2005 and by 2016 was a Boeing 747 Captain and the Chief Technical Pilot. He is currently the Deputy Nominated Person for flight operations at Cargolux and is responsible for overseeing the entry into service of the Boeing 777-8F. According to Captain Klees, the decision to equip the new fleet with LPV capability was driven by a forward-looking approach. By implementing LPV, they aim to stay ahead of the curve, anticipate the decommissioning of ILS systems and eventually perform CAT-I LPV approaches using EGNOS.

When asked about the main reasons behind the company's decision to equip the new aircraft with LPV capability, Captain Klees pointed to the European Commission's PBN IR mandate, as he foresees it could lead to airdromes phasing out ILS CAT I approaches for normal operations. He also emphasised that LPV will play a pivotal role in the future of RNP approaches. Additional factors identified by the company were improved fuel efficiency through constant descent approaches and the ability to select closer alternates during the pre-flight phase, which will allow the airline to carry less fuel on board.

As for the challenges the company may face during the transition to LPV, Captain Klees mentioned that the process should be very smooth, as these approaches closely resemble other PBN approaches. The company's pilots are already trained in PBN principles and familiar with these types of operations. This aligns with the original objective of LPV approaches, which are designed to mimic ILS CAT I approaches, using satellite-based signals to provide vertical and lateral guidance without relying on barometric measurements.

Captain Klees hopes that, over time, LPV will become the preferred approach method for pilots. Initially, the transition may be slower as experienced pilots are more accustomed to using ILS. However, once they become familiar with the new technology, Captain Klees believes that pilots will find LPV approaches to be very comfortable and more stable. In addition, as of June 6, 2030, operators will no longer be able to use ILS CAT I approaches except in the event of contingency.

Cargolux strongly supports LPV and encourages other companies to incorporate this capability, especially in newer aircraft, by selecting it as an option from the manufacturing line.

As Captain Klees stated: "with LPV, we are taking a step forward in both safety and operational reliability. The more tools we have in the cockpit, the better equipped we are to ensure smooth, precise and safe landings".

Did you know...?

The NCA will discontinue DGPS service in Norway

The Norwegian Coastal Administration is discontinuing the DGPS service in Norway from January 2026. One of the reasons behind this decision is the recent release of the EGNOS Safety of Life Assisted Service for Maritime, ESMAS, which will notify of any unreliability in the GPS signals. See the complete press release here.

AIR NOSTRUM STORY WITH EGNOS AND LPV

We had the opportunity to meet with the Spanish regional carrier Air Nostrum, whose experience with EGNOS and LPV dates back to the early beginnings of these types of operations. Juan Manuel Díaz Mayoral (FOPS Engineering Services Manager) and Captain Francisco Dalmau (Subdirector of Flight Operations) illustrated the story of Air Nostrum and EGNOS to us.

Credits: Air Nostrum

Air Nostrum history

Spanish regional carrier Air Nostrum was founded 30 years ago, operating its first regular flight between Valencia and Bilbao with a Fokker 50 in December 1994. Starting with a small team that quickly grew, by January 1995, Air Nostrum had three aircraft, and by the end of 1996, it was operating seven, beginning its expansion phase, adding ATR 52-500 aircraft to its fleet. In 1997, Air Nostrum signed a franchise agreement with Iberia, marketing its flights under the brand name "Iberia Regional Air Nostrum", with Iberia being its main client. It was not until 1998 that it incorporated its first CRJ 200ER turbojet, renewing its fleet a year later with new CRJ and ATR aircraft and introducing the first Dash8-Q300s in 2001. Today, its fleet consists of CRJ1000, CRJ200 and ATR 72-600 aircraft. After implementing an adjustment plan between 2009 and 2013 to improve Iberia's competitiveness and connectivity at its main hubs -Madrid and Barcelona- the company is now focusing on its core business: domestic routes, short international routes, niche markets and Public Interest routes.

Air Nostrum and EGNOS/LPV

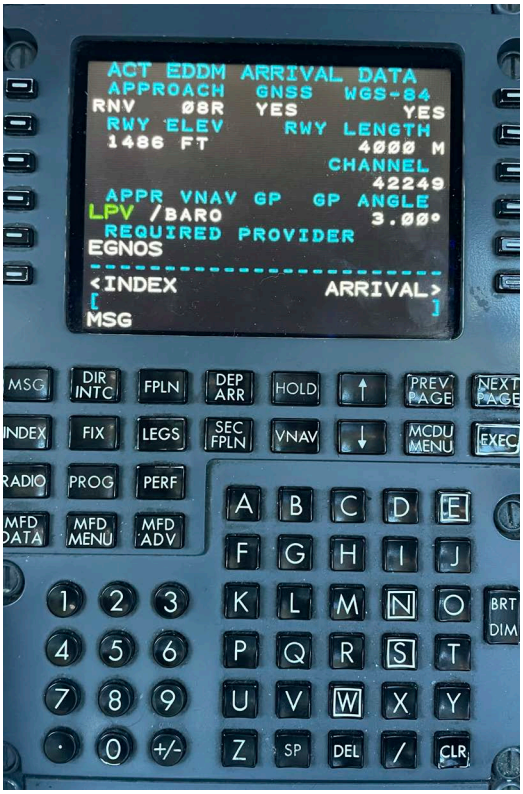
Air Nostrum, as a regional airline, has the right aircraft for the niche in which it specialises. Its main challenges come from the type of airports at which it operates. These are smaller airports with local flights, general aviation traffic and weather challenges. Many of these airports, which are not major hubs, lack expensive equipment such as ILS. According to pilots, having LPVs at these airports is very beneficial to their operations. Some of these airports only have VOR or even visual approaches.

That is why Air Nostrum decided to equip all its

CRJ1000 aircraft with the LPV functionality in the early days of these approaches. Now, with some 1,000 EGNOS-based procedures, it is easy to see the usefulness of an LPV-equipped aircraft, but back then, as they state, "it was a gamble at the time". With the increase in LPV procedures available at European airports in recent years, it has benefited from the advantages of LPV.

The feedback from the pilots is very good. They appreciate that the approaches are more stable than ILS, and there is not much operational difference for them. Given their experience with the CRJ-1000, they anticipate that in the future, it will install LPV in its aircraft through forward-fit, which is the most cost-effective and efficient solution.

When discussing the PBN IR, they see the regulation as a positive initiative, encouraging airports to develop more of these procedures over time. They support the gradual and strategic decommissioning of ILS where necessary and where the market demands it, particularly in areas unaffected by GNSS signal interference. For example, given the scope of its route network, they have not experienced any RFI cases.



Credits: Air Nostrum

Future vision

Air Nostrum intends to retain the CRJ-1000 fleet and focus on consolidating its current operations. In addition, it is exploring opportunities in Public Service Operations and charter services. The company is also involved in several projects related to electric and hydrogen-powered engines, reflecting its commitment to future innovation and sustainability in aviation.

When discussing future LPV plans for its fleet, they explain that the return on investment timeline is crucial. They strongly advocates LPV approaches, especially given the nature of its network, which consists of smaller airports that typically rely on conventional navaids that offer very high minimums. The only challenge it faces for LPV selection is the financial aspect, but for new aircraft, selecting LPV from the manufacturing line is essential without any doubt.

EGNOS SUPPORTING INSTRUMENT APPROACH PROCEDURES IN NON-INSTRUMENT RUNWAYS

ESGE RWY 04L/22R. Credits: ESGE

General Aviation airports

As defined by ICAO, general aviation (GA), which covers all civil aviation operations other than scheduled air services and non-scheduled air transport operations for remuneration or hire, is a key sector in Europe's aviation industry. It connects remote areas and supports local economies across Europe.

Despite its relevance, airports serving GA face safety and accessibility challenges often since they mostly operate under Visual Flight Rules (VFR) without any Air Traffic Services (ATS) (neither Air Traffic Control – ATC nor Aerodrome Flight Information Service – AFIS). Traditionally, instrument-based flight procedures have relied on conventional navigation based on ground stations, which, while providing reliable and accurate navigation support, entail substantial implementation and maintenance costs, a financial burden that exceeds the budget of GA airports.

EUSPA and ESSP activity for General Aviation

Recognising this situation and the significant number of GA-serving airports in Europe, in 2019, the European Union Agency for the Space Programme (EUSPA) and the European Satellite Services Provider (ESSP), with the support of the European Union Aviation Safety Agency (EASA), joined forces and, within the framework of the EGNOS Service Provision Contract, launched an initiative to boost safety and accessibility at GA airports fostering implementations of EGNOS-based instrument approach procedures in these scenarios.

As part of this initiative, a guidance document titled "Safety Assessment Guidelines for the implementation of EGNOS-based instrument approaches to non-instrument runways located at aerodromes serving General Aviation" was developed to assist airports in the implementation process. By relying on the ability of EGNOS to provide a free service for aircraft navigation, airports lacking the infrastructure and means for traditional ground-based instrument landing systems could benefit from satellite navigation to increase accessibility by offering safer and more reliable operations.

To ensure the guidelines' practical applicability, in 2023, EUSPA and ESSP supported selected European GA airports, including the Swedish Borås Airport, in their plans for GNSS-based approaches and implementation of EGNOS-based procedures. This story recounts the achievements of this joint work between EUSPA, ESSP and Borås Airport.

> "Within the framework of the EGNOS Service Provision Contract, ESSP and EUSPA supported Borås airport in Sweden in the process for the implementation of EGNOS-based procedures on non-instrument runways at non-controlled airport"

Borås airport (Sweden), a success story

Located in southwest Sweden, Borås Airport (ESGE) is about 60 km from Gothenburg. It is owned by the City of Borås and operated on a non-profit basis by the Borås Airport Association. The airport has no ATC or AFIS, scheduled crew or employed personnel. With limited infrastructure and primarily serving recreational and club aviation, it has, however, in recent decades, grown into one of the busiest GA airports in Sweden, playing a key role in connecting the local community. It is also used for general public service flights.

Due to its characteristics, Borås Airport was eligible to be chosen for EUSPA and ESSP's mentioned supporting activity. It involved a detailed safety assessment process, as defined in the published guidelines, including:

- A theoretical safety assessment on the feasibility of implementing a proposal for EGNOS-based instrument procedures specifically designed by EUSPA tailored to Borås Airport and
- A subsequent hands-on risk-assessment session at the airport's premises brought together representatives of EUSPA and ESSP with critical stakeholders, including the airport operator, regular pilots and Air Navigation Service Provider (ANSP) representatives. This session was crucial to gathering insights and feedback from those directly involved in the airport's operations, ensuring that the proposed procedures and safety assessment considerations were in line with the characteristics of the scenario.

As a result of this safety assessment process, EUSPA and ESSP provided specific material that will support Borås Airport in implementing EGNOS-based procedures. The Borås Airport representative and its working group well valued and appreciated this work. It will, together with the airport's determination, be very valuable for discussions at the national level in Sweden, constructively influencing the regulation of Instrument Flight Rules (IFR) operations in areas without ATC or AFIS, expected to be published in 2024. This will be a crucial step towards successfully completing the official publication of instrument procedures at Borås Airport and other GA airports in Sweden.

A promising future ahead in Europe

However, Borås was not the only airport supported by this European initiative; the same process was carried out by ESSP and EUSPA at Breda Airport in the Netherlands, with equally satisfactory results. In addition to demonstrating the usefulness of the methodology described in the guidelines, the joint work carried out at these airports provided real demonstrations of the feasibility of EGNOS-based procedures on non-instrument runways at uncontrolled airports, which is an important step forward in improving safety and accessibility of airports serving GA.

By developing and testing the Safety Assessment Guidelines document, this European initiative has provided a valuable resource to airport operators and paved the way for future GA operations. The lessons learned, and the success achieved demonstrate the potential for similar initiatives to have a lasting impact on the aviation industry, ensuring that even the smallest airports can offer the highest standards of safety and accessibility. These collaborations can, therefore, serve as a key driver for broader regulatory changes, including at the European level, ensuring significant implications for regional aviation. This joint work highlights the potential of EGNOS-based procedures for application at other airports, offering a cost-effective solution that represents a success story in improving GA operations across Europe.

Safety Assessment session at Borås airport. October 2023. Credits: ESSP

EGNOS IMPLEMENTATION IN TELEVIC GSP PASSENGER INFORMATION SYSTEMS

Credits: Televic GSP

The Passenger Information System (PIS) is the operational tool that provides visual and audio information to rail passengers at stations or platforms, on-board trains and online, automatically or manually programmed. The main information displayed to the passenger is related to the real-time location of a train along its route. Passengers expect clear, updated and reliable information on key aspects such as connections, arrival times, disruptions and alternative routes. In addition, other information such as weather, on-board services, news or any other third-party sources are also provided.

The overall system consists of managing information and presenting it through different display elements deployed on passenger platforms and within passenger cars. Although the information can be displayed in various places, the core of these applications, when GNSS is involved as a positioning source, is on-board trains.

More than 5,000 trains in Europe have been equipped with European GNSS-based PIS devices, and at least 9 European manufacturers include GNSS-based positioning in their PIS solutions. This is the case for Televic GSP, a Belgium-based company that supplies its equipment worldwide. Televic GSP provides innovative and cutting-edge information and communication solutions for rail passengers. With over 40 years of experience in the rail sector, it has equipped more than 60,000 vehicles with its technology.

Over the last year, Televic GSP has been working to improve its Passenger Information Systems by adopting EGNOS and has recently started the implementation with one of its main customers. Its goal when opting for EGNOS was to take advantage of the higher accuracy compared to GPS alone, taking advantage of the SBAS interoperability using either WAAS in the United States or EGNOS in Europe. During the testing phase, Televic verified that using EGNOS in its equipment can offer better performance, so it decided to launch this improved PIS on the market early next year. As Mario DeMarco, Product Manager at Televic, explains, "From now on, we can offer high precision to our customers worldwide", and they are pleased to have added value to their product with the inclusion of EGNOS.

The success of Televic GSP demonstrates that the importance of GNSS-based telematic equipment in rail is growing, as are its requirements. EGNSS and EGNOS, in particular, are contributing to improving this kind of solution, and other non-safety-related rail applications.

White paper on EGNOS for UAS operations

ESSP hexacopter
Credits: ESSP

EGNOS, initially deployed for Safety of Life navigation services in aviation, has expanded its applications to emerging domains such as Unmanned Aircraft Systems (UAS) operations, which have evolved exponentially in recent years. In such operations, GNSS has become essential for safer and more reliable UAS navigation, and GNSS receivers are integrated as standard features in most new commercial UAS. European GNSS (EGNSS) -EGNOS (European Geostationary Navigation Overlay Service) and Galileo- bring significantly added value to UAS navigation, positioning and related applications compared to other systems.

EUSPA and ESSP have developed a document reviewing EGNOS services and their current and future applications in unmanned aviation. The document includes not only the current EGNOS services and their immediate application in non-safety-critical applications but also the main considerations for the development of a possible future EGNOS-based safety-critical EGNSS service adapted to UAS operations similar to the current EGNOS SoL Service for manned aviation.

The current applicable regulatory framework establishes a proportional risk-based approach based on identifying three categories of UAS operations: open, specific and certified. Within the specific category, operations are further classified by risk levels: Low risk (SAIL I & II), Medium risk (SAIL III & IV) and High risk (SAIL V & VI).

The application of existing EGNOS services to UAS operations is currently considered for the EGNOS Open Service and the EGNOS EDAS service. Both improve the performance of the PVT solution onboard the UAS GNSS receiver, as demonstrated in the document. UAS operators can openly use them in non-safety-critical scenarios, such as operations in the open category and at lower risk levels of the specific category, where integrity information is not considered a must.

The document also focuses on UAS applications where the integrity concept is necessary: medium (TBC) and high-risk operations of the specific category, as well as UAS in the certified category. It remains to be defined at which risk level the integrity concept is necessary within the specific category.

The current landscape of UAS operations lacks a safety critical service similar to the aviation Safety of Life (SoL), as this service is not directly applicable to UAS operations but to manned aircraft (as described in its SDD). Consequently, providing an EGNSS service suitable for UAS based on EGNOS akin to the SoL Service would add value to the said risk levels of UAS operations.

Following this comprehensive overview, the document provides an in-depth analysis of the current performance of the EGNOS Open Service (OS) and the EGNOS Data Access Service (EDAS) in real non-safety-critical UAS operations. By showing performance in real operating conditions, the flight data obtained from the tests demonstrate that EGNOS OS and EDAS

Flight tests
Credits: ESSP

provide improved accuracy to UAS operations by reducing the Navigation System Error (NSE)[1] and Total System Error (TSE)[2] for non-safety-critical operations. These tests were conducted using ESSP's custom-built hexacopter.

The evaluation of the real-world performance of a hexacopter in the open category provides information on the differences in NSE when using only GPS, EGNOS OS and EDAS for navigation, both near and far from the RIMS station (EDAS base) in Málaga, as indicated below:

Location: Madrid
Distance from EDAS base: > 400 km
Wind speed: 1-2 m/s (3.5 - 7.5 km/h)

High-end Receiver NSE

Correction	HNSE		VNSE	
	95%	mean	95%	mean
EGNOS	0.9	0.6	0.5	0.4
EDAS	1.6	0.9	1.5	0.6
GPS	1.9	1.7	3.6	3.2

Location: Málaga
Distance from EDAS base: ˜ 35 km
Wind speed: 5-7 m/s (18 - 26 km/h)

High-end Receiver NSE [m]

Correction	HNSE		VNSE	
	95%	mean	95%	mean
EGNOS	1.7	1.1	2	1.4
EDAS	0.7	0.3	0.7	0.7
GPS	3.2	2.5	5.8	4.9

Figure 1. NSE statistics.

The TSE values of the flights performed in Madrid and Málaga were also calculated, as well as the percentage of time in which the UAS performed the turns within the defined radius:

Location: Madrid
Distance from EDAS base: > 400 km
Wind speed: 1-2 m/s (3.5 - 7.5 km/h)

Total system Error (xyz)

Correction	P95 [m]	mean [m]	inside radius [%]
EGNOS	1.6	0.9	78
EDAS	1.9	1.0	77
GPS	3.8	1.7	15

Location: Málaga
Distance from EDAS base: ˜ 35 km
Wind speed: 5-7 m/s (18 - 26 km/h)

Total system Error (xyz)

Correction	P95 [m]	mean [m]	Inside radius [%]
EGNOS	2.9	2.2	30
EDAS	1.6	0.7	55
GPS	7.2	5.7	0

Figure 2. TSE statistics.

Do not hesitate to read the full article in the guidance material section of the EGNOS User Support Website.

[1] **Navigation System Error (NSE):** Calculated as the difference between the receiver's estimated output position and the actual position of the UAS.
[2] **Total System Error (TSE):** Calculated as the difference between the Actual Position of the UAS and the Desired Flight Path. Assuming that the PDE is not computed, the TSE is a combination of the NSE and the Flight Technical Error (FTE), understood as the ability of the autopilot system to maintain the defined position based on the estimated PVT solution calculated by combining measurements from the GNSS source and other positioning sensors such as IMUs (Inertial Measurement Unit), compasses, barometers, etc.

Talking about EGNOS with… AEROTEC

Approved Training Organisation (ATO) for next-gen pilots

AEROTEC, represented by José María Tatay Díaz –its head instructor and pioneer of PBN qualification in Spain– shares his vision on how EGNOS was introduced in the standard student syllabus back in 2016 under Commission Regulation (EU) 2016/539 and the resulting implications; for instance, the LPV implementation in approved training simulators and on different aircraft units.

Credits: AEROTEC

Can you please tell us what AEROTEC is and who José María is?

"AEROTEC was established in 1993 to be a high-quality Approved Training Organisation (ATO) that would train pilots from 0 to ATPL (Airline Transport Pilot License) or even as instructors. It has two operational bases: in Madrid-Cuatro Vientos (LECU), a visual-only airdrome, and the other in Seville (LEZL), an instrumental airdrome that also operates at night. This allows our students to practice different procedures at various locations and become accustomed to all the possibilities available to them."

From the very beginning, José María has dedicated his career to teaching. He started in the pharmaceutical sector around 2005 and switched to aviation in 2008 when he obtained his pilot license. He then became an instructor in 2010.

"I joined AEROTEC in 2016 as Head Instructor and realised that it was possible to expand the overall knowledge that pilots and instructors gain after their training by developing a specific syllabus that would explain in greater depth the concepts that aviators need to know". As a result, students get an outstanding overall training that enables them to be especially prepared for the times ahead.

A320 simulator cockpit
Credits: AEROTEC

"One crucial aspect of basic pilot training is PBN, and with EGNOS being the enabler of LPV approach procedures, it has its own dedicated section within the course".

What EGNOS/LPV capabilities and training resources does AEROTEC offer to the next-gen pilots today?

"We satisfy the EGNOS/LPV training requirements with our student pilots by several means. Firstly, the theoretical part is carried out in the classroom through an eight-hour PBN training - as required by the regulation – which includes system definition and operation, familiarisation with the controls and LPV APCH chart reading, among other topics. Pilots then test their skills using a wide variety of certified flight simulators, including analogue and digital cockpits."

"The 'analogue cockpits' portfolio comprises basic and advanced aircraft, including single engine and multi-engine, and the 'digital cockpits' include Garmin avionics, as well as the simulator based in Airbus A320 manufactured by Entrol; a real-life replica of this aircraft model."

This aircraft model is particularly interesting, as it is one of the most widely used in Europe. As of mid-2022, airlines purchasing it are able to request the implementation of LPV capability from production, the so-called 'SLS function' for Airbus customers.

"When the student has completed all the necessary training using flight simulators, it is time to move on to real aircraft. For this, AEROTEC provides several units that cover the whole spectrum of possibilities."

"Focusing on EGNOS and LPV, we have both simulators and aircraft:

Simulators with LPV capability:

- The N1000 mounting Garmin 1000 avionics, where you can select the specific aircraft model used. E.g., Tecnam, Cessna, etc.
- The A32, modified by Entrol to allow performing LPV approaches and even RNP ARs.

Aircraft with LPV capability:

- The DA-40 with Garmin G650 avionics.
- The Tecnams 2006 and Mentor with Garmin 1000 avionics."

"In total, we have 30 aircraft units dedicated to training, 7 of which are LPV-capable."

How are LPV APCH procedures usually taught?

"Simulators are always the first step for pilots to become familiar with LPV approach procedures after theoretical training. Therefore, we instruct

FP2006T aircraft cockpit
Credits: AEROTEC

pilots to successfully complete several LPV approach procedures before testing them in real life. The simulators allow us to set up approaches at different locations without travelling there, which is very cost and time-efficient. So we take the opportunity to use LPV at various destinations until the student becomes proficient."

"It was not until 2013 that the first LPV approach procedure was launched in Santander (Spain), so at the beginning, we had to travel there to test the LPV in a real scenario. Therefore, the first and most widely used option for us has always been simulators, as they offer a safe environment, allow us to stop the simulation at any point and provide instructions to correct errors. In addition, it enables our students to practice real-life LPV approach procedures without having to physically travel whilst having the possibility to ask the instructor if they have any doubts."

In 2016, ATOs were required to provide PBN training as part of standard pilot training. How did this affect AEROTEC?

"At first, it was a bit chaotic. The regulation stated that by August 2018, all pilots had to be PBN approved, and ATOs had to be certified to train in PBN a year in advance. However, ATOs also needed PBN-approved instructors even though there were no certified courses at the time, so it was difficult to get AEROTEC-approved to train pilots for PBN."

"In the end, it was possible to receive approval and certification, so we started to offer PBN as standard to all future new pilots in due course."

"A year later, in 2019, regulators requested pilots to renew their PBN training annually, so AEROTEC went through a renewal campaign with its trained pilots so that they could maintain PBN capability."

"As the regulation stands, pilots who are already flying can either be PBN certified (through the certified course) or wait for the next scheduled license renewal to complete this training. Taking into account that pilot licenses must be renewed every seven years and that this regulation came into force in 2018, 2025 will be the last year in which we will still have active pilots without PBN training. In essence, all pilots flying in 2026 will be able to perform LPV approaches, which I believe makes the skies safer."

"At AEROTEC, we were pioneers in PBN and were well informed of the processes and certifications, so we were already in the process of acquiring our first LPV flight simulator, and it was shortly after receiving our certification that we purchased the first LPV-capable aircraft."

"One thing that came very clear to us when we decided to make our aircraft LPV-capable is that the cheapest way to implement it is to request the capability from the moment you purchase it."

What are your thoughts on PBN procedures and LPV approaches, especially considering any feedback you may have received from pilots?

Credits: AEROTEC

"A remarkable advantage of LPV is that pilots can predict the availability of satellites at the destination from the departure airfield, which provides greater certainty and facilitates preparatory tasks before flying. In addition, the fact that LPVs resemble ILS also makes it very easy for students to learn the principles of operations and interoperate the different technologies, especially with pilots who are renewing their licences and have typically been used to ILS."

"An interesting fact to note is that we have observed that the avionics that process the corrections sent from EGNOS play a major role in the performance obtained, which is strictly linked to the algorithms implemented in the receiver. For instance, some aircraft may perform better than others on the same LPV approach despite having the same hardware and software because of the receiver algorithms. As a result, we believe it is important for our pilots to understand how the SBAS signal is calculated and sent so that they can understand the implications of different phenomena."

"PBN makes flying more efficient at different levels and is the future of navigation. LPV procedures, enabled by the EGNOS signal in Europe, allow pilots to have a reliable, stable and accurate positioning source for 3D operations as low as 200ft minima."

Did you know...?

SORA v2.5

On 13th of May 2024, a new SORA version 2.5 has been published by JARUS, updating Annexes A, B, E, F, I, the Cyber Safety Extension and the Main Body, providing a better understanding by refining the details on the articles and an Explanatory Note that summarizes the changes from version 2.0 to serve as guidelines for the Community.

EGNOS Services highlights

NEW SOL FOR AVIATION SDD PUBLICATION, V3.6

The new EGNOS Safety of Life (SoL) for Aviation Service Definition Document (SDD) was published on 9 September 2024.

The EGNOS Safety of Life (SoL) for Aviation Service is provided openly and is freely accessible at no direct cost. It is tailored to safety-critical transport applications in various domains; in particular, the service meets the aviation requirements for Vertical Guidance Approaches (APV-I) and Category I precision approaches, as defined by ICAO in Annex 10.

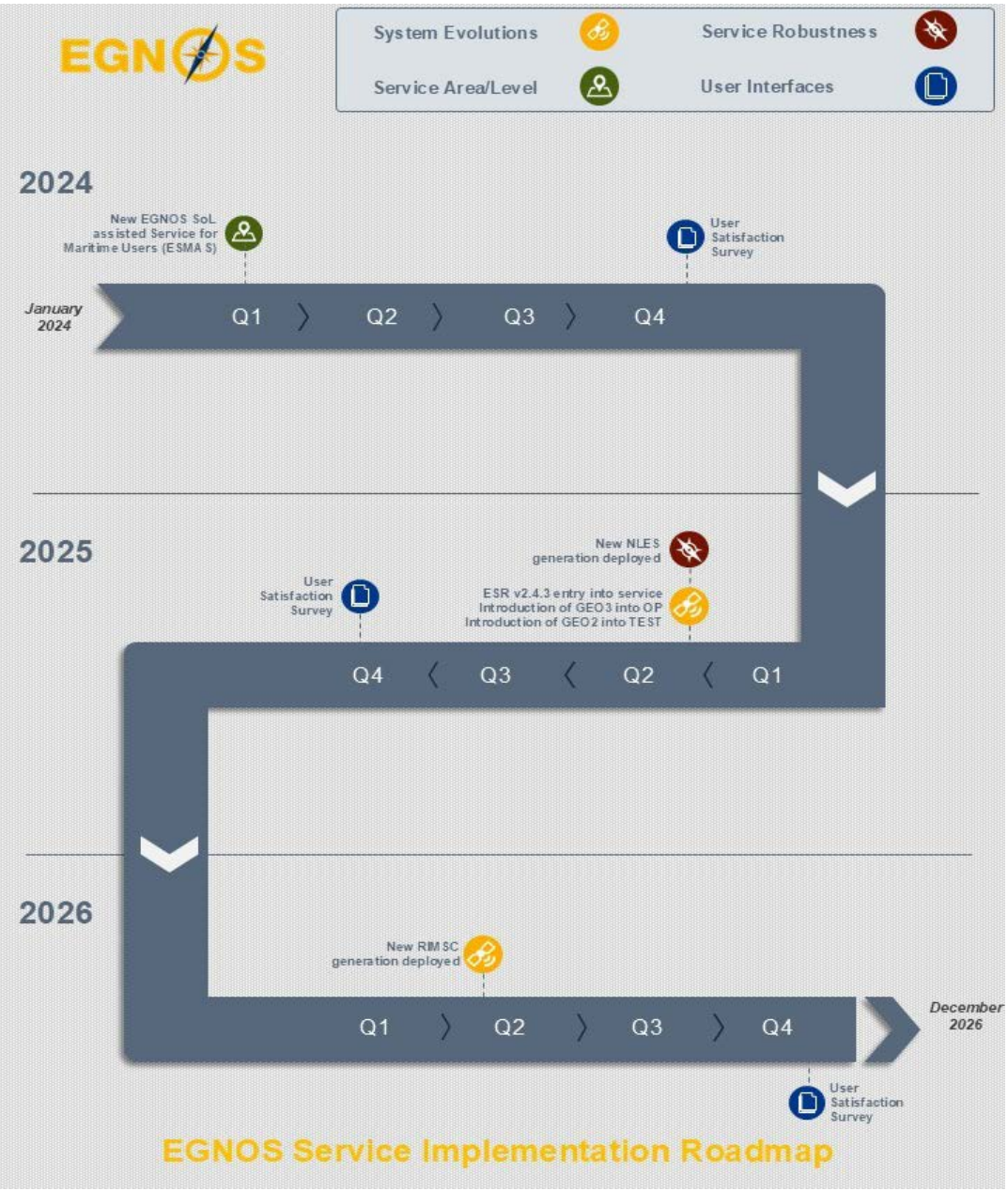
In this latest SDD release, the document has undergone extensive updates to reflect recent changes in the EGNOS system (e.g. the deployment of the new RIMS Kuusamo in Finland) and EGNOS services (i.e. the EGNOS Safety of Life assisted Service for Maritime Users (ESMAS) declaration). In addition to these changes, the most significant is the integration of new SoL commitment maps aligned with the observed performance obtained after the EGNOS System Release 2.4.2B deployment, which provides increased robustness towards challenging ionospheric situations.

This is also supported by the updated and detailed analysis of the impact of ionospheric activity in Solar Cycle 25, which began in December 2019 and is expected to peak around 2025. This extreme solar activity poses challenges for satellite navigation. The document offers insights into how EGNOS maintains reliable performance, even in adverse ionospheric conditions.

You can access this information in its online version or download the content in PDF format at SoL SDD. Do not hesitate to contact our Helpdesk if you have any questions.


EGNOS
The questionnaire has been filled in by
88 respondents
82 In 2022
USER SATISFACTION SURVEY 2023
24 Non-EGNOS Users
20 In 2022
+
64 EGNOS Users
62 In 2022
8.2
Global Satisfaction Score
8.6 - 2022
10-point Scale.
85.6%
EGNOS satisfaction: User Recommendation
84.6% - 2022
USER SATISFACTION SCORE PER MARKET SEGMENT
All scores are based on EGNOS Users' answers.
35 respondents
Aviation 8.5 2022 8.8
10 respondents
Agriculture 7.3 2022 8.1
4 respondents
Maritime 7.2 2022 8.1
2 respondent
Rail 7.2 2022 8.3
3 respondents
Road 8.1 2022 9.5
8 respondents
Sur. & Map 8.8 2022 7.8
1 respondents
LBS (Location BasedServices) 8.0 2022 10
1 respondent marked "other" Market Segment.
Your SATISFACTION is our reason for being!
EGNOS SERVICES
EGNOS SUPPORT
Support Website 7.8 8.3 2022
Documentation 8.5 8.9 2022
19 (30%) EGNOS Users (*)
SoL 8.0 2022 8.7
27 (42%) EGNOS Users (*)
OS 8.4 2022 7.6
7 (11%) EGNOS Users (*)
EDAS 7.8 2022 9.2
(*) Each respondent can use more than one service.
Performance
Helpdesk 8.8 9.0 2022
EGNOS SoL accuracy 8.5 2022 9.4
EGNOS SoL availability 8.1 2022 8.6
EGNOS SoL continuity 7.7 2022 8.3
EGNOS SoL coverage 7.4 2022 8.5
EGNOS OS accuracy 8.0 2022 7.3
EGNOS OS availability 8.7 2022 7.9
EGNOS OS coverage 8.6 2022 7.3
EGNSS USER SATISFACTION SURVEY
SHARE YOUR INSIGHTS
2024 IS OPEN
EUSPA
#EUSpace

EGNOS SERVICE IMPLEMENTATION ROADMAP



The latest EGNOS Service Implementation Roadmap (SIR) was published on the 30th September 2024.

The SIR aims at providing a high-level overview of the EGNOS System and Services expected evolutions linked to the consecutive EGNOS System Releases (ESR) deployments and the information/interfaces improvements/changes, mainly focusing on:

- Evolutions of the EGNOS System which have impact on the service.
- Evolutions of the service area for any EGNOS Service and/or the declaration/decommissioning of a Service Level.
- Evolution of the system to ensure that the performance levels are maintained or increased.
- Evolution of the interfaces towards the EGNOS users.

You can access this information in its online version at EGNOS SIR. Do not hesitate to contact our Helpdesk if you have any question.

What's new?
Since the last bulletin...

EGNOS WORKING AGREEMENTS SIGNED (EWA)

The following EWAs have been signed in the last quarter:

TRIAC
TRIAC is an Air Navigation Service Provider (ANSP) certified for ATC and AFIS services, which specializes in the needs of regional airports and commercial airfields.

Germany

REGA
Swiss Air-Rescue REGA provides professional medical assistance from the air for people in need in Switzerland and around the globe.

Switzerland

HARJEDALEN AIRPORT
Härjedalen Airport is a regional airport which operates as an essential hub for both commercial and general aviation in the region, providing key connectivity for the local community and tourists.

Sweden

GERMAN ARMED FORCES
Implementation of EGNOS-based procedures in military environments under general aviation rules.

Germany

IRISH AIR CORPS
Irish Air Corps are the air component of Ireland's Defense Forces and plays a critical role in safeguarding national security and providing essential services such as search-and-rescue (SAR), maritime surveillance, emergency medical transport, and supporting ground forces.

Ireland

MUNICIPIO DE VILA REAL
Municipio de Vila Real is a certified Air Navigation Service Provider (ANSP), providing AFIS services mainly in the north of Portugal.

Portugal

SBAS IN THE WORLD

GAGAN and the evolution of LPV procedures

On April 21, 2015, GAGAN was certified for Approach with Vertical Guidance (APV 1), becoming the third SBAS in the world to achieve this milestone and the first to do so in the equatorial region. On April 28, 2022, IndiGo made history as the first airline in Asia to conduct an LPV approach at Kishangarh Airport. India has made significant progress since then, with 17 LPV procedures now published across 8 different airports, and many more expected to follow in the coming years!

KASS entry into service

The Korea Augmentation Satellite System (KASS) has been officially certified by Korean authorities and is now operational. This system results from a partnership between Thales Alinea Space and the Korea Aerospace Research Institute (KARI) for the Korean Ministry of Land, Infrastructure and Transport (MOLIT).

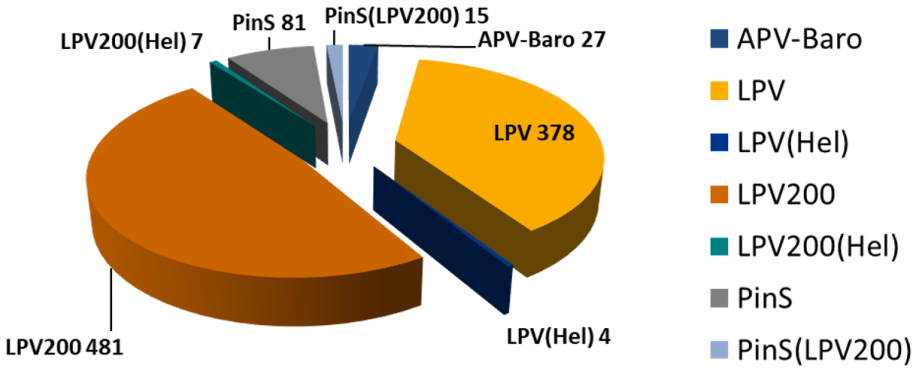
The development of the system, KASS, began in 2020 and, as of 2022, has been operating through the geostationary satellite MEASAT-3d and will soon include KOREASAT 6A. The system is developed following international standards set by ICAO (International Civil Aviation Organisation). Initially focused on the Safety of Life in aviation, it will be interoperable with all other SBAS systems worldwide. This will help the operation and ensure flight safety as aircraft transition between different areas.

KASS is compatible with GPS and, in the future, will be interoperable with Galileo and KPS (the Korean Positioning System).

LPV PROCEDURES

LPV, LPV-200, PinS & APV Baro procedures published
(including AIRAC cycle 2024 #10– 03/10/2024)

Next graph shows, the number of procedures LPV, LPV-200, PinS, APV-Baro, LPV-Hel, LPV200-Hel and PinS-LPV200. The total number is **993**



FAA PROCEDURES

Courtesy of the FAA WAAS Team.

Did you know...?

Top 5 European Airports for Aircraft Declaring LPV Capability
In recent years, more and more aircraft are now equipping with the capability to perform Localizer Performance with Vertical guidance (LPV) approaches. According to Eurocontrol, these are the top five European airports with the highest number of aircraft declaring LPV capability on arrival from January to July 2024: Paris Charles de Gaulle (LFPG), Zurich (LSZH), Madrid-Barajas (LEMD), Rome Fiumicino (LIRF), and Geneva (LSGG).

What's going on...

in aviation.

AIRSPACE WORLD 2024

At Airspace World 2024, ESSP, representing EUSPA, stole the show at the European Commission stand with an exciting VR flight simulator experience. Attendees had the chance to step into the cockpit of an Airbus A320 and perform a virtual LPV approach to Geneva Airport (LSGG). This immersive demonstration showcased the precision and benefits of satellite-based navigation systems, allowing visitors to experience first-hand the enhanced accuracy and safety LPV approaches offer.

AMSTERDAM DRONE WEEK

This annual event dedicated to UAVs was celebrated in April 2024 at the Amsterdam RAI, gathering various representatives from relevant organisations and institutions involved in drone regulation, production or operation. In this environment, the use of EGNOS has proven to be beneficial for manufacturers, as they can provide a higher level of position accuracy on their platforms (compared to GPS alone) without the need for additional and potentially expensive equipment and for several operations such as photogrammetry or lines inspection, among other. As a result, it was the perfect occasion to support companies with the potential to benefit from EGNOS and keep up to date on the developments of the applicable drone regulations.

In addition, there were several interesting presentations on projects and the future of air transport, including a one-hour hands-on training

on how to implement and use EGNOS and Galileo on the most common drone setups. There was a live practical demonstration using the components of the ESSP drone platform, which was configured in real time to use EGNOS and/or Galileo as positioning sources.

The organisation also set up a specific area for one-to-one meetings with visitors to provide personalised support to interested users.

in aviation.

AEROSPACE TECH WEEK

Aerospace Tech Week, held in Munich (Germany) on 17-18 April 2024, consisted of multiple events under one roof, especially for avionics, with respected conference tracks dedicated to its core technologies and a large central exhibition. It offered a unique opportunity to promote EGNOS to key aviation stakeholders, especially those in commercial aviation, one of the market segments where EGNOS and LPV adoption have room for improvement.

This annual international event provided a great opportunity to establish face-to-face contact with the aviation industry. It was instrumental in supporting air operators, aircraft manufacturers and avionics developers in adopting EGNOS and establishing collaborative relationships with them.

In conversation with IATA's Director General, Willie Walsh. Credits: Aerospace Tech Week

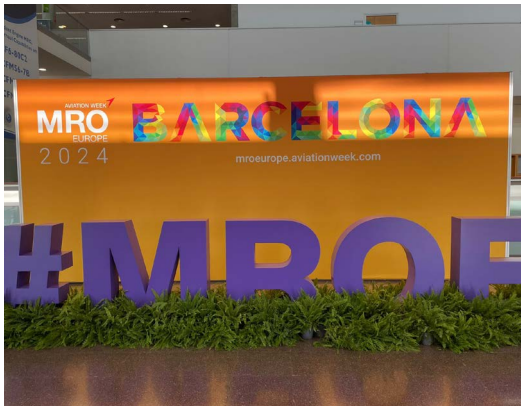
EGNOS WITHIN AESA GUIDELINES FOR SAIL III OPERATIONS

With the increasing demand for UAS SAIL III operations, the lack of guidance material to ensure compliance with the applicable requirements is becoming increasingly evident. AESA (the Spanish Competent Authority) has established a national working group to promote these types of operations by developing guidance material. ESSP and EUSPA have participated in this working group on EGNSS-related activities (EGNOS and Galileo) to support UAS operations (i.e. OSO#13 External Services). The guidance material document developed in this working group will be reviewed by AESA and EASA and is expected to be adopted nationally.

In the guidance material draft, EGNOS Services and associated documentation (Service Definition Document, Helpdesk or EGNOS User Support Website) are listed as one of the enablers to show compliance with the applicable requirements for OSO#13 External Services for SAIL III operations.

MRO EUROPE BARCELONA

On 23-24 October, MRO Europe brought together key players in the aviation industry in Barcelona, and ESSP took the opportunity to engage with key stakeholders. Focusing on collaborations with Original Equipment Manufacturers (OEMs) and Part 21 design organisations, ESSP highlighted the importance of integrating satellite-based navigation solutions, such as LPV, into future aircraft designs and upgrades. These meetings helped to strengthen partnerships and drive innovation to improve navigation capabilities across the European aviation sector, ensuring safer and more efficient operations for the future.



in maritime.

NEW SERVICE AND PUBLICATIONS IN SUPPORT OF SAFE MARITIME NAVIGATION

The roadmap to enhance the safety of maritime navigation in Europe through positioning and navigation services has reached a key milestone. Three important steps have been accomplished this year after several years of work.

The publication of the new IEC standard for SBAS receivers (IEC 61108-7:2024 ED1) provides, from 3 May 2024, the basis for standardising for the first time the use of the Satellite-Based Augmentation systems in all GNSS receivers.

The declaration of the EGNOS Safety of Life Assisted Service for Maritime Users (ESMAS) on 13 March 2024, which reached its full capacity with the publication of the new IEC standard, has since then provided a unique and scalable tool to improve the safety of navigation across Europe. It is the first SBAS-based service dedicated to supporting the Safety of Life at sea.

Lastly, including the new standard under point 4.63 (GNSS Equipment) of the Maritime Equipment Directive (MED), which entered into force on 4 September 2024, has provided the regulatory trigger for adopting the standard across European fleets.

This milestone, important as it is, is, however, not the last stage of the plan. ESMAS is a service ready to evolve along with the EGNOS system, so the service is expected to improve its performance in the coming years, along with the evolution of EGNOS towards the DFMC (EGNOS V3). For additional information, please, visit the EDAS and Maritime User Support website.

Did you know...?

IALA takes on new powerful position to develop, harmonize and enhance worldwide safety of navigation

The International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) has recently announced that, on August 22, officially changed their status from a non-governmental organization (NGO) to an Intergovernmental Organization (IGO). This status is an important step in harmonization, enhancing worldwide safety of navigation, efficiency, and marine environment protection.

in maritime.

PAPER ON IEC 61108-7 TESTS (JRC & ESSP)

Last year, the Directorate General Joint Research Centre (JRC) and the European Satellite Services Provider (ESSP), under coordination of the European Union Agency for the Space Programme (EUSPA), performed a joint campaign to assess the validity and appropriateness of the test scenarios and minimum performance requirements defined in the new IEC 61108-7 standard published to homogenize the use in the GNSS receivers, of EGNOS and the all the different SBAS worldwide. To reach this goal, dedicated setups were designed and implemented at the JRC and at ESSP laboratories, where live and simulated GPS+SBAS signals were used. For the analysis, all the Test Cases (TCs) described in the standard were implemented and two commercial devices were tested.

From the results, it emerged that all the TCs were properly designed and implemented, therefore confirming the feasibility of the tests defined in IEC 61108-7.

This work's results have been published as a paper (IEC-61108-7 SBAS Standard for Ship-Borne Receivers: preliminary testing validation activities) on the 17th of September of this year under the open access journal from MDPI under the topic "Safety Critical Navigation".

RIS WEEK JUNE 2024

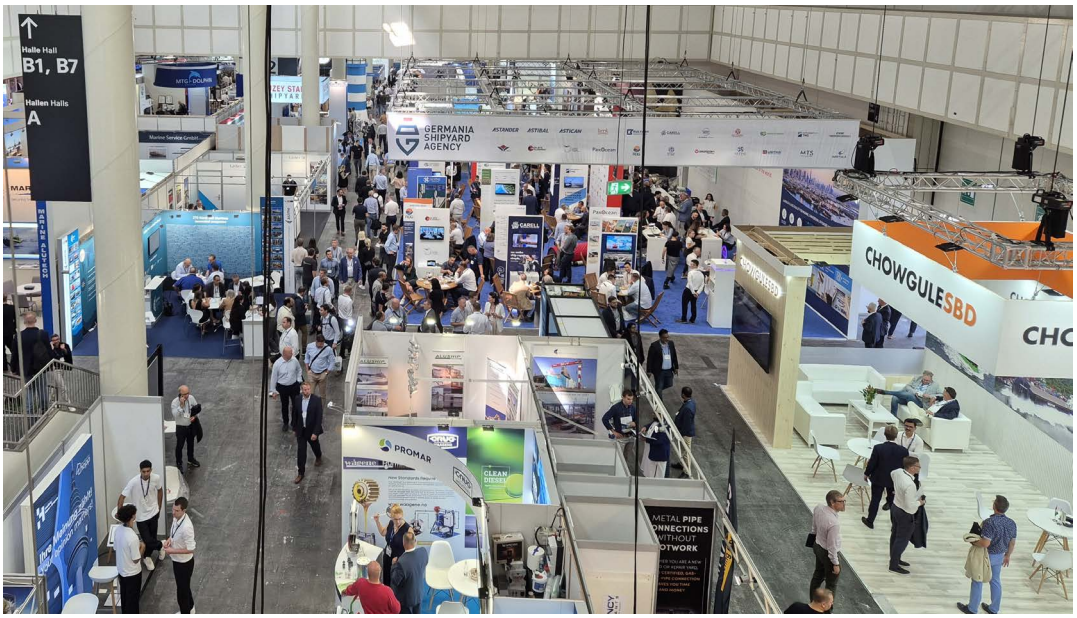
As in previous years, the CESNI RIS Week was held the last week of June, from the 24th to the 28th, in Basel (Switzerland). This is one of the main forums where stakeholders from across Europe meet to exchange information on the status of River Information Services (RIS) on inland waterways in the EU. Relevant organisations such as the Central Commission for the Navigation of the Rhine (CCNR), the Danube Commission, etc., attended together with experts from the public and private sectors to exchange and share on technology and activities related to the harmonisation and standardisation of RIS implemented in Europe. Among the various topics discussed, there was time to highlight the benefits of European space technology and EGNOS for inland navigation. Thus, ESSP, as a regular attendee of RIS Week, had the opportunity to present an initial approach to a possible future EGNOS service for inland waterways, which was well received and led to a very productive exchange with different experts from organisations such as the German WSV (Federal Waterways and Shipping Administration). Other relevant topics addressed during the week were related to technological research and experimentation that will bring autonomous navigation of vessels on Europe's extensive (and very busy) waterways closer, also improving their safe use.

AQUA 2024

AQUA, formerly Aquaculture Europe, is an international benchmark event for the aquaculture industry. Aquaculture is establishing itself as an essential sector in the global food supply due to the diversity of technologies used for its production, its diversity of market propositions and its respect for the environment. The international event included an international trade exhibition, industry forums, student sessions and activities, satellite workshops and updates on EU research. The event took place from 26-30 August at the Bella Center in Copenhagen, Denmark. EGNOS representatives were present at the event, visiting the trade exhibition, promoting the service and identifying potential technologies, operations and partners that could benefit from the European SBAS.

The diversity of European aquaculture was showcased at the International Trade Exhibition. This event was a great opportunity to meet with relevant companies in the industry and discover the latest products and services. In addition to the trade show, the industry forum, parallel to the technical workshops, and the Innovation forum were great ways to keep up to date on trends in this interesting market, where positioning is becoming increasingly present.

SMM 2024



EGNOS was present at SMM, a biannual trade fair and conference and one of the most important gatherings for the global maritime industry. The event took place from 3-6 September 2024 at the Exhibition Hall and Congress Centre in Hamburg, Germany. This leading maritime trade fair brought together more than 2,200 exhibiting companies from all technologies of the marine industry and over 48,000 participants from more than 100 countries. The stands and conference content revolved around the highly relevant theme of "driving the maritime transition".

The exhibition covered innovative and technological solutions for relevant aspects such as digitalisation, communication and integration of vessel electronics, where EGNOS plays a crucial role. The conferences also highlighted pertinent present and future topics such as decarbonisation, digital transformation and marine traffic management. During the days of the exhibition, EGNOS representatives took the opportunity to contact different stakeholders, and it was a great opportunity to make new contacts.

in rail.

INNOTRANS

As part of the event, Europe's Rail hosted an on-the-move workshop on board a special train from Brussels to Berlin: "the European Train to InnoTrans", which brought together high-level representatives from various entities, including Mr Rodrigo Da Costa, Executive Director at EUSPA, who highlighted the importance of satellite positioning for rail applications.

EGNOS and its benefits were discussed with some attendees at the train and InnoTrans fair, where EGNOS participated at the EUSPA stand. The InnoTrans fair is an international rail event held every two years at Messe Berlin. The exhibition covered five trade fair segments: Railway Technology, Railway Infrastructure, Public Transport, Interiors and Tunnel Construction.

During the event, as EGNOS service provider, ESSP furnished information to the attendees on using EGNSS in rail and used the opportunity to visit other stands and promote EGNOS adoption with different stakeholders in the field. It was an excellent opportunity to reconnect with people and make new contacts.

EGNOS4RAIL

On 23 November last year, a new project was launched to bring closer the introduction of a future safety of life service for Rail in Europe.

The EGNOS4RAIL project combines the European knowledge and expertise of the Space Agencies ESA and EUSPA (with the support of ESSP) and the public and private Railway sector (European Railways Agency, rail manufacturers, infrastructure managers, etc.).

This two-year-long project will be based on previous studies. It will seek to solve the remaining regulatory and technical challenges for the progressive implementation of an EGNOS service, drawing on experience in both GNSS and Rail and looking for synergies between the two sectors.

Several workshops and meetings have already taken place involving regulatory, technical and safety experts from project partners such as ESA, ERA, Rail System Pillar, etc., and have resulted in a very productive exchange of views. Relevant conclusions are already being addressed, with ESSP leading some discussions supporting EUSPA with its expertise in EGNOS and service provision.

Due to its long experience as an EGNOS Service Provider for the Aviation domain, ESSP is working with EUSPA to define a potential approach for the certification and authorisation of an EGNOS Service in Rail, as well as its impact on the current regulatory framework in this field. This effort is complemented by the definition of an initial Service Provision Scheme, detailing the main features of the service and interfaces between the actors involved in the service provision and the Service Level Agreement, establishing the main responsibilities of the actors.

This collaborative work will continue with several meetings and new workshops already planned for the remainder of the year.

in GNSS.

EGNOS WORKSHOP

The EGNOS Workshop held in Dublin in March 2024 showcased the latest advancements in satellite-based augmentation systems, focusing on aviation, maritime, and land applications. Industry leaders, authorities and users gathered to discuss on EGNOS, its performance on the different services, roadmaps, market adoption and its present and future applications in different transport domains. At the beginning of the event, EUSPA officially declared the new EGNOS Safety of Life (SoL) assisted service for Maritime users (ESMAS). The EGNOS service portfolio is broadening its horizons, and ESMAS has become a reality after several years of intense work to obtain it. To know more about this EGNOS Annual Workshop edition, take a look at the presentations on the Agenda.

Upcoming Events

METSTRADE

19 - 21 Nov

METSTRADE Show is the world's leading event for professionals in the leisure marine equipment industry. This global event focuses on innovation, market developments, and on-site networking & knowledge. With more than 2,500 exhibiting companies, it will take place in Amsterdam from 19 to 21 November. This year, EGNOS will be present at the event in its own stand number 05.363. It would be a pleasure to see you all there!

EGNOS

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