EGN○S NEWS

ISSUE – SIMULATING

Editorial

Welcome to another issue of EGNOS News, keeping you up to date with the most recent developments taking place at the levels of system, service and application.

Last issue we announced the transfer of ownership of EGNOS from ESA to the European Commission (EC) on 1st April 2009. Another highly significant milestone has now also been achieved. On 1st October 2009 the official start of operations for EGNOS Open Service was announced by the EC. A contract for the operations of EGNOS up to 2013 has also been put in place between the EC and the European Satellite Services Provider, (ESSP SaS).

In this issue of EGNOS News we first report on the availability of a powerful new free tool from ESA – the SBAS simulator. The simulator provides a highly flexible and configurable on-line facility for educating, testing and investigating the capabilities and performance of SBAS systems. EGNOS News gives a tour of some of its key features and would certainly encourage you to try it out as well!

In the same sphere of SBAS data we investigate the EGNOS Data Access Service (EDAS) which has allowed users during an ongoing free 12 month trial phase to receive the internal data collected, generated and delivered by EGNOS. EDAS appears to provide exciting opportunities to use EGNOS data to support existing services, or build new innovative services.

Following up on our interview with Eurocontrol on EGNOS for aviation in our last issue, this time we also discuss some of the latest news on the preparation for the use of EGNOS at airports – from approaches to ground operations.

We also report on the real-world operational implementation of EGNOS for fleet tracking by ENI; leading the way in confirming the long anticipated potential of EGNOS for these types of logistic applications.

Finally, we take a look at the recent publication of a new EGNOS brochure communicating the key
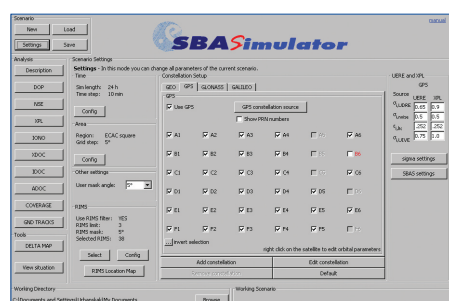
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messages on the benefits and future for Europe's first satellite navigation system.

As always, we very much look forward to receiving your comments and suggestions for anything you would like to hear about in future issues of EGNOS News.

The SBAS Simulator Arrives

SBAS Simulator User Interface

There is a new opportunity for GNSS professionals, application developers, researchers and students to learn about the working of SBAS systems. What is more, it is available to all, for free!

ESA's SBAS Simulator has only recently been made available and can now be accessed on ESA's 'EGNOS for Professionals' website (www. egnos-pro.esa.int/sbassimulator). The tool has been developed in collaboration between ESA

and IGUASSU Software Systems, Czech Republic. This has resulted in a user friendly tool with sophisticated capabilities.

The SBAS simulator tool provides many of the simulation capabilities available within ESA to a wide range of those interested in EGNOS and SBAS. Looking into the tool it is clear that it will be a powerful aid in understanding and educating on SBAS systems, while offering EGNOS professionals simulation capabilities for a wide variety of scenarios without usage constraints.

To give you a flavour of the sort of analysis available, EGNOS News will take you on a quick tour of its key features.

Once on the simulator web-page, simply click on the 'start SBAS simulator' tab, accept the Java certificate, and then you are up and running.

Once online, the tool brings up the user friendly interface. The 'Scenario' panel allows the user to define, load and save scenarios. The left hand side

below displays the 'Analysis' tabs which when clicked bring up various widgets.

Clicking through the functions reveals that the tool supports SBAS simulations for GPS, Galileo, GLONASS and GEO constellations, as well allowing the user to define their own constellations. For example, clicking on the XPL tab reveals a number of configurable parameters for a SBAS system with a surprisingly high degree of flexibility:

- The simulation time;
- The area. This feature also provides the option to set areas outside EGNOS coverage;
- User mask angle;
- Ranging and Integrity Monitoring Stations (RIMS) configuration. This feature even allows the user to test out vastly expanded RIMS networks including locations in Asia, Africa and the WAAS network in the U.S;
- Constellation Setup. Allowing selection of current and future constellations or the option for the user to define their own constellation.
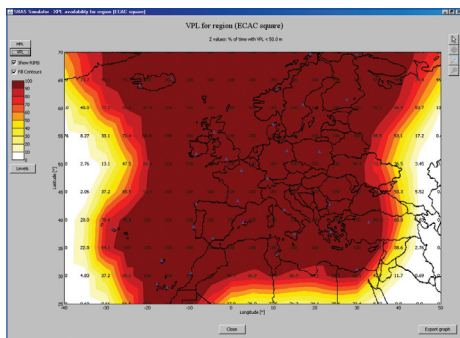
SBAS Simulator result for VPL<50m

Once set-up as desired, simply clicking the 'Simulate XPL' button runs the analysis. Horizontal and Vertical Protection Levels (XPL) is the term to describe the protection levels due to horizontal and vertical navigation error for a certain alert limit (in this case less than 50m in the vertical). The simulator displays the results after a few minutes of processing with all GPS satellites for 38 EGNOS RIMS.

Investigating the remaining analysis tabs reveals a similar level of flexibility and configurability. The wide range of analysis available also includes:

• Protection Level simulations;
• Ionospheric simulations.
• Navigation system error;
• Coverage of satellites;
• Satellite ground tracks;
• Sky plot and 3D simulations;
• Inverse Depth of Coverage;
• Extended Depth of Coverage;
• Availability of the Depth of coverage;

The wide range of results can be produced quickly and provide an intuitive understanding of SBAS performance.

The simulation results are based on emulating the System defined by ground RIMS stations and system errors. Interestingly, there is also the option to use real SBAS messages for NSE and XPL analysis. The software operates as a system volume simulator and provides performance based on simplified macro models for the ECAC region. The performances over regions are only an approximation with no guarantee of the obtained results.

The intended users for the SBAS Simulator have already welcomed the new tool. Prof. Michel Bousquet of the Institut Supérieur de l'Aéronautique et de l'Espace (ISAE) at Toulouse

"would strongly recommend the SBAS Simulator as a significant tool to learn and understand satellite navigation systems ". He added that the tool will be widely used at ISAE and "helped the students better understand the different concepts and working of SBAS systems".

The SBAS simulator is just the latest tool available from ESA's website. This new addition to the portfolio of tools provides even more opportunities to learn and exploit SBAS systems.
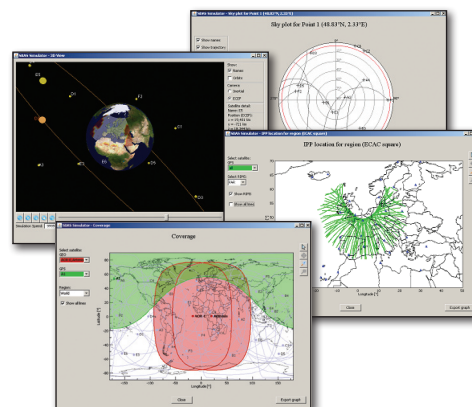
SBAS Simulator example analysis results

Exploiting EGNOS Through EDAS
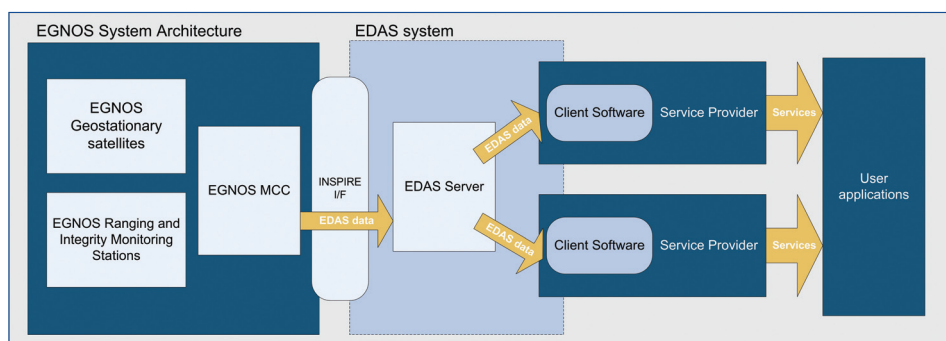
EDAS system and service concept

EGNOS is now providing a new terrestrial data service – EDAS. EGNOS will provide two services via the three EGNOS geostationary satellites: the Open Service and the Safety-of-Life Service. Now, a new terrestrial service has been made available.

Plugging into EDAS - the EGNOS Data Access Service- allows users to receive the internal data collected, generated and delivered by Europe's first satellite navigation system in real-time. EDAS therefore provides the opportunity to use EGNOS data to support existing services, or build new innovative services. Examples of downstream applications EDAS could support include redistributing EGNOS messages to urban areas, assisted A-GNSS concepts, and use in professional high accuracy GNSS services.

The EGNOS ground infrastructure is composed of Master Control Centres (MCC), Navigation Land Earth Stations (NLES) and Ranging and Integrity Monitoring Stations (RIMS). There are currently 34 RIMS distributed over Europe and

North Africa. EDAS provides access to the data collected and generated by this infrastructure to deliver:

• The raw GPS, GLONASS and EGNOS GEO observations collected by the entire network of RIMS and NLES;
• The EGNOS augmentation messages, as normally received by users via the EGNOS geostationary satellites;
• EGNOS ATC messages: containing EGNOS, GPS and GLONASS status information and almanacs.

In addition, EDAS also provides FTP access to historical EGNOS data.

The standard and easiest way to receive EDAS is over the internet. Simply by downloading the client software EDAS can be received through a typical broadband internet connection in either ASN.1 or RTCM format.

For uses which need increased speed and reliability, other connections will be available. This

will include a fixed line solution providing a line for each user.

EDAS builds on the qualities of EGNOS to provide a reliable high level of service to users. EDAS offers the following key advantages:

• Reliability and assurance: EGNOS will be a certified Safety-of-Life system requiring a highly reliable and resilient infrastructure. This infrastructure is the basis for EDAS.
• Data delivery: EGNOS data is provided in real-time through a standard internet connection or direct fixed-line.
• Data content: EDAS not only provides EGNOS broadcast data, but also RIMS raw data and satellite status messages.
• European and North African coverage: EDAS data is sourced from the 34 EGNOS RIMS generating unique GNSS datasets from Europe and North Africa.
• Commercial contracts: In the future, it is planned that EDAS can be provided to service providers on a long-term basis with reliable performance levels.

EDAS is now over half way through a free 12-month beta trial. The trial is open, on application, to companies who plan to exploit it to develop location-based services for the market. A number of organisations have been testing the system for several months. Organisations can submit their application to test the EDAS service by going to the EGNOS-EDAS website (http://egnos-edas.gsa.europa.eu).

The Case for EGNOS at Airports

The value-added role of EGNOS in aviation was highlighted at the Airports Council International's annual conference in Europe, held in November 2009 in Barcelona, Spain. Among the 1,000 delegates were top airline and airport executives. Since EGNOS is expected to be certified in 2010 for use by the aviation sector, it is critical that this market is aware that they can prepare in advance to use the system.

David McMillan, the Director General of Eurocontrol communicated to the delegates that EGNOS is a bridge to creating a unified air traffic management system under the Single European Sky initiative. "EGNOS will improve air safety and efficiency," he told delegates. "It is good for airports."

In an interview, McMillan explained that EGNOS is going to be especially important for expanding the capabilities of Europe's smaller airports.

Preparation is already well underway in Europe to prepare for EGNOS use in aviation. For example, many European airports are currently in the process of validating and writing the required LPV approach procedures using EGNOS, he said. These include 60 airports in France, 10 in Spain and several in Italy, Germany and Switzerland.

Airlines can also develop their plans to install EGNOS-enabled satellite navigation equipment throughout their fleet so as to take advantage of the new LPV procedures once the system is certified. To demonstrate this Spain's Air Nostrum has participated in an EU-funded project and successfully conducted flight trials at three regional airports using EGNOS.

To further this, the GNSS Supervisory Authority (GSA) has been looking for airlines interested in becoming an "EGNOS pioneer" by participating in Accepta, a project funded through the EU's 7th Framework Programme for Research and Technological Development (FP7). Through the project the EC will co-finance the installation of EGNOS-enabled satellite navigation equipment on board aircraft and the development of the relevant LPV procedures.

There are also developments on the ground at airports to exploit EGNOS. In late 2009 a live demonstration was conducted at Casablanca's Mohammed V airport of tracking a service vehicle using EGNOS. The aim of the live demo was to indicate how better location precision could be used to improve safety in the civil aviation sector.

It is anticipated that improving the precision of tracking ground traffic with EGNOS, can help

reduce the risk of accidents due to human error and increase efficiency. The demonstration by the METIS project used a test section of the airport's apron area near Terminal 1. Funded by EuropeAid, a Directorate-General of the EC, the project is managed in the context of the European EGNOS programme.

A service van known as a "Follow Me" vehicle was fitted with an EGNOS-enabled GPS navigator and sent its position via a wireless network to a ground supervision station in the control tower. As the van travelled along the test area, its route was tracked in real-time on a digital map of the airport displayed on the station's screen using specially adapted software. The driver could also see his position on the GPS device.

The demonstration showed how EGNOS could play a part in the guidance and control of ground traffic at airports, said Antonella Di Fazio, the project coordinator for METIS and part of Italy-based Telespazio's research and development unit.

With the certification of EGNOS now in view, the aviation community is being prepared to take full advantage of the benefits available.

News in Brief

Implementing EGNOS across the fleet

Following a successful test project, ENI is in the process of installing EGNOS on all 1,500 trucks in its domestic fleet and about 400 trucks based outside of Italy. ENI is a multinational oil and gas company and Italy's largest industrial group by market capitalisation.

The ENI Group and Interporto Bologna, both based in Italy, were part of the MENTORE project, which developed the technologies, service platforms and market scenarios for EGNOS and Galileo-based tracking and tracing services. The project was facilitated by receiving funding through the EU's Sixth Framework Programme for Research and Technological Development (FP6).

The two companies are part of a wave of early adopters of EGNOS for transport logistics. It is one of the market segments targeted as a major sector where EGNOS has potential to improve efficiency and help companies meet regulatory requirements.

ENI had tested EGNOS as a means of tracking the company's oil and gas delivery trucks. They found EGNOS improved the accuracy and the quality of data received from each truck. For example they were able to obtain a truck's exact and guaranteed position for loading and which bay it was loading from in the depot. They reported that they were not able to get this

information when only GPS was used as the GPS error is larger than the distance from bay to bay.

This real-world operational introduction of EGNOS validates its long thought potential for logistics operations. There is now a concerted attempt to promote the system developed by ENI as a standard for European freight transport.

The EGNOS brochure

Communicating the main features of EGNOS is not straightforward given its range of services, applications, system functions and stakeholders. This overview is now provided in a concise and appealing format in the form of the new 'EGNOS brochure'.

The 12 page guide provides an introduction to "Europe's first contribution to satellite navigation": its history, status and future certification for aviation and its planned technical evolutions.

Also recently available is the User Guide for Application Developers. This guide provides practical information to EGNOS users who are not GNSS specialists. It presents clear guidance for the developers' questions: "How can EGNOS enhance my application" and "How in practice can I use EGNOS for my applications".

→ EGNOS: EUROPEAN GEOSTATIONARY NAVIGATION OVERLAY SERVICE

Europe's first contribution to satellite navigation

The new EGNOS Brochure

These publication are available along with other EGNOS material at http://www.egnos-pro.esa.int/publication.html. Taken together the material provides a full description of EGNOS and its capabilities.

Forthcoming Events

Galileo Application Days
Brussels, Belgium
3-5 March 2010
http://www.application-days.eu/

Munich Satellite Navigation Summit
Munich, Germany
9-11 March 2010
http://www.munich-satellite-navigation-summit.org/

EFTF 2010: European Frequency and Time Forum
Noordwijk, Netherlands
13-16 April 2010,
http://www.eftf2010.org/

PLANS 2010: IEEE/ION Position Location and Navigation Symposium
Indian Wells/Palm Springs, California, USA
3-6 May 2010
http://www.plansconference.org/

Navitech-Expo 2010/ International Satellite Navigation Forum 2010
Moscow, Russia
1-3 June 2010
http://www.navitech-expo.ru/en/

Joint Navigation Conference (JNC) 2010
Orlando, Florida USA
7-10 June 2010
http://www.jointnavigation.org/

ION GNSS 2010
Portland, Oregon, USA
21-24 September 2010
http://www.ion.org/meetings/gnss2010cfa.cfm

European Navigation Conference on GNSS 2010
Braunschweig, Germany
19-21 October 2010
http://www.enc-gnss2010.org/

NAVITEC 2010
ESTEC, Noordwijk, The Netherlands
8-10 December 2010
http://www.congrex.nl/10c12/

Links and Contacts

ESA Navigation Web Page:
http://www.esa.int/navigation

ESA EGNOS Web Page:
http://www.esa.int/EGNOS

ESA EGNOS for Professionals Web Page:
http://www.esa.int/navigation/egnos-pro

ESA EGNOS Real Time Performance Web Page:
http://www.esa.int/navigation/egnos-perfo

ESA EGNOS Help Desk:
Egnos@esa.int

EGNOS News:
EGNOS-News@esa.int

EGNOS Operations User Support:
http://egnos-user-support.essp-sas.eu

EC EGNOS Web Page:
http://ec.europa.eu/transport/egnos/

ESA Galileo Web Page:
http://www.esa.int/Galileo

EC Galileo Web Page:
http://ec.europa.eu/transport/galileo

European Satellite Services Provider:
http://www.essp-sas.eu/

FAA GPS Product Team:
http://gps.faa.gov

GNSS Supervisory Authority:
http://www.gsa.europa.eu/

Help Us To Help You

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The Editorial Team welcomes your comments, inputs and suggestions for the next issue. Please send emails to EGNOS-News@esa.int.