EGNOS NEWS

Volume 5, Issue 2, 2005

Editorial

The countdown is over and EGNOS is here! With great excitement, we report the success of the Operational Readiness Review (ORR) meeting for EGNOS. Together with the appointment of the European Satellite Service Provider (ESSP), this means that EGNOS is now in its Initial Operations Phase.

In this issue we concentrate on events leading up to Initial Operations. This includes the striking result that the observed performance of EGNOS surpasses its requirements by a considerable margin with measured horizontal accuracies around the 1 to 2 metre level and very high availability.

In support of the continuing growth of EGNOS, we take a look at some of the ongoing and planned tests and demonstrations showing the benefits EGNOS is bringing us all. Carried out across a broad spectrum of potential markets and applications, they include the marine, rail, aeronautic and space sectors.

We also talk about ESA's exciting new experimental website publishing real time EGNOS performance during Initial Operations. This allows potential users of EGNOS to verify for themselves the performance they can expect.

As always, we very much look forward to receiving your comments and any suggestions you have for future issues.

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EGNOS Start Of Initial Operations

ORR Briefing

Following the technical qualification exercise at the Operational Readiness Review (ORR), Initial Operations of EGNOS began on 28 July 2005.

The EGNOS ORR is a key step for European satellite navigation policy and implementation. Results have shown that EGNOS achieves the best performance of any current SBAS system. This milestone represents the culmination of more than 8 years of intensive effort.

To achieve this we had to collectively demonstrate that the EGNOS system could be accepted for operation in terms of:

- Functionality and operability
- Stability in the real environment
- System performance
- Safety and Product Assurance levels appropriate for a Safety Critical system.

For ORR, a team of more than sixty international experts was assembled and a comprehensive review held. One striking result from this review was that the EGNOS measured performances surpass expectations. This effectively demonstrates excellence on the part of European technology and engineering.

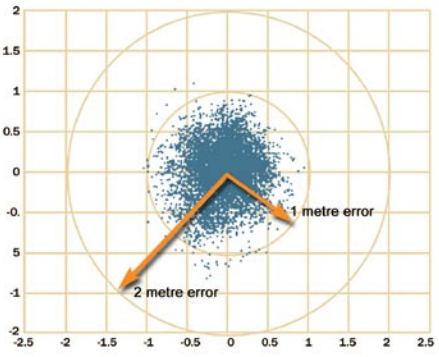
Following ORR, ESA completed contract negotiations with the European Satellite Services Provider (ESSP) and the Initial Operations Phase began on 28 July 2005. This means that the responsibility for operating the EGNOS ground segment and ensuring that the Signal In Space (SIS) remains on-air has now moved from industry to the ESSP.

The ESSP shareholders include a number of major European Air Navigation Service Providers. These are Aena (Spain), DFS (Germany), DSNA (France), ENAV (Italy), NATS (UK), NAV (Portugal) and Skyguide (Switzerland).

In the ongoing Initial Operations Phase, the stability and robustness of EGNOS will be improved. The ESSP will technically validate EGNOS operations and establish its operational organisation. This will enable the EGNOS open service to be declared available in early 2006.

In parallel, the ESSP will work with the Air Navigation Service Providers and relevant national regulatory authorities to achieve certification of EGNOS for use in safety critical applications. The timeframe for the resulting EGNOS Safety-of Life service is 2007, following the successful completion of the projected Operations Qualification Review (OQR).

When this is achieved, the Continuous Operations Phase will begin and EGNOS will be in a full, safety critical operating mode.



Measured performances surpass expectations

Real Time Performance Information

Imagine you could view the actual measured performance figures for EGNOS, throughout the whole of Europe and in real-time... with ESA's new experimental 'EGNOS for Professionals Portal' you can!

With EGNOS now in its Initial Operations Phase, we are providing real-time performance information, continuously measured across a pan-European network of monitoring stations. The network currently comprises ten stations but is in a continuous process of expansion

We are providing this experimental website not only to promote interest in EGNOS capabilities generally but also specifically to support the development of a broad range of EGNOS applications.

The Portal covers each of the EGNOS Geostationary satellites and presents Approach with Vertical guidance (APV) availability maps, ionospheric monitoring 3D maps and message broadcast plots. Also shown is the actual measured positioning performance at each of the networked monitoring stations.

This valuable on-line resource for EGNOS application developers provides a powerful tool in terms of the actual (or true) performance levels against which the tested application performance can be assessed and interpreted. This, of course, will give a significant boost to application troubleshooting and problem resolution.

For more information visit www.esa.int/navigation/egnos-perfo

ENEIDE: A Double Success For ESA

April 25th saw the safe touchdown of a Soyuz spacecraft carrying back to earth ESA astronaut Roberto Vittori and the ISS 10 crew, marking the completion of the ENEIDE (Experimente di Navigazione per Evente Italiano Dimostrativo di EGNOS) mission at the International Space Station (ISS). Aimed at verifying the application of navigation techniques in a Low Earth Orbit, based on the combined use of GPS and EGNOS, the ENEIDE experiment:

- verified the performance obtainable by a GPS/EGNOS receiver on board a Soyuz Russian spacecraft; and
- performed navigation measurements during two different phases of the Soyuz flight

Based on the use of a multi-standard (GPS, EGNOS) onboard receiver system, together with an antenna mounted outside the Soyuz, the experiment started only 4 hours after takeoff when the first observation period began with the spacecraft in orbit. Data were collected by the receiver and the position and velocity of the Soyuz was calculated in real-time together with integrity information.

The second phase of the experiment then took place after docking with the ISS. More than 200 miles above the Earth's surface, the system periodically continued to determine the position for the next 10 days with high accuracy.

There were many different technical challenges to be met in this experiment including signal acquisition; cold start without orbital or attitude information; and providing the astronaut the ability to monitor and control the status of the experiment at all times.

Today, EGNOS already delivers metre level accuracy on earth. Tomorrow, thanks to the work begun by the ENEIDE experiment, we will have this capability 200 miles above the Earth's surface. As well as giving drive to further critical space-based operations, ENEIDE will also provide essential input for the operational characteristics of the Galileo/EGNOS system for both space, aeronautical and terrestrial navigation.

The EINEIDE experiment is a co-founded program of the Italian Ministry of Defence and Alcatel Alenia Space Italia S.p.A - LABEN.

News from Brussels

Galileo Concession: In March 2005 the GJU announced that it would begin negotiations in parallel with both Galileo concession bidders (Eurely and iNavsat). In May 2005 both consortia submitted a letter to the GJU expressing their intention to merge. A Joint Proposal was submitted to the GJU on June 20th and the GJU approved it on June 27th. This document is an input to the negotiation process over the coming months. The GJU intends to conclude the negotiations with the Merged Consortium by December 2005 in order to sign the Concession Contract in early 2006.

EGNOS Integration in the Galileo Concession: The GJU decided that the EGNOS Economic Operator (EEO) should be within the Galileo Concessionaire pursuant to the so-called "early integration scenario". This scenario will be implemented through one single contract with the Galileo Concessionaire / EEO. The same entity will provide both EGNOS and Galileo services which will be combined once the Galileo system becomes fully operational.

With respect to the EGNOS "early integration" timeframe, the agreement setting up the terms and conditions of the EGNOS assets ownership transfer from ESA to the Galileo Supervisory Authority (GSA) is expected to be finalized by September 2005 and ESA's internal approval is expected to take place in November 2005. Thus, by December 2005 ESA and the GSA should sign the EGNOS transfer agreement in parallel to the conclusion of the Galileo Concession Contract negotiations.

6 FP 3rd Call Status: The 3rd call under the 6th FP is expected to be launched by the end of 2005.

EGNOS: Diverse Benefits in Europe and Beyond

Ocean-to-Ocean Trans African flight with EGNOS

The AFI System Test Bed (ASTB) is already enabling EGNOS to extend into Africa. A recent test flight in Africa demonstrated the EGNOS capability for Approach with Vertical Guidance (APV) operations.

Flying from Dakar to Mombassa, the ATR-42 test aircraft of the Agence pour la Sécurité de la Navigation Aérienne en Afrique et à Madagascar (ASECNA) continuously monitored the EGNOS Test Bed signal, using it to execute a series of APV landings. This demonstration was undertaken as part of the 6FP Programme for Development and Demonstration of Applications for Galileo and EGNOS (ProDDAGE, managed by GJU and supported by ESA). It highlighted the capabilities provided by the planned operational extension of EGNOS for Africa.

This operational extension is called the Interregional Satellite based system over Africa-India region (ISA). It offers substantially improved integrity (i.e. safety) for APV compared to any other on-board GPS system. There are currently 10 test stations in Africa – with two more planned for South Africa and Madagascar.

This EGNOS flight trial successfully showed that the EGNOS navigation performance met the requirements for APV and supported the ICAO decision to implement an operational ISA based on EGNOS. The benefits which will be derived from the ISA include:

- Navigation coverage in areas without conventional aids
- Savings in operation and maintenance of ground based systems
- Improved safety for airport approaches
- Savings associated with reducing diversions

Airport Surface Movement

Under conditions of reduced visibility (rain, snow, fog etc) safe surface movement of aircraft and ground vehicles around congested airport aprons becomes increasingly difficult. This can become the limiting factor on airport operations. Advanced landing aids routinely enable safe landing of aircraft in reduced visibility but if it is then not possible to safely move aircraft from the runway to the gate, airport operations must stop.

Testing carried out at a Portuguese airport in June has shown the benefits from improved situational awareness for airport surface movements (and therefore safety) through use of a low cost Airport Surface Movement Guidance and Control System (A-SMGCS) based on EGNOS.

Part of ESA's GNSS for Airports Movements Monitoring and Alert (GAMMA) initiative, this project demonstrated the use of a low cost A-SMGCS which relied on the EGNOS Signal In Space (SIS) to provide the required level of accuracy and integrity (in terms of the upper bound on position error). Carried out at Portugal's Francisco Sa Carneiro Porto Airport, it assessed the feasibility of the functionality and the new services provided (guidance, surveillance and control for surface movement). It also proved the suitability of EGNOS to support these services.

Train Management

The detailed planning for a demonstration of an EGNOS based train location system in South Africa is now in its final stages. This is scheduled to take place by mid-November 2005 near Johannesburg, South Africa.

The system consists of a GPS/EGNOS receiver coupled to other rail sensors such as odometers and a digital map database. Coupling of these sensor outputs is achieved using the processing unit located onboard the train. There is also an option to support a GSM communication link providing TCP/IP based remote monitoring of the train location from the central server.

In the past achieving rail traffic safety and efficiency in a remote area has required significant investment in trackside signalling equipment. A solution based on GPS and EGNOS can drastically reduce these costs. It also delivers sufficient accuracy and integrity to comply with the safety requirements of applicable standards such as the European Rail Traffic Management Systems (ERTMS).

Waterway Transport

To compete against road and rail our waterways must be safe, predictable and efficient for all stages of the transport process. GPS, as a sole means, cannot meet the stringent safety requirements necessary for waterway applications. However, when combined with EGNOS it can.

The ESA GALEWAT project introduces EGNOS into the River Information Systems (RIS) throughout the EU, by using Automatic Identification System (AIS), a standardised communication link between vessels and the shore.

GALEWAT compares several modes of operation: GPS standalone, GPS with maritime radio beacon augmentation, and GPS with EGNOS. The EGNOS augmentation was provided both directly via Signal In Space and indirectly via AIS. Retransmission of the EGNOS messages from an AIS base station solves the critical issue of signal availability and lies at the heart of the GALEWAT concept.

The results of the first demonstration in Lisbon (Portugal) were very encouraging. An examination of performance proved that GPS/EGNOS can serve maritime applications requiring a 10m integrity alarm limit.

The next test campaign will be in Constanta (Romania) later this year, where we hope to provide complementary results for the waterway to open sea environment.

EGNOS Evolution Programme

As EGNOS v1 operations start, the global GNSS environment continues to evolve. To maintain its cutting edge position, EGNOS must continue to evolve in parallel. Therefore ESA has recently launched a definition study for the EGNOS v2 & v3 concepts, supported by the EGNOS Industrial Consortium.

The focus of the EGNOS Infrastructure Evolution Plan is to deliver user benefits via a stepwise functional evolution but without disturbing existing operations and service provision. This will be achieved in four phases over the interval 2006 to 2011.

EGNOS v2.1 in 2006 should implement the EGNOS Data Server which will give real time access to EGNOS RIMS measurements and message data to service providers. V2.1 will also extend EGNOS coverage to the North of Africa (MEDA) region and implement Message Type 0/2.

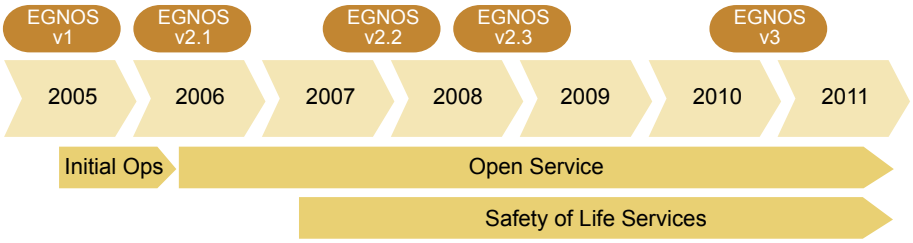
EGNOS v2.2 in 2007/8 should address the Regional Extension Module (REM) concept for implementing further extensions of EGNOS as recurrent modules, including potential extension of EGNOS into Africa. Also included is the ESA ALIVE concept proposal for transmitting Disaster Alert messages via EGNOS.

EGNOS v2.3 in 2008/9 should include L5 Message standards and initial L5 Geo broadcasts. It also includes enhancement of the EGNOS RIMS receivers to monitor GPS L1/L5, Galileo and modernised GLONASS SIS.

EGNOS v3 in 2010/11 should cover the Multi-constellation Regional System (MRS) concept, implementation of a GPS L5 augmentation service and may also include Galileo and modernised GLONASS augmentation services.

These EGNOS evolutions are currently being assessed by ESA through a definition phase, in close coordination with the EGNOS Mission Board, who should provide the final mission recommendations.

The measured performance of EGNOS during its Initial Operations Phase is already excellent. The EGNOS Infrastructure Evolution plan will ensure that EGNOS remains at the forefront of GNSS augmentation for the foreseeable future.



Frequently Asked Questions

Q1 – Is the ESTB SIS still available now that EGNOS is in Initial Operations Phase?
A1 – Yes. Currently PRN 124 (ARTEMIS) is broadcasting the EGNOS SIS. PRN 126 (IOR-W) is temporarily being used by the EGNOS Industrial Consortium to complete ORR actions. PRN 120 (AOR-E) is broadcasting the ESTB SIS for the users requiring Message Type 0/2 (under direct ESA control).

Q2 – What is the status of SISNeT now that EGNOS is in the Initial Operations Phase?
A2 – The SISNeT platform is currently only monitoring PRN 120 but is migrating to EGNOS. The ESTB signal is available through PRN 120. SISNeT provides the ESTB signal from PRN 120 through port 7777 of Data Server v2.1 and the ESTB signal from the ESTB CPF through port 7778 of Data Server v3.0. SISNeT will soon begin monitoring PRNs 124 (EGNOS) and 126 (Test), at which point these signals will also become available from SISNeT (see www.esa.int/SISNET).

Q3 – Are there any plans to implement SBAS Message Type 0/2 for EGNOS ?
A3 – Yes, SBAS Message Type 0/2 is already under implementation as EGNOS v2.1; delivery is currently expected in Q1 2006.

Forthcoming Events

EGNOS Receiver Workshop, ESTEC, Noordwijk, The Netherlands, 30th Sept 2005

Geosolutions 2005, Birmingham, UK, 28-29th September 2005

ESA GNC 2005, 17-21 October 2005, Loutraki, Greece, http://www.congrex.nl/05a09/

EGNOS Performance and Applications Workshop, Gdynia, Poland, 27-28 October 2005, http://www.egnosworkshop.com

NAV 05. London, UK, 1-3 November 2005, http://www.rin.org.uk

ICAO ACAC GNSS Workshop, Rabat, Morocco, date to be announced

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

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

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

ESA EGNOS Help Desk: Egnos@esa.int

ESA RIMS Entities Assistance Desk: Egnos-read@esa.int

EGNOS News: EGNOS-News@esa.int

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

ESA Artemis Web Page: http://www.esa.int/artemislaunch/

EC Galileo Web Page: http://www.europa.eu.int/comm/energy_transport/en/gal_en.html

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

USCG Navigation Center GPS Page: http://www.navcen.uscg.gov/gps/default.htm

Galileo Joint Undertaking http://www.galileoju.com

Help Us to Help You

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