EGNOS

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EGNOS BULLETIN

Issue 14, Q1 2015

ATR 600 © ATR-PIERRE BARTHE

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EGNOS implementation

EGNOS Success Stories

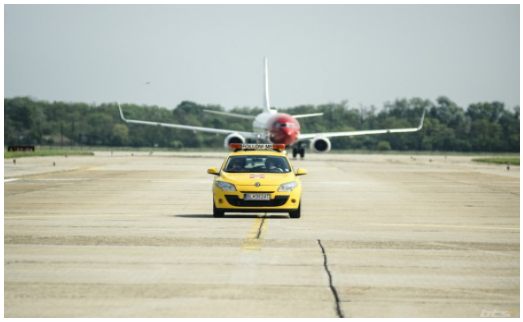
ATR OBTAINS EASA CERTIFICATION FOR THE NEW DEVELOPMENTS IN THE ATR-600 AVIONICS SUITE

The propeller-bladed regional aircraft manufacturer ATR is pleased to announce that it has obtained certification for the very latest innovations developed for the avionics of the ATR 42-600s and ATR 72-600s from the European Aviation Safety Agency.

The new certification concerns the LPV (Localizer Performance with Vertical guidance), RNP-AR 0.3 (Required Navigation Performance with Authorization Required) and V-NAV (Vertical Navigation) approach functionalities coupled to the autopilot.

Credits: © ATR-Pierre Barthe

These new improvements will allow the latest generation ATRs to follow more accurate and even more secure approach trajectories thanks to satellite navigation, without requiring ground-based navigation facilities. These new features, which significantly reduce the pilot's workload, are integrated into a new version of the ATR -600 avionics, the "Standard 2" version.
Further information click here.



Credits: Bratislava Airport

1ST LPVS IN THE SLOVAK REPUBLIC

The first PBN approach procedures became operationally effective at Bratislava and Košice airports as of 5 February 2015.

Under the umbrella of the GSA-funded ACCEPTA project, LPS SR š.p. (Air Navigation Service Provider of the Slovak Republic) conducted the necessary tasks so as to provide each airport with RNP APCH procedures to all of its instrument runway ends. The new procedures include LNAV, LNAV/VNAV and LPV lines of minima.

"This has been a very demanding project. The introduction of PBN procedures has required the involvement of many professionals at LPS SR but also the collaboration and commitment of our Transport Authority" says Rastislav Primus, Head of ATM Planning and Procedures Department at LPS SR.

LPS SR activities on PBN, however, do not finish with the end of this project. In fact, 3 more airports (Piešťany, Žilina and Poprad-Tatry) will have received LPV procedures during the coming two years. "With the experience we have acquired, we are confident in meeting ICAO objectives on PBN implementation at all our instrument runway ends by 2016", Mr. Primus concludes.

Did you know…?

…that BULATSA, the Bulgarian Air Navigation Services Provider, will publish its first PBN procedures for Burgas Airport in 2015? You can find more information in the following **link**.

Talking about EGNOS benefits with…

Airbus Helicopters

When and how did you first hear about EGNOS?

We started hearing about EGNOS in the early 2000's and immediately recognised the value of this technology for helicopters operations. As soon as 2003, under sponsorship of GISS (Galileo Interim Support Structure), we performed a successful in-flight demonstration of helicopter steep approaches using EGNOS guidance. The helicopter was an EC155 fitted with a specific GNSS receiver from Thales designed for EGNOS validation purposes (EGNOS Test Bed User Equipment). To our knowledge, this was the first time in the world SBAS technology had been used for helicopter guidance along a final approach path. Afterwards, in the frame of various European projects (GIANT, OPTIMAL, CleanSky), we continued to assess the potential benefits of EGNOS for helicopter operations through demonstrations of specific IFR procedures under SBAS guidance at airports and hospital heliports.

What are, in your opinion, the main benefits of EGNOS for a helicopter operator?

Unlike fixed wing aircraft, which have used ILS for many years to achieve precision IFR approaches at airport runways, no technology was available to provide helicopters with accurate lateral and vertical approach guidance for accessing remote sites under IFR away from airports (e.g. city heliports, hospital helipads); subsequently leading to service disruptions when weather below VFR minima. Thanks to EGNOS, helicopter-specific IFR approaches with vertical guidance could be implemented at any site and without requiring ground installation, which is very flexible and cost effective. EGNOS definitely contributes to making helicopter operations safer and less dependent on weather.

> "EGNOS definitely contributes to making helicopter operations safer and less dependent on weather."

Have you detected a demand for this technology from operators?

Yes, definitely. Following EGNOS entry into operational service in March 2011, more and more European helicopter operators have expressed their interest for having EGNOS technology on board the helicopters they fly, in particular those who are customers of Airbus Helicopters. In September 2013, Airbus Helicopters made available for its customers, Europe's first EGNOS guided IFR approach (LPV) to a heliport at the company facility in Donauwörth, Germany. In parallel, requirement for having helicopter-specific LPVs available at their operating sites is also growing.

Airbus Helicopters offers a wide range of models. Which was the first offering LPV capability?

A few years ago, EC135/145/155 models fitted with Garmin™ GNS 400/430 GNSS receivers got an FAA STC (Supplemental Type Certificate) for LPV approaches under WAAS guidance (US SBAS). In November 2014, EC135 models fitted with Garmin™ GTN 750 GNSS equipment were EASA certified for LPV approaches. H135 (formerly EC135) is the most popular Airbus Helicopters model for medical operations and the demand for LPV capability is high in this sector; this is the reason why this model was prioritized for being LPV certified in Europe. The newest helicopter models fitted with Helionix© (Airbus Helicopters new avionics suite), H145 (formerly EC145T2) and H175 (formerly EC175), will very soon be certified for LPV approaches. Also, the H225 (formerly

Credits: Airbus Helicopters

EC225e), the new version of the EC225 widely used in the off-shore sector, is LPV capable and certification is expected by end 2015. In the future, all new civil Airbus Helicopters models will include LPV capability in the baseline IFR version. On a case-by-case basis and depending on demand, retrofit solutions for LPV capability are also proposed for some legacy models.

How does Airbus Helicopters foresee the future of helicopter IFR navigation?

Until recently, the development of IFR helicopter operations was hindered by the lack of IFR procedures adapted to helicopter characteristics and operating sites. It should be remembered that IFR procedures were originally established for the needs of fixed-wing aviation. Now, thanks to the new PBN specification dedicated to helicopters (RNP 0.3) and ICAO criteria for Point-in-Space approaches and departures at heliports, helicopter-specific IFR procedures for all phases of flight can be designed and implemented. As a result, operators' interest for IFR ops is growing and some customers of Airbus Helicopters already made helicopter-specific IFR procedures deployed at their operating sites.

> "All new civil Airbus Helicopters models will include LPV capability in the baseline IFR version."

Meet the users

Philippe Rollet is Senior Expert at Airbus Helicopters for rotorcraft integration in the ATM system. He is a strong proponent for helicopter-specific IFR approaches relying on GNSS guidance and for more than ten years is being involved in several European projects dealing with EGNOS applications. He is advisor in the Helicopter Working Group of ICAO Instrument Flight Procedures Panel and also Technical Manager of GARDEN and CARE CleanSky projects aiming to define satellite-based procedures for environment-friendly rotorcraft IFR operations.

How will SESAR contribute to it?

SESAR is aiming to develop solutions for improving European ATM; this in collaboration with all stakeholders and in particular the Airspace Users (AU). The European Helicopter Association (EHA) is member of SESAR Airspace Users group and is working to make helicopter specific requirements included in SESAR. Thanks to EHA involvement, Point-in-Space approaches, Low Level IFR routes and Simultaneous Non Interfering (SNI) helicopter IFR procedures at airports are now included in the SESAR Concept of Operations (ConOps). In parallel, Airbus Helicopters participates in a SESAR project dealing with the integration of General Aviation and Rotorcraft. Some helicopter operators are, or have already been, involved in Large Scale Demonstration projects sponsored by SESAR. More generally, it is expected that consideration of helicopters in SESAR will foster the deployment of helicopter specific PBN procedures throughout Europe.

Towards the maritime application of EGNOS by General Lighthouse Authorities of the UK & Ireland

General Lighthouse Authorities of the UK & Ireland mission is to deliver a reliable, efficient and cost-effective Aids to Navigation service for the benefit and safety of mariners. In this article, Alan Grant and Nick Ward, present GLA view of the steps that should be taken so that EGNOS/ SBAS could provide additional services and complement the mix of systems required to achieve resilient PNT for e-Navigation.

The European Geo-stationary Navigation Overlay Service (EGNOS) was developed for aviation; however in recent times there has been a move to encourage its use across different transport sectors. This article reviews how EGNOS could be used within the maritime sector and sets out some of the key activities required before it can be used.

The International Maritime Organisation (IMO) recognises navigation systems for use on vessels bound by the Safety Of Life At Sea (SOLAS) convention. There is currently no recognition of EGNOS or any Satellite Based Augmentation Systems (SBAS) as there are no maritime receiver performance standards. There is therefore no approval for SOLAS vessels to use EGNOS or any SBAS data in their bridge systems or for navigation.

> “Maritime receivers have been provided with SBAS capability and non-SOLAS vessels are free to use any system.”

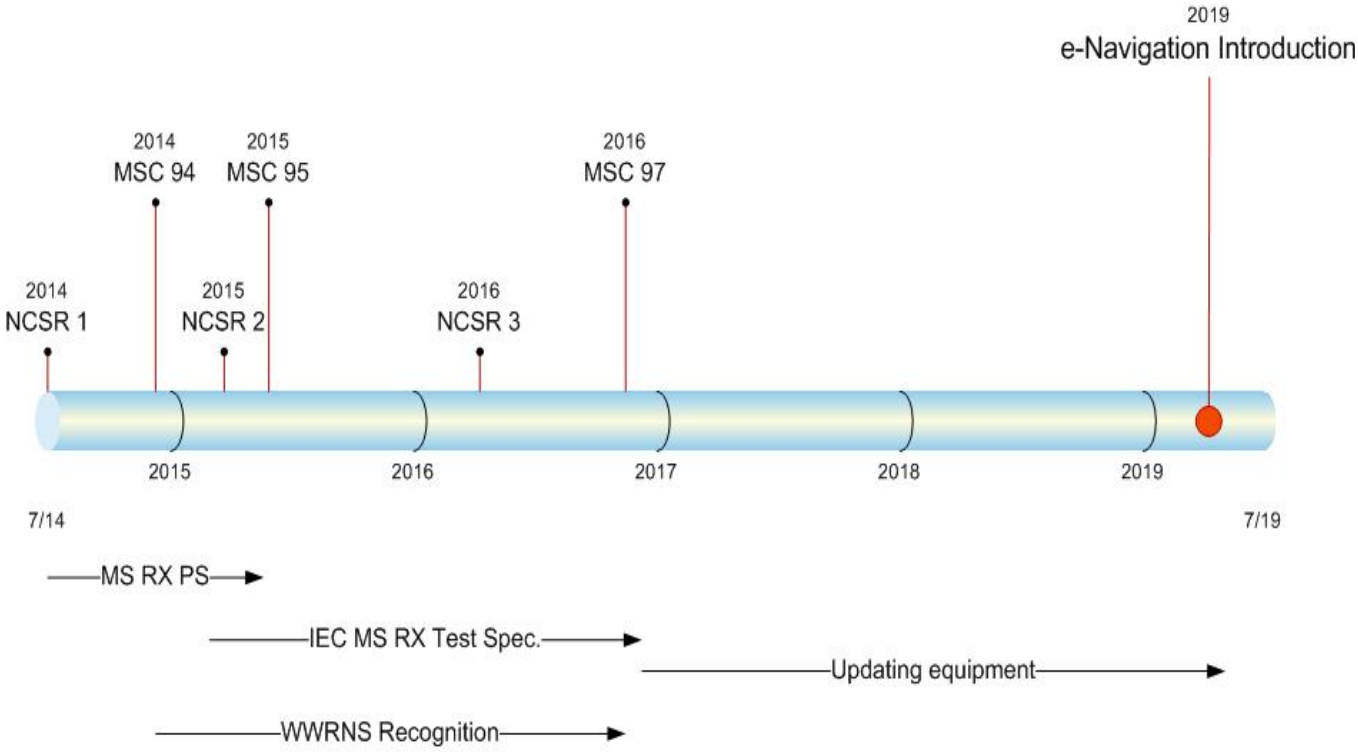
Maritime receivers have been provided with SBAS capability for some time and non-SOLAS vessels (smaller vessels and leisure craft) are free to use any system.

This has led to the unsatisfactory situation of some SOLAS vessels unknowingly using SBAS corrections believing they are using the approved marine beacon system. Also, without approved maritime receiver performance standards, it is down to the manufacturer to decide how best to map aviation integrity information to the maritime user, leading to inconsistent approaches which are not appropriate for a safety service. It is therefore in the maritime sectors' interest to find a resolution to this situation.

There are some other considerations which need to be addressed, such as how an aviation centric system is able to meet maritime requirements. Issues specific to maritime, such as operating at sea level and the potential for masking of satellites from port or vessel infrastructure need to be considered. As does the need for a clear communications channel between the service provider and the user, in order to make the mariner aware of any service failure or planned maintenance.

For the IMO to recognise EGNOS, or SBAS, a new work item will need to be considered for the Work Plan by the IMO Maritime Safety Committee (MSC). This committee will then consider the work and request its Navigation, Communications and Search and Rescue (NCSR) sub-committee to develop the appropriate receiver performance standards. This process requires the support of several national administrations and could take 3-4 years before such receiver performance standards are developed.

However, the story doesn't stop there as the development of the performance standard enables SBAS use on the vessel, but an International Electrotechnical Commission (IEC) test specification is required to ensure receiver hardware meets the performance standard. The



development of the test specification can start before the IMO has formally approved the receiver performance standard, but can take a further 2-3 years. Therefore the whole process may take 5-6 years from start to finish.

The IMO is currently developing a multi-system receiver performance standard which should enable the use of SBAS correction information. This should negate the need for a bespoke receiver performance standard, and as it is currently being developed, may halve the development time. The multi-system receiver performance standard is due to be considered at NCSR2 early 2015 and an indicative timeline for SBAS standardisation is given in Figure 1. It assumes the performance standard is finalised at NCSR2 and approved at MSC95; and the IEC test specification is completed by 2017. Based on these assumptions, IMO approved receivers capable of using SBAS should be available in the 2017-19 timeframe, in time for the introduction of e-Navigation.

A second avenue for recognition is to offer EGNOS as a component of the IMO World Wide Radio Navigation System (WWRNS). GPS and GLONASS are the only two systems currently recognised as components of this system, however Galileo and BeiDou are currently being considered. It is possible that EGNOS, as a regional system, could be considered on its own, or it might need to be offered in collaboration with other SBAS services around the world.

> “About the lack of approved maritime receiver performance standards: “It is in the maritime sector’s interest to find a resolution.”

It is clear that EGNOS, and other SBAS, could provide additional services and complement the mix of systems required to achieve resilient PNT for e-Navigation, while adding additional sources of integrity information. However, there are a number of steps to be taken in order to realise these benefits.

Meet the authors

Alan Grant
Principal Development Engineer
at GLA R&RNAV

Nick Ward
Research Director
at GLA R&RNAV

What's new?
Since last bulletin...

EGNOS WORKING AGREEMENTS (EWA) SIGNED

The following EWAs have been signed in the last quarter:

Croatia Control Ltd.
Croatia

LPV & APV BARO PROCEDURES PUBLISHED PER COUNTRY

(including last AIRAC cycle #03 – 05/03/2015)

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 – LPV procedures	# LPV Procedures	Airports – APV baro Procedures	# APV baro Procedures
France	63	91	1	1
Switzerland	6	6	0	0
Guernsey	1	2	0	0
Germany	18	29	31	71
Italy	6	12	0	0
Spain	1	2	0	0
Finland	1	2	0	0
Austria	2	2	0	0
Czech Republic	3	6	1	4
Norway	2	6	0	0
Poland	1	2	0	0
United Kingdom	2	4	0	0
Sweden	2	3	0	0
Netherlands	2	3	0	0
Slovak republic	2	4	0	0
Denmark	1	2	0	0
Croatia	1	1	0	0
Total	113	176	33	76

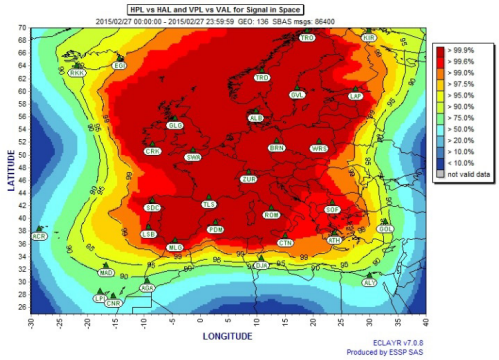
Warm welcome to Slovak Republic, Croatia and Denmark as the "newcomers" in the EGNOS LPV publications list!

LPV 200

Nowadays, LPV is the highest precision GNSS (EGNOS enabled) aviation Instrument Approach Procedure. By the use of the current EGNOS SoL service, the pilot can take the aircraft down , without visual contact to the ground, to as low as 250 feet minima (ILS look-alike approach).

But EGNOS is in constant evolution. The new EGNOS system release V2.4.1M, which will be deployed in Q3 2015, will enable LPV operations based on EGNOS SoL service down to a decision height of 200 ft, what will bring extra operational benefits: reduction in delays, diversions and cancellations and increased accessibility to European runways.

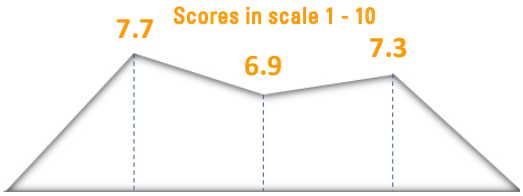
This new service level will be called LPV-200 and its declaration towards users is foreseen in Q4 2015.



Above, a map shows the LPV200 coverage area with the signal coming from the EGNOS TEST (PRN136) geostationary satellite for the first January 2015.

USER SATISFACTION SURVEY 2014 RESULTS

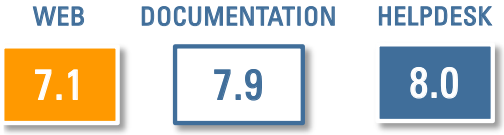
The questionnaire has been filled by **79** EGNOS users. Thanks to their contribution, we know the EGNOS users **experience** and **perception** about the different **EGNOS services**. Information on the survey results will be published soon.



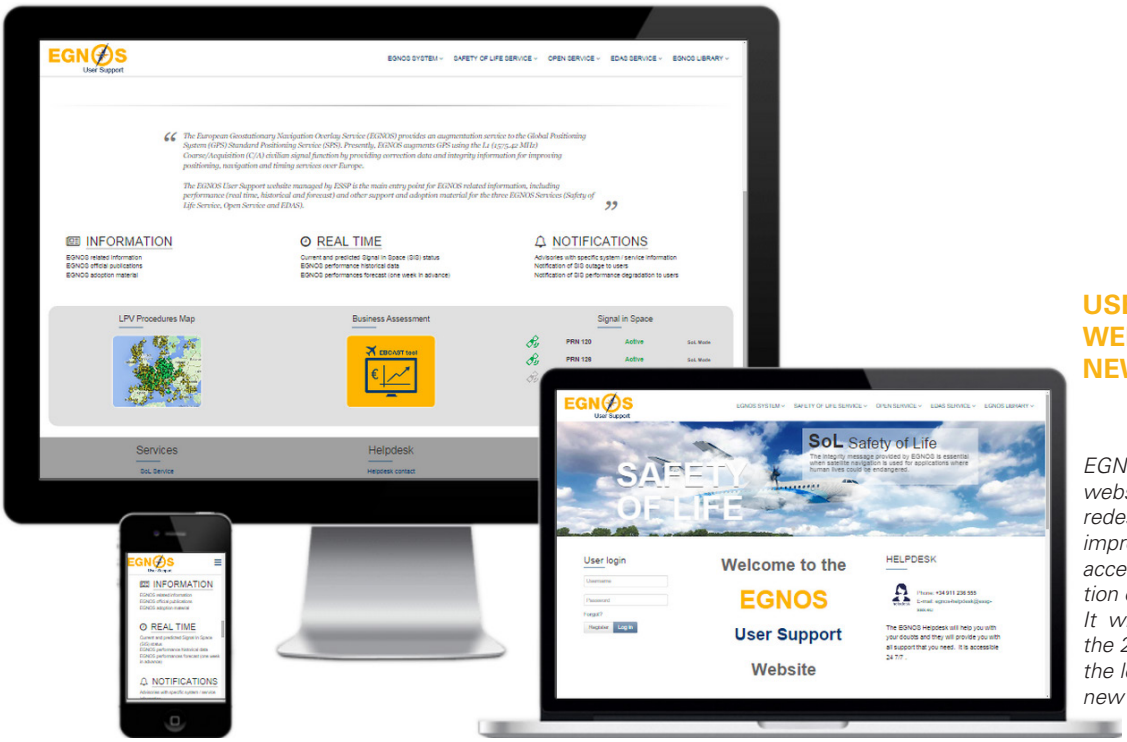
User Satisfaction Score per Service

7.6

Global User Satisfaction Score



User Satisfaction Score per Support Means



USER SUPPORT WEBSITE NEW FEATURES

EGNOS User Support website has been fully redesigned to offer an improved usability and access to the information on EGNOS status. It will be released on the 27th April. See on the left an advance of its new appearance.

What's going on... in aviation.

NEW LPVS ON-GOING AT BARROW/WALNEY ISLAND

Following the decision of Barrow/Walney Island managers to implement new instrument approach procedures for both airport runway ends, BAE Systems Marine Ltd Flight Department is currently planning the best way to renew part of it's a/c fleet.

According to John Ismay, Aerodrome Manager, "Two of the three corporate aircraft will be replaced soon. We will not retrofit them because, from a business point of view, the best option for us is to replace the older Beechcraft B200's with new airframes. The third aircraft is already RNAV and LPV capable".

In fact, the company has already anticipated all of the steps to be taken in order to take the maximum profit "We already know how our pilots will be trained. They will attend a specific course at Flight Safety Intl in Farnborough" says Ismay. ESSP is currently supporting BAE Systems Marine Ltd, as the serving ANSP at the airport, for the establishment and signature of an EGNOS Working Agreement, an enabler for the publication of LPV procedures based on EGNOS.

Barrow/Walney Island aerodrome – EGNL
Copyright: Norman Brice

ACCEPTA PROJECT ACHIEVEMENTS

The ACCEPTA project has finally come to its end after more than four years of persistent but fruitful work. The initiative, managed by the European GNSS Agency (GSA) and coordinated by Ineco, started back in May 2010 as part of the FP7 Programme and it counted on the participation of forty partners from thirteen different European countries.

During this time, ACCEPTA completed the publication of 30 LPVs procedures in ten countries and it triggered the implementation of 35 more which will be published during 2015. In some cases like Austria, Czech and Slovak Republics, Netherlands, Portugal, Switzerland, Spain and the UK, these represent the first LPV implementations ever done in the country, with the associated difficulty that this entails. In addition to the LPVs, seven PinS procedures to LPV minima for rotorcraft were designed and validated within the project.

ACCEPTA also pursued the upgrade and certification of 32 aircraft and rotorcraft with EGNOS avionics to be able to fly such procedures. These include Bell-412, AW109SP, CRJ-1000, Hawker-750, Fokker-50, BN2B Islander and some Beechcraft, King Air and Cessna models amongst others. Twenty two of them have already achieved airworthiness certification after installation and seven of these have been now operationally approved by their authorities. The remaining ten aircraft will be retrofitted and certified during 2015.

EGNOS WORKSHOP AT WORLD ATM

On the 10th March at WATM, a workshop devoted to EGNOS within European aviation was held. The status and roadmap of the EGNOS Safety-of-Life service was presented by ESSP, Eurocontrol presented the scope of the PBN and other Implementing Rules. And funding and grant programmes in support of EGNOS usage in aviation was addressed by the European GNSS Agency (GSA). Attendees had also the opportunity to learn how some European ANSPs (Sweden, Holland, Jersey, Portugal, Bulgaria and Slovakia) implemented their first EGNOS-based operations.

in maritime.

FUTURE STANDARDS

IALA is developing future standards, recommendations and guidance material for e-Navigation including the potential use of GNSS for Safety of Life applications in the maritime domain.

The IALA "15th Meeting of the ENAV Committee" was held last 13 - 17 October, with the objective to set out the planning for the activities to be developed in the 2014-2018 working period.

The PNT working group (chaired by Alan Grant/GLA) discussed the need to revise the requirements included at IMO Resolution A.915 (22). With this purpose, a liaison note has been forwarded to the IALA ARM Committee in order to gather comments on it. This WG will be also involved in the development of a new IALA Guideline on the use of SBAS.

Did you know...?

... that the latest Memorandum of Understanding (MoU) between the European Commission, the European Railway Agency and the European Rail sector Associations concerning ERTMS states that GNSS, with a special focus on EGNOS and Galileo, can play a major role in rail fleet management, signalling and train control.

Complete information here.

in agriculture.

GNSS EQUIPPED TRACTORS

Usually, new models for tractors and combines are delivered from factory already equipped with GNSS both by default under user request. Nevertheless, it is also possible to retrofit them, and this is indeed quite common. The investment a farmer needs to do to retrofit the machinery depends a lot on the type of GNSS-based guidance solution to be installed. SBAS solution is simpler and therefore cheaper while RTK although provides better accuracy, needs higher investment as the equipment needs to be coupled with the hydraulic system on the tractor or combine.

Credits: CLAAS official dealer at Mozoncilo, Segovia-Spain

Upcoming Events

15-18 April

Aero Friedrichshafen

The entire spectrum of general aviation will be presented at the AERO 2015. This event represents a great opportunity to learn on general and business aircraft manufactures' forward-fitting and retrofitting plans and getting in touch with various associations such as national AOPAs, PPL/IR, flight schools and airport owners.

EGNOS will be present at booth A4-114

19-21 May

EBACE

At EBACE, new business aircraft manufacturers, avionics firms, handling organizations, fractional providers, charter/lease companies and aircraft resellers will display their latest products and services. It is the right place to meet with new and existing customers within business aviation.

EGNOS will be present at stand M070.

7-10 April

European Navigation Conference

The European Navigation Conference is an annual congress organized under the auspices of the European Group of Institutes of Navigation (EUGIN). It will be a showcase for state-of-the-art technology and for innovations in the fields of terrestrial and satellite navigation.

EGNOS will be present with a number of papers and a workshop:

- **Enhancing the EGNOS NOTAM Proposals: increased automation and state-of-the-art prediction engine**
- **EDAS (EGNOS DATA ACCESS SERVICE) for added value applications**
- **USING EGNOS for CAT-I Operations: the LPV200 service**

29 - 30 Sept 2015

Copenhagen

The EGNOS Service Provision workshop

N55.692862, E12.599305

Save the date!!

29 - 30 Sept 2015

European Global Navigation Satellite Systems Agency

ESSP
We certify you´re there.

European Commission

EGNOS

EGNOS, it's there. Use it.

http://egnos-user-support.essp-sas.eu

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.

http://egnos-portal.gsa.europa.eu

EGNOS applications. Developers platform. Business support.

For questions & information

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Precise navigation,
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