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EGNOS BULLETIN

Issue 26, Q2 2018



Credits: BOEING

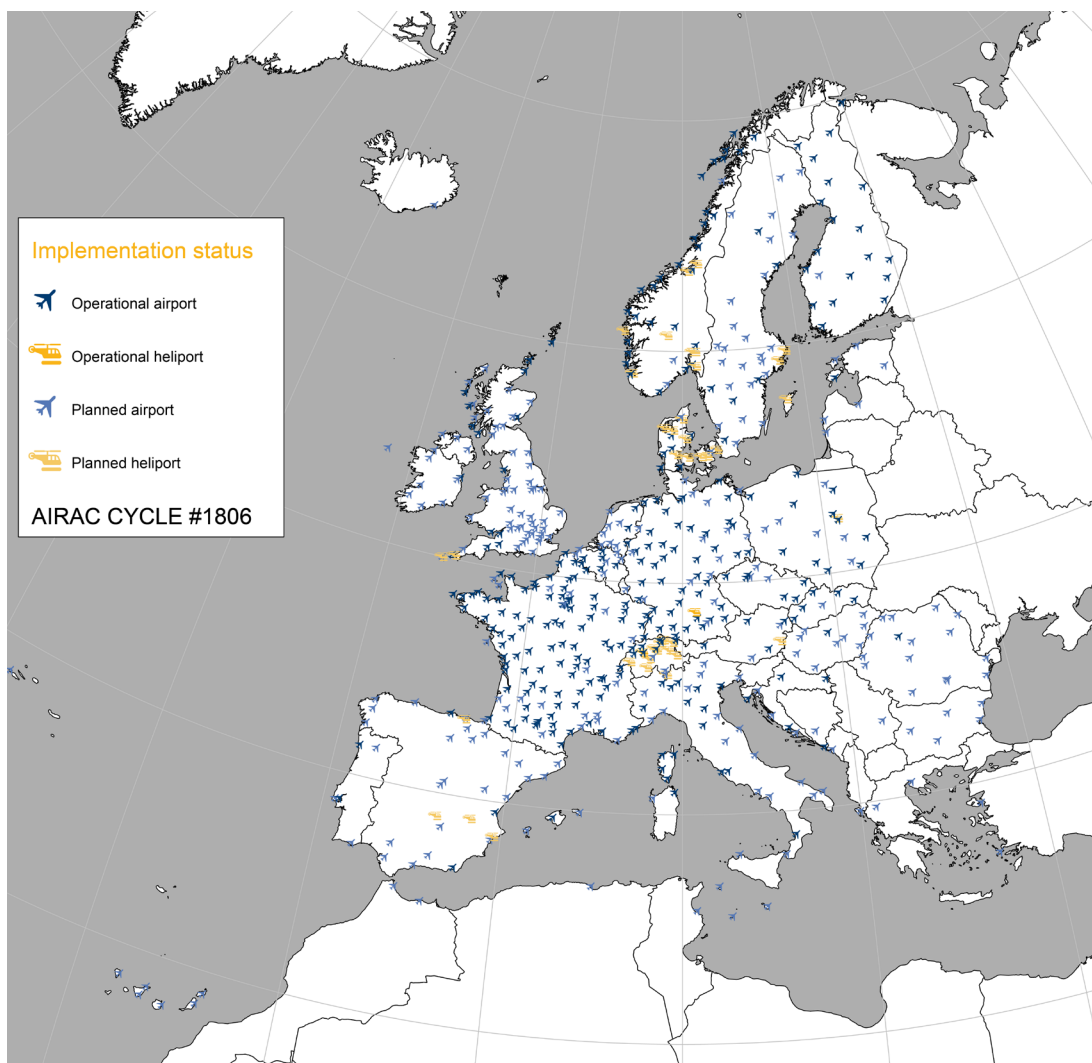


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Global Navigation
Satellite Systems
Agency

Precise navigation,
powered by Europe



EGNOS implementation



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Talking about EGNOS benefits with... BOEING

David Zeitouni is a Technical Fellow in [Boeing Commercial Airplanes](#) where he has worked in the Flight Deck, Flight Crew Operations and Integration Group since 2010. He is currently a member of the ICAO Instrument Flight Procedures Panel & the ICAO Performance-Based Navigation Study Group. He also served as a United States Air Force military pilot and graduated from the Air Force Academy

When did you first hear about SBAS and LPVs in the US?

Prior to working for Boeing, I worked for a company called Universal Avionics Systems Corporation. Universal was an early adopter of SBAS technology. As their FMS (Flight Management Systems) Systems Engineering manager, we certified the first Part 25 (large aircraft) SBAS and LPV FMS. Working for Universal gave me great experience with SBAS and LPV. We had customers ranging from single pilot aircraft to regional operators. I had direct experience with the benefits and value of SBAS.

What about EGNOS, were you following its beginnings or did you find about it recently?

While developing SBAS at Universal in the mid 2000's, I became aware of not just WAAS, but the other operational and in development SBAS. As we developed our LPV capable FMS and SBAS receiver, we conducted interoperability testing with all the SBAS systems (WAAS, EGNOS and MSAS) at the time. The FMS I helped certify in 2007 was interoperable and able to utilize EGNOS when safety of life services were enabled. I've been promoting the benefits of SBAS for many years within my organizations and within the industry groups I participate.

As pilot, have you ever been able to fly a LPV approach yourself? If so, what was your experience? Was it as good as everyone says?



Credits: BOEING

In my US military career, I was not able to fly an LPV. The Air Force had not adopted or retrofitted LPV technology onto the aircraft. During development of SBAS and LPV systems at Universal, I was able to fly LPV approaches as a pilot and passenger. I'm hooked. The GNSS augmented approaches (LPV and GLS) are awesome. They provide the precision of ILS without the instability or quirkiness due to interference. So, yes, I think LPV is as good, actually better than everyone says.

Photo: 777 Flight Deck /
Credits: BOEING



Could you please tell us about your role at Boeing?

Currently, I'm a technical fellow for Boeing. I work in Boeing Commercial Airplanes division in the Flight Deck engineering organization. My organization is responsible for defining, specifying and developing all of the features and functionality within the flight deck. This includes everything from the flight deck door and bulkhead forward. My specific role is primarily related to Communications, Navigation and Surveillance equipment and functions.

“Airlines that operate to airports without ILSs are also seeing the benefit of LPV (...) having an alternative if the ILS is out of service is a benefit”

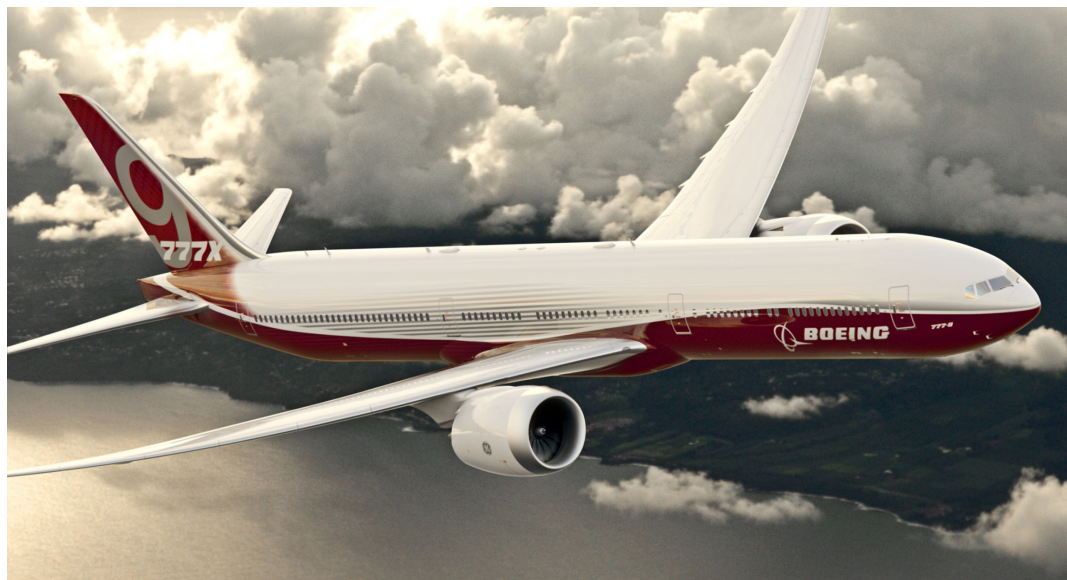
With my background in FMSs, I focus on navigation related technologies, but our organization's larger reason for existing is to define the human/machine interface for the Boeing flight

deck. My background as a transport pilot is also instrumental in understanding the role of the pilot in the modern flight deck and integrating the capabilities like LPV into our aircraft so that the pilot can use them without causing confusion or adding unnecessary workload. Working on GNSS augmented approaches, especially LPV, has been a primary task of mine in recent years.

Integrating LPV approaches into the Boeing flight decks requires some work. When we get it right, the pilot is able to follow LPV guidance just like ILS or GLS providing access to thousands of LPVs in North America and Europe.

We always heard that WAAS was born for general and business aviation which are today their most frequent users. However, Europe seems to be reaching medium size and large airports, which is attracting the interest from regional and commercial airlines. Has Boeing received any request for LPV from customer airlines?

It's true that WAAS LPV was adopted early by the GA and business aviation, but not because there is something special about LPV for GA and business aircraft. Airlines only upgrade equipment when there is a very good business case to do so. The majority of airlines operate to airports with ILS procedures to all the main runways. So, there hasn't been a great need for airlines to retrofit with LPV. As LPV proliferates with projections for significant increases in coverage areas in the coming years, the business cases are shifting. Airlines that operate to airports without ILSs are also seeing the benefit of LPV. Additionally, having an alternative if the ILS is out of service



Credits: BOEING

is a benefit. So, yes, Boeing is starting to see interest for LPV from customers. It's still sparse, but interest none-the-less.

Surely you are aware that other big manufacturers like Airbus, Embraer, Bombardier or ATR are offering LPV options for their new and some legacy models. Is Boeing planning to offer such capability in the short term?

The short answer is yes, Boeing is working on LPV. We have to make the case on each different model and program, but it is happening. Our next new derivative, the 777X, will have LPV as a customer option. That will be followed by the 737 MAX. In cases where changes to production aircraft are not possible, we are investigating retrofit options.

Which models will be first to benefit from such developments and what is the tentative date for entry into service?

Benefit is very individual to a specific operator. An airline that doesn't operate on North America or Europe will probably not see much benefit for LPV in the near term. We are within the next two years or so for the 777X and 737 MAX. There are no specific dates for other models at this time.

What will be, in your opinion, the main advantages or benefits of having LPV on Boeing aircraft?

Again, the advantages will depend upon your operation. For some, it is having a precision approach where no other precision approaches exist. For others, it's the backup to ILS or the benefits of geometric (non-temperature

restricted barometric) approaches. Anytime, an operator can fly a precision 3-D approach instead of a 2-D dive and drive is better/safer.

We are aware that the FAA has recommended SBAS for ADS-B Out as it offers an improved availability with respect to GPS and that EASA is likely to follow the same approach. Is Boeing considering such recommendation?

Yes, Boeing is well aware of the FAA SBAS recommendations for ADS-B. The number of reasons to have SBAS on the aircraft is growing (i.e. GAGAN mandate for Indian registered aircraft). Boeing is actively working on forward fit and retrofit SBAS packages for most of the current commercial models.

Any final message for our readers?

In the modern world of consumer electronics where technology changes at a rapid pace, aircraft technology is very slow by comparison. Most commercial aircraft fly for 20+ years and often have minimal changes made to them in their active lifetime. When you consider those facts, getting SBAS and LPV on commercial aircraft is now happening at a quick pace. In a few years, we will look back and see that we did make a rapid change from standard GPS to SBAS quickly by commercial aviation standards. It's easy to wish it would move faster, but we're getting there.

“In a few years, we will look back and see that we did make a rapid change from standard GPS to SBAS”

Moving towards wide-scale SBAS CAT-I deployment

The EGNOS Safety-of-Life (SoL) Service became available for its primary purpose of aircraft navigation in March 2011, supporting the implementation of Approach Procedures with Vertical guidance (APV) down to LPV minimum. On Sept 29, 2015, the LPV-200 Service Level was declared operational and added within the SoL Service, enabling the implementation of LPV approaches down to a Decision Height (DH) of 200ft (also known as SBAS CAT I). It became an even more attractive alternative to ILS CAT I and today many airlines are implementing this technology.

Credits: Vienna Airport



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and added within the SoL Service, enabling the implementation of LPV approaches down to a Decision Height (DH) of 200ft (also known as SBAS CAT I). It became an even more attractive

alternative to ILS CAT I and today many airlines are implementing this technology. During the period that the APV was provided alone (nearly

5 years), almost 220 LPV approaches based on EGNOS were put in operation, plus around 90 LNAV/VNAV approaches where EGNOS was usable as the source of vertical navigation. By mid-2018 the figure has almost doubled and today we can find about 430 LPV approaches deployed all around Europe, and more than 100 of the above mentioned LNAV/VNAV.

It is interesting to look at how the process has taken place and, in particular, how ANSPs have made use of the more performing CAT I capability provided by EGNOS. When looking at the overall 430 LPV figure, it should be noted that 300 are based on the APV service level, and that 130 have been implemented as CAT I approaches. But it is worth noting that out of the 130 CAT I LPVs, a conversion from APV to CAT I took place at least for 54 of them, confirming how relevant the

“SBAS performances are similar to those provided by ILS CAT I but avoiding investment and maintenance costs for airports”



Credits: Vienna Airport

improvements brought by the CAT I approaches over the APV ones might be for some scenarios and/or ANSPs.

A survey carried out by ESSP SAS during 2016 among early LPV-200 adopters indicated that:

- The main interests behind SBAS CAT I implementations were to achieve a cost-effective option and the best-quality back-up for ILS CAT I approaches, followed by an intention to reduce the landing minima and improve the airport's accessibility;
- Over 90% of the CAT I approaches would be published at runways qualified as Precision Approach Instrument Runway within aerodromes with ATC services;

Almost 3 years after the declaration of the LPV-200 service level, two additional observations can be made. On the one hand, France leads the implementation of SBAS CAT I approaches with 61 of them, having implemented a lot of them at those runways affected by the ILS CAT I rationalization campaign initiated in 2016. As a consequence, also aircraft operators are increasingly showing interest in the technology.

On the other hand, today 10 States have already implemented SBAS CAT I approaches. But the number of States who plan to implement such kind of approach procedures keeps growing, and so does the total number of LPV approaches that will be deployed in Europe in the coming years. It should be reminded that its performances are similar to those provided by ILS CAT I but avoiding investment and maintenance costs.

A few words from the Austro Control Instrument Flight Procedures design team

Austro Control looks back on a long history of PBN activities and has always pursued a continuous implementation strategy for innovative procedures. After expanding the RNP approach concept throughout the country, the Austrian ANSP became an early adopter of Europe's SBAS system EGNOS. In the scope of the FP7 ACCEPTA project, the first LPV approach procedures (based on APV criteria) for Linz and Graz airports were published in 2014, thereby adding vital experience in this field to Austro Control's IFP team. Heavily used by general & business operators as well as the Austrian aircraft manufacturer Diamond Aircraft, the implementation has proven to be successful right from the beginning.

Given the fact that Austria is located inside the core coverage area of the European SBAS system and with the goal to increase operational safety and all-weather accessibility of airports, Austro Control has continued the roll-out of LPV approaches based on CAT-I criteria throughout the country, starting with Vienna airport, where all LPV approaches provide a Decision Height of 200ft, supposing the best quality back-up for ILS CAT II/ III approach in RWY16, an equivalent performance for RWY11 and even improving the minimum for RWY34.

As a logical consequence, Austro Control's IFP team also initiated the process of transforming "legacy" APVs at Linz and Graz into SBAS CAT-I approaches. This renewal process has been completed with the March 2018 AIRAC update which now has all Austrian SBAS procedures upgraded to CAT-I standards. Thus, Austro Control's success story in EGNOS usage already has a lot to offer... but the journey continues.

EGNOS Success Stories

Lease Fly takes advantage of already existing LPV STC for ATRs

Photo: ATR 42 /
Credits: Lease Fly



Thanks to GSA funding, several STCs have been developed allowing LPV functionality being upgraded in numerous aircraft models. Many Part 21 organizations are therefore engaging new

customers with reduced costs for LPV upgrades. One such case is the development and installation of an STC produced by [AKKA](#) for Hop! a few months ago.

This STC enabled LPV functionality for the ATRs 42 and 72 legacy (100 to 500 series) by installing the Esterline CMC Electronics [CMA-5024](#) GPS/SBAS Landing System Sensor Unit (GLSSU) and [CMA-5025](#) Control

Panel. Having this STC available for purchase has been great news for many operators wishing to take advantage of LPV. reduced costs are possible thanks to LPV procedures.

Take the case of [Lease Fly](#), a Portuguese company maintaining several ATRs and a Cessna Citation, offering charter flights and wet-leasing services. According to Pierre Yves Lazies, Sales Director from AKKA Technologies, "having this STC available is raising strong interest from many ATR's regional operators." For Lease Fly and similar operators LPV approaches are a great news, given their need to land at many small and medium sized airports without ILS, so safer operations, increased accessibility, less disruptions and even reduced costs

“Having this STC available is raising strong interest from many ATR's regional operators”

EGNOS training for environmental law enforcement agents



EGNOS was present at the course "[Taking samples in the natural environment \(2018\)](#)", organized by the School of Security and Emergencies of the Government of Navarre with the collaboration of the Technical Unit of the Environmental Spanish Prosecution's Office. This training action was provided to a group of agents of the environmental units of different Spanish security forces. The global objective of the course was to update and unify the procedures for collecting natural samples for law enforcement investigations. The topics covered in the different sessions went from basic techniques and methodologies for ground and water sampling to computer tools for visual analysis through thematic cartography and photogrammetry. In this context, the acquisition of positioning measurements is of great relevance, as the samples taken need to be georeferenced for both reporting and visualization. For this purpose, the more accurate location data the better, so EGNOS can play its role augmenting GPS. For this reason, as part of the course, the attendants received a training session, both theoretical and practical, on EGNOS and its benefits. In line with the course's aim, the EGNOS

session was specifically dedicated to the use of EGNOS in field campaigns, in order to optimize the acquisition of location measurements. During the theoretical part, EGNOS architecture, services and capabilities were introduced. Afterwards, specific EGNOS performance data and use cases related to field measurements were presented, showing the usefulness of EGNOS in that kind of situations. The practical part consisted on explaining how to configure EGNOS in professional mapping and surveying handheld devices along with an in-situ demonstration with specific equipment. The attendants could activate and configure EGNOS in their own positioning devices, which they usually employ at work. In this way, they could check that their devices can successfully lock to EGNOS geostationary satellites and apply the corresponding corrections to the GPS signals, improving the accuracy of their location measurements at no cost. In general, the feedback from the law enforcement agents trained in EGNOS was very positive, as they were glad to know that in such an easy way they could enhance both the management and results of their field campaigns.

EGNOS services highlights

New EGNOS App available

Do you want to get access in an easy and interactive way to all EGNOS related information? Download now the EGNOS app and get at your fingertips all information you need in relation to EGNOS.

Don't miss the opportunity to easily access any information that EGNOS users may need for the different EGNOS Services (Open Service, Safety-of-Life, EDAS), including EGNOS official documentation (Service Definition Documents, Service Notices, public reports...), performance data (real-time, historical and forecasts) and support material for different application domains.

In addition, the EGNOS app enables you to contact the EGNOS Helpdesk by filling the embedded form or calling the 24/7 front-desk and takes advantage of your device's capabilities to locate and display your position within the EGNOS service area map.

Download it now!

[App Store](#)

[Play Store](#)

Many new functionalities and contents to come! **Stay tuned.**



Get it on **iOS** and **Android** for free



What's new?

Since last bulletin...

EGNOS WORKING AGREEMENTS SIGNED (EWA)

The following EWAs have been signed in the last quarter:



Hemavan Tärnaby Airport **Sweden**



EANS **Estonia**



Skövde Flygplats AB **Sweden**

LPV & APV Baro procedures published per country (including AIRAC cycle 1806 – 24/05/2018)

Next table shows, for each country:

- the number of airports with LPV procedures, as well as the total number of LPV procedures;
- the number of airports with APV Baro procedures authorised to be flown with EGNOS vertical guidance as well as the total number of APV Baro procedures.

Country	Airports – SBAS APV procedures	# SBAS APV Procedures	Airports – SBAS CAT-I procedures	# SBAS CAT-I procedures	SBAS RNP0.3 routes	Airports – APV baro Procedures	# APV baro Procedures
Austria	0	0	4	7	0	0	0
Belgium	5	9	0	0	0	0	0
Croatia	4	6	1	1	0	0	0
Czech Republic	5	9	0	0	0	1	4
Denmark	4	8	1	2	0	0	0
Estonia	1	2	0	0	0	0	0
Finland	1	2	0	0	0	17	33
France	69	105	46	62	0	3	4
Germany	23	37	5	8	0	21	56
Guernsey	1	2	0	0	0	0	0
Hungary	0	0	1	4	0	0	0
Ireland	1	1	0	0	0	0	0
Italy	11	21	2	2	0	0	0
Netherlands	2	3	0	0	0	0	0
Norway	17	26	9	19	0	5	10
Poland	1	1	11	22	0	0	0
Portugal	2	3	0	0	0	0	0
Romania	1	2	0	0	0	0	0
Slovak Republic	2	4	3	4	0	0	0
Spain	4	9	0	0	0	0	0
Sweden	6	10	0	0	0	0	0
Switzerland	8	10	2	3	4	0	0
United Kingdom	14	31	0	0	0	0	0
Total	182	301	85	134	4	47	107

SBAS in the world

TRIBUTE TO PER ENGE

A clear and brilliant mind who contributed to make SBAS a reality. From EGNOS bulletin, we join GNSS community remembering [Prof. Per Kristian Enge](#). An inspiring personality for many Europeans working in navigation by satellite.

Enge, a professor of aeronautics and astronautics, was best known for his work on GPS. He led deployment of two navigation systems in use today. The first began operation in 1995 and had over 1.5 million marine and land users as of 2014. The second system launched in 2003 and was, at last count, in use in over 100,000 aircraft and by more than 1 million land users.

"Anyone who works in GPS is aware of Per and his influence. He was just an intellectually talented person who could understand many scientific nuances and integrate them in ways others could not," says Brad Parkinson, widely considered to be the "father of GPS" and the man who recruited Enge to Stanford.



WAAS

The table below shows the WAAS list of satellite-based approach procedures. You can find further information on [SatNav news](#). Courtesy of the FAA WAAS Team.

Satellite-based Approach Procedures			
RNAV (GPS) Approaches	ILS Runways	Non-ILS Runways	Total
LPV Line of Minima	1,168	2,730	3,898
<250' Decision Altitude			1,052
Exactly 200' Decision Altitude			1,004
LP Line of Minima	4	648	652
LNAV Line of Minima	1,217	4,805	6,022
LNAV/VNAV Line of Minima	1,146	2,640	3,786
GPS Stand-Alone Procedures	1	54	55
GLS Approach	11		11
(Data as of March 29, 2018)			

What's going on... in aviation.



WORLD ATM



EGNOS was present once again in [World Air Traffic Management \(ATM\) Congress](#) which took place in Madrid between 6 and 8 of March to connect the world's aviation industry.

The world's largest air traffic management event, gathering more than 200 exhibitors and 100 sessions, counted on an EGNOS stand attracted by many visitors interested in GNSS concepts and applications in aviation sector.

A cockpit simulator contributed as a demonstration tool to show how EGNOS can improve landings by reducing delays and increasing safety.

During the three days, attendees were able to find out the latest information in relation with EGNOS implementation status, test the EGNOS Application in their smartphones and take a look at the new [EGNOS User Support Website](#).

AERO 18

Last April, [Aero 2018](#) took place at Friedrichshafen. This is one of the most interesting events for General Aviation (GA) awareness in Europe. It was a great opportunity to meet GA stakeholders (manufacturers, operators, pilots, associations), keep raising their interest on EGNOS and inform about the latest initiatives from GSA.

EGNOS was present as a Silver sponsor with a stand with a flight simulator who attracted a lot of visitors. Additionally, the GSA participated in a keynote from EASA to talk about EGNOS.

The main outcome of the show in what regards to EGNOS is that it is a very well-known technology amongst GA users and there is a lot of people



asking for it and using it due to its clear benefits for small aerodromes.

What's going on...



in aviation.

EBACE

[EBACE](#), the annual meeting for the European business aviation community took place in Geneva from 29 to 31st May. This is an opportunity for professionals from Europe and around the world to exchange knowledge and best practices in the sector.

EGNOS was present once again at this event and the colleagues from ESSP and GSA promoted its use among the business aviation stakeholders.

It was great to discover how EGNOS is becoming more popular and awareness is increasing year by year. Attendees were able to go into detail about EGNOS benefits, learning how it is key to ensuring

the industry's access to airports.

Gian Gherardo Calini, the Head of Market Development in the European GNSS Agency (GSA) jointly with the SESAR Joint Undertaking (SJU) and airport operators participated in a conference about Air Traffic Management, "[How to Ease Your Flight Operations with New Technologies?](#)"

The session was focused on discussions about the future ATM technologies and GSA took the opportunity to report on EGNOS status in LPV approaches and ADS-B out, showcasing the benefits in safety and efficiency in aviation operations.



in maritime.



IALA MEETING



For the first time in this important Conference, EGNOS use in the maritime domain had a prominent place in the agenda. Mainly through the presentation of the activities carried out in this regard during the last four years at IALA, Cerema's presentation of the operational implementation of EGNOS corrections over French DGPS beacon stations, together with the overview of future plans, objectives and coming activities.

The [19th IALA Conference](#) which took place at the end of May in Incheon, Korea, is the largest international worldwide event on the aids to navigation where national, industrial, and associate members from around the world gather to discuss new technologies, new policy directions and trends for the enhancement of safe waterways. Based on the defined strategy, the work developed in the last years and the future plans, the GSA and ESSP presentation on Satellite Based Augmentation Systems showed the different possible solutions for the transmission of SBAS/EGNOS corrections to maritime users. It is worth mentioning the IALA key role in this scenario, with the recently approved IALA Guideline G1129 on The Retransmission of SBAS Corrections Using MF-Radio Beacon and AIS and also the planned guidance material on Augmentation Services to be developed during the next working period, which will surely strengthen the harmonized implementation of SBAS solutions for both Maritime and Inland Waterways domains.

Moving on to a real life practical example of how the architecture approaches gathered in the G1129 Guideline are implemented, Cerema showed the results of a full scale experiment successfully conducted in France in 2018. Based on the good results of the preliminary study of 2016 and relevant inputs of other organisations such as ESSP publications, the French Maritime Authority and Cerema have been working together to design and set-up a test bed aiming at transmitting EGNOS corrections over the French DGPS beacon stations. The results show a compliance of the EDAS based centralized solution tested with performance requirements, mainly regarding availability, accuracy and integrity. Furthermore, cost effectiveness will likely lead to reduce the overall costs for the service provider.

With the complete service provision chain in operation for Olonne station and with the foreseen implementation of the service in an additional station, the French Maritime Authority plans to officialise the service very soon. In the following years, the foreseen DGPS centralised architecture will be constituted by 6 DGPS stations and a central server.

It is also worth mentioning the ongoing joint work between the European Commission and the GSA, in collaboration with the ESSP, to define and potentially implement a new EGNOS Maritime service based on the on-board direct use of the L1 SiS. This service is based on operational users' requirements established by IMO Res. 1046 and can contribute to enhance the resilience of PNT information complementing the current DGNSS. The Maritime community is supporting this process through the European Maritime Radionavigation Forum (EMRF), helping in the introduction of SBAS-based solutions from a Service Provision, regulatory, standardisation, technical and operational point of view.

IALA Guidance on Augmentation Services is expected to provide guidance on the harmonised implementation of SBAS solutions for maritime use.

What's going on... in maritime.



DATA CAMPAIGN IN NORWAY SEA



GSA and ESSP, with the collaboration of The [Norwegian Coastal Administration](#) and Hurtigruten Cruises, have carried out a GNSS data collection campaign of 10 days along the Norwegian coast with a trajectory through Trondheim to Kirkenes and Kirkenes to Bergen. The aim of this data campaign was to assess EGNOS performance at user level in the maritime domain at high latitudes in Europe.

A preliminary assessment of EGNOS was done using some commercial receivers and a software receiver in line with the SBAS guidelines. Results show that the vessel is receiving EGNOS differential messages from at least one of the GEO satellites used by EGNOS to broadcast the SBAS messages. The accuracy performance, that is, the difference between the PVT solution and the true path computed using PPP algorithms, shows

that horizontal navigation solution error (HSNE) is around 1 meter during the 95 % of the time. These availability and accuracy results indicate that SBAS performance is widely compliant with the requirements defined in the IMO Res. A.1046 (27) for general navigation.

GSA and ESSP offer the opportunity to reproduce this GNSS data collection in any of GNSS maritime receiver with SBAS capability free of charge. The objective of this proposal is to compare the performances of current GNSS receivers with those obtained by a receiver (software receiver) aligned with the SBAS Guidelines developed in the RTCM SC-104 SBAS WG and to support receiver manufactures for the implementation of SBAS guidelines in their products. If you are a receiver manufacturer interested in reproducing these data, please contact resev@essp-sas.eu

in surveying.



EGNOS WEBINAR: FREE ACCURACY FOR MAPPING AND GIS APPLICATIONS



Credits: Eurogeographics

In order to disseminate the capabilities of EGNOS for mapping and GIS applications, a webinar has been organised by [EuroGeographics](#) and the European Global Navigation Satellite Systems Agency ([GSA](#)), with the collaboration of [ESSP](#), the EGNOS service provider. The [webinar](#) will take place on 20 June 2018 (Wednesday) from 10:30 AM to 11:30 AM CEST.

Online registration is required through the following [link](#).

The webinar aims at briefing users from mapping and GIS communities about EGNOS, the European free augmentation service that improves GPS accuracy up to sub-meter range. The webinar is open to all mapping and GIS users, from both private enterprises and public organisations.

What's going on...



in GNSS.

ENC 2018

Credits: ENC Website



[ENC 2018](#), the leading forum in Europe for keeping up with the top research advances and scientific discoveries in the field of navigation technologies, took place in Gothenburg, Sweden from the 14th to the 17th of May. Several papers with EGNOS as common thread were submitted this year and accepted for the lecture sessions.

In the maritime field, the paper "[SBAS Maritime Service: EGNOS Preliminary Performance Based on IMO Res. A.1046\(27\)](#)" addresses a list of performance parameters to completely characterize the SBAS maritime performance and assess the level of EGNOS performance attained for maritime. With regard to the use of EGNOS in precision agriculture, results of in-field tests

showing that the DGNSS corrections broadcast by EDAS could be a suitable solution for cereal farms are gathered in the paper "EDAS (EGNOS Data Access Service): Differential GPS Corrections Performance Test with State-of-the-Art Precision Agriculture System".

Space weather was another topic where EGNOS was addressed. Under the title "Effects of a X9.3-Class Solar Flare on EGNOS Performance", this paper reports the space weather incident that occurred in September 2017, the strongest solar flare in more than a decade, and investigates the EGNOS response at both system and signal in space levels.

To learn more about this conference, click [here](#).

Did you know...?

EGNOS was taking part in the latest edition of SmartRail through the presentation of "Signalling from space: towards rail safety relevant applications with EGNOS and Galileo." This was an excellent opportunity to share knowledge and discuss how the industry can face the challenges in the use of E-GNSS in the railway domain.

Learn more about this event at <https://www.smartrailworld.com/events/smart-rail>

Upcoming Events

AVIATION ELECTRONICS EUROPE 2018

19 - 20
June

The Aviation Electronics Europe 2018 will gather delegates from around the world to benefit from presentations and discussions from international industry expert speakers.

Airline and Operators CEOs; parts and components distributors and manufacturers; airline stockists; avionics manufacturers, software & developers, fixed wing and rotorcraft; maintenance company CEOs, and EASA, FAA and other regulatory personnel will meet in Munich next 19-20 June.

On [the second day of the conference program](#), two presentations will feature SBAS with titles **"Avionics Manufacturers bet heavily on SBAS"** and **"European GNSS supporting PBN and CNS evolution"**.



INNOTRANS

18 - 21
Sept.

Once again EGNOS will be present at Innotrans, the leading international trade fair for transport technology which takes place every two years in Berlin.

Organized by Messe Berlin, the 12th edition of InnoTrans will take place from 18 to 21 September 2018. Sub-divided into five trade fair segments, Railway Technology, Railway Infrastructure, Public Transport, Interiors and Tunnel Construction, Innotrans occupies all 41 halls available at Berlin Exhibition Grounds.

Do not miss the opportunity of visiting **EGNOS stand at Hall 6.2 - Booth 308**.





EGNOS, it's there. Use it.

<https://egnos-user-support.essp-sas.eu>

EGNOS applications. Developers platform. Business support.
Information on historical and real-time EGNOS performance. EGNOS Signal in Space (SIS) status. Forecast on SIS availability and EGNOS performance. EDAS information and registration. EGNOS adoption material and tools.

For questions & information

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