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Editorial

This has been a busy and successful year for all of us involved with EGNOS. Many of us shared a feeling of undiluted elation when the first EGNOS Master Control Centre (MCC) was inaugurated at Langen, Germany, last June. The Torrejon MCC is now also working and the remaining two MCCs should be deployed over the next couple of months. At the same time we have also deployed about 25 reference stations throughout the network. Institutionally, we heard that the Galileo Joint Undertaking (GJU) has been given control of the EGNOS programme orientation after the Operational Readiness Review (ORR) next year following the EU Council conclusions on the integration of EGNOS into Galileo. The ESA EGNOS receiver manufacturers' workshop at Paris in June was a good opportunity for both sides to talk about matters of mutual concern and to see how we can best ensure the success of EGNOS services when they become operational. We are also seeing positive interest in EGNOS expansion from Africa, the Mediterranean Region and Latin America.



2004 is going to be a momentous year when we see the fruits of our labours and our EGNOS vision becomes reality. All of us at ESA wish you a peaceful Christmas and a happy New Year 2004!

Receiver Manufacturers' Workshop

Earlier this year, ESA hosted its first workshop for EGNOS receiver manufacturers to provide firm information about the transition from the EGNOS System Test Bed (ESTB) to EGNOS, to talk about matters of mutual concern and to see how we could best ensure the success of EGNOS services when they become operational.

Last January, we were conscious that 2003 was going to be a year of change and that one of our challenges was to ensure a smooth transition from ESTB to EGNOS. Receivers are key components in the EGNOS system. We knew that a large number of users were experimenting with their EGNOS receivers using the pre-operational signals available from the ESTB, although we had learned from experience that there were some differences between receivers. We initiated the workshop to ensure that all parts of the EGNOS system were compliant with the relevant standards and understood how the transition was going to be managed.

Fifteen industry representatives from Europe and the US attended the workshop. During the day there were presentations on the EGNOS status, the transition from ESTB to EGNOS, the integration of EGNOS into Galileo and the public relations information that could

be made available to receiver manufacturers. These are all available on the ESA web site (www.esa.int/estb).

Three workshop conclusions resulted from our discussions (see below). This workshop was acclaimed by all present as a real success. We are looking forward to a second workshop at the beginning of 2004 to consolidate the successes of the first workshop and to prepare for the formal start of EGNOS signal provision/operations.

Receiver Workshop Conclusions

GNSS is a swiftly moving technology and Europe must keep pace with the evolution of international standards in order to maintain full interoperability between EGNOS and other SBAS systems such as WAAS.

EGNOS must enter operations and be certified as soon as possible. This, together with a reaffirmation of the long-term role of EGNOS within the European radionavigation policy, is key for market take-up in the aviation and maritime sectors.

Extension of EGNOS coverage beyond Europe and the provision of EGNOS data over terrestrial data links are highly desirable for opening up and growing the multi-modal markets for European GNSS products and services.

Stop Press!

ESA has established READ – RIMS Entities Assistance Desk – to respond to operational questions and issues after RIMS deployment. (egnos-read@esa.int)

Formal Inauguration of the Langen MCC



Claudio Mastracci, Dieter Kaden and Laurent Gauthier at the Langen MCC

On 11 June this year ESA and industry officials and the press gathered at Langen, Germany, for the inauguration of the first EGNOS Master Control Centre inside the DFS (German Air Navigation Services) facilities. This momentous occasion marked an important step in the development of Europe's own navigation system.

Claudio Mastracci (ESA Director of Applications), Dieter Kaden (DFS Chairman and CEO), and Laurent Gauthier (ESA EGNOS Project Manager) stepped up to pull the switch. Both Mastracci and Kaden emphasised the importance of this to satellite navigation and improving aircraft safety.

Langen is the first of four MCCs, and we can now look forward the other three MCCs becoming operational at Torrejon (Spain), Ciampino (Italy) and Swanwick (England).



Countdown to EGNOS

The countdown to EGNOS is progressing well as we near the end of six years of intense effort. Infrastructure is being rolled out, tests have been undertaken using the Artemis satellite and the ESTB has demonstrated the potential of EGNOS in Africa and South America.

At the time of writing, the industrial team is undertaking its in-factory system integration and verification activities as a pre-cursor to the formal Factory Qualification Review (FQR) in January 2004. There is an excellent assembly, integration and verification process in place, and the important “switchover tests” for the Central Processor Facility, Central Control Facility and the Navigation Land Earth Stations (NLES) have been performed, giving us confidence in the behaviour of the complete EGNOS system.

The first master control centre (MCC) was inaugurated at Langen, Germany, in June and the second MCC at Torrejon is now also operational. The remaining MCCs at Ciampino and Swanwick should be inaugurated over the next couple of months. Two of the six NLES, Fucino and Goonhilly 2, have been deployed. The RIMS (Reference and Integrity Monitoring Stations) situation is more complex because there are three types of RIMS – A, B and C. Of the 34 possible locations, 25 RIMS A have been deployed, 8 RIMS B have been deployed and 9 of the possible 15 RIMS C have been deployed.

One of the greatest challenges is to ensure a smooth transition from ESTB to EGNOS – maintaining the ESTB service while allowing the industrial team to roll-out EGNOS. Up to four geostationary satellites have been made available to support this process and we have switched the ESTB signals between the satellites to maintain continuity of service. Users must check the schematic and sign up to the daily broadcast schedules from the mission control centre to understand how best to take advantage of the ESTB during the transition period (detailed information may be obtained through www.esa.int/navigation/estb and through the ESTB/EGNOS Helpdesk ESTB@esa.int). The navigation transponder on the Artemis satellite was used for the first time in August 2003 to test

the Scanzano up-link station and the first transmission of a GPS-like signal (PRN 124) occurred in November 2003. The test results were very good, paving the way for the formal introduction of Artemis into the EGNOS baseline early in 2004.

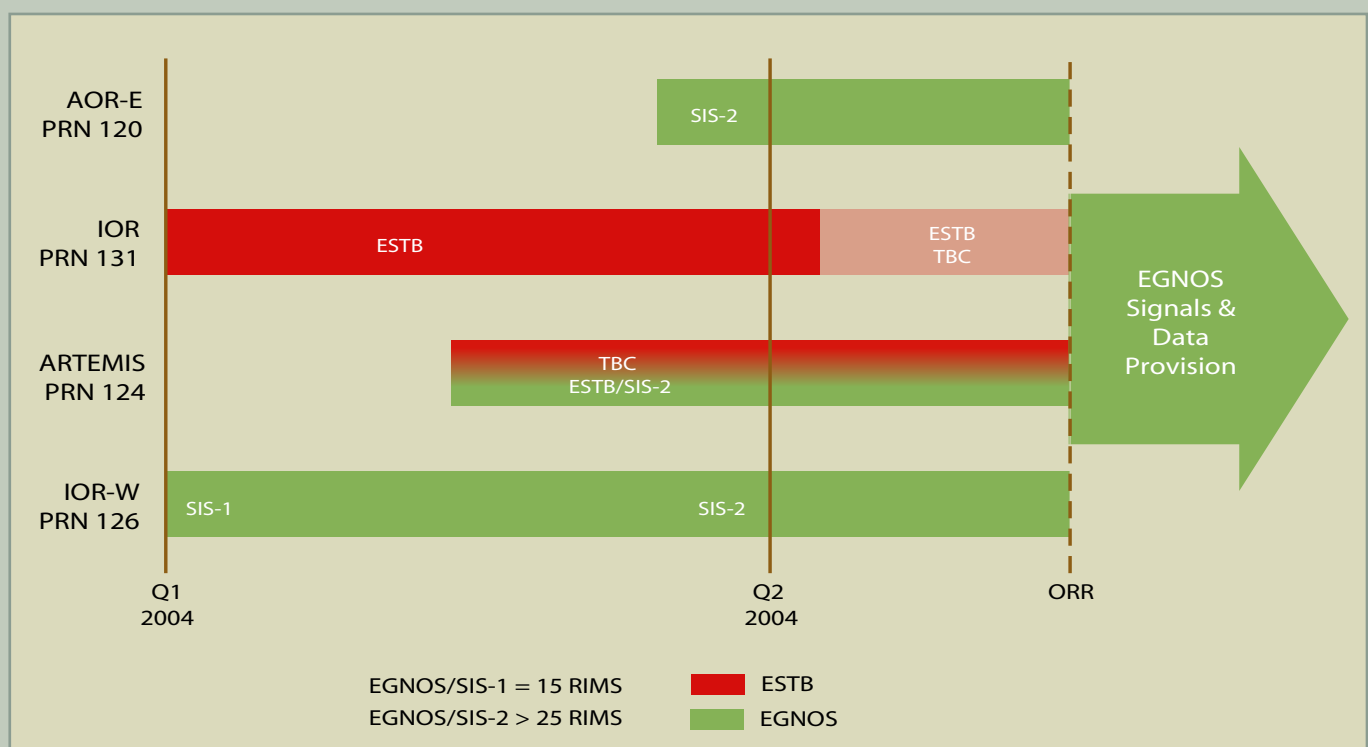
So what happens to EGNOS after ORR (Operational Readiness Review)? Well, the EU Council has already stressed the need for EGNOS to be certified so that it can be used for aviation. It has also stressed the importance of EGNOS as a precursor to Galileo and as an instrument enabling Galileo to gain market acceptance swiftly. The Council also concluded “the extension of EGNOS to other parts of the world should be pursued determinedly by the Commission and Member States”.

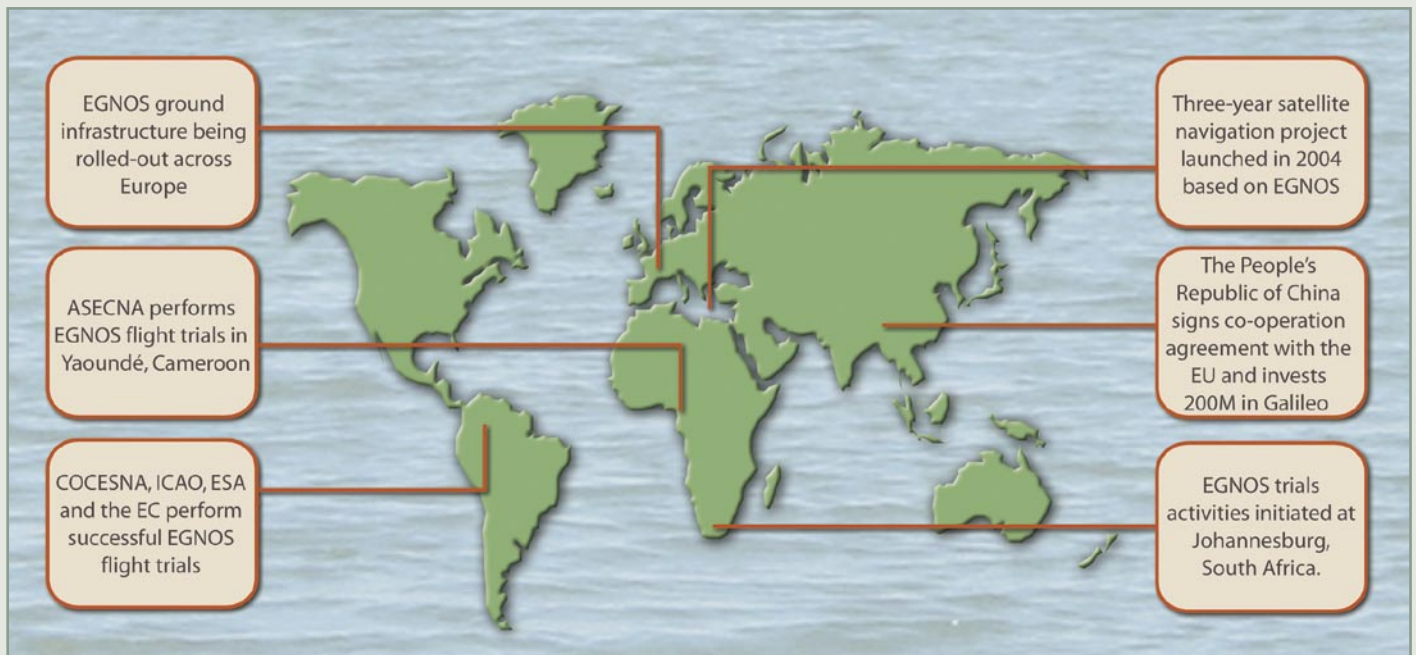
Here at ESA, and in close coordination with our partners, we are planning a GNSS support programme to address all these issues and more. Some of the options that we are considering include:

- provision of optional messages (e.g. MT0/2 for non-safety of life services that is already included in the ESTB, and MT28 that is a pre-requisite for coverage expansion);
- provision of SBAS services in the protected L5 frequency band;
- delivery of EGNOS services using alternative data-links; and
- performance improvements (e.g. availability and coverage extension).

In the short-term we are looking forward to the ORR milestone that closes out the EGNOS development phase. In the longer-term we have our eyes fixed firmly on the activities needed to achieve goals related to the growth of multi-modal markets; the long-term competitiveness of European satellite navigation technology; realising the macroeconomic and end-user benefits of European satellite navigation as soon as possible; and improving the likelihood of success of Galileo in 2008.

ESTB and EGNOS Signals Schedule





Out And About

In June this year, the Council of the European Union concluded that the extension of EGNOS to other parts of the world should be pursued determinedly by the Commission and Member States, to share its operation with these regions and to promote the European technology.

There is great interest in EGNOS being extended to other parts of the world, to share its operation with regions outside of Europe and in order to promote European technology. Extending EGNOS into countries that have expressed an interest in Galileo will enable worldwide markets and opportunities to be opened up for Galileo. Here we report on recent activities in the People's Republic of China, Latin America, Africa, the Mediterranean region and at the International Civil Aviation Organisation's (ICAO) 11th Air Navigation Conference.

On 27 October the Council of the European Union authorised the EU Presidency to sign a Co-operation Agreement with the **People's Republic of China** on Galileo. This provides for co-operative activities on satellite navigation in a wide range of sectors, notably science and technology, industrial manufacturing, service and market development, as well as standardisation, frequency and certification. This includes establishing the 'China, Europe Global Navigation Satellite System Technical Training and Cooperation Centre (CENC)' at Beijing University. Loyola de Palacio (European Commission Vice President in charge of Transport and Energy) welcomed the EU-China agreement on Galileo, explaining "The EU-China agreement will do more than secure a promising future for Galileo and European business interests: it opens the way for China's participation in the Galileo Joint Undertaking and a substantial financial stake-holding of some €200 million".

The European Union and **Latin America** have built on historical institutional and commercial relationships to work together in the field of GNSS under an ICAO regional co-operation project. COCESNA (Corporación Centroamericana de Servicios de Navegación Aérea), Colombia and Cuba together with ICAO, the EC and ESA have recently concluded EGNOS trials in Central/South America. Drawing on technical support from an industrial consortium led by Alcatel Space Industries that was established for the EDISA contract, three RIMS were deployed in the region and connected to the ESTB.

The results demonstrated excellent levels of performance in line with aviation requirements for APV operations (Approach

with Vertical Guidance). These are outstanding given that only three RIMS were available. The trials provided useful information in support of the ICAO activities in the definition of the GNSS strategy for the region and the results were communicated at the first EGNOS/Galileo Seminar organised by ICAO in Guatemala.

Satellite navigation activities in **Africa** support EU-Africa co-operation policy objectives for regional development and enhanced transport maintenance and safety standards. ASECNA (Agence Pour La Sécurité de la Navigation Aérienne en Afrique et à Madagascar) recently performed flight trials at Yaoundé, Cameroon, on the occasion of the 14th ICAO AFI APIRG meeting (AFI Planning and Implementation Regional Group) that brings together the highest level civil aviation decision makers in the region. This meeting concluded that an SBAS system should be implemented in Africa as an extension of EGNOS. The next phase of the work plan includes the deployment of RIMS in the region (pre-operational service) and paving the way for EGNOS operational implementation.

The Fifth Euro-Mediterranean Ministerial Conference in 2002 adopted an action plan for the development of the Euro-Mediterranean partnership together with a regional strategy and satellite navigation is a key component. A three-year satellite navigation project for the MEDA region is expected to be launched in 2004. This will comprise infrastructure development, demonstration and training and will be based on EGNOS. Further activities are envisaged through the 6th Framework Programme. A co-operation office will be established shortly to provide a reference point for the promotion of GNSS applications and services in the region.

The 11th ICAO Air Navigation Conference took place in September 2003 with the aim of assessing the status of GNSS implementation and the GNSS transition strategy for aeronautical navigation. Five hundred delegates from 112 states attended the conference and around 200 papers were presented. The outcome was generally positive for EGNOS and Galileo.

The conference recommended: GNSS operations should be implemented swiftly to support approach procedures with vertical guidance (APV) and CAT 1 precision approach; APV operations be promoted to enhance safety and accessibility; and that states should take full advantage of new GNSS signals and constellations in the reduction of GNSS vulnerabilities.

News From Brussels



The Galileo Joint Undertaking (GJU) has been the focus for a frenzy of activity since its launch earlier this year.

In June 2003, the Council of the European Union published its conclusions regarding the integration of EGNOS into Galileo. It had previously called for an optimal or appropriate integration of

Operational Readiness Review. The EU Council has recognised the importance of EGNOS as a precursor to Galileo and as a way of opening up the market for future Galileo services. There are also comments on funding, expansion, certification and long-term service provision.

The GJU issued its first call for Galileo 6th Framework activities on 31 July 2003 with 18.9 million Euros available to support five activities: receiver development; local component development; introduction of Galileo services using EGNOS; application market development; and mission implementation. EGNOS features in the call, in particular in the last three of these activities. The deadline for proposals was Friday 17 October and the assessment is ongoing so that work can start early in 2004.

On 17 October, the GJU launched the first phase of the Galileo Concession process. This aims to pre-select potential concessionaires based on their credentials, their ability to develop a comprehensive business plan and their plans for financing.

Interested parties had until 5 December to respond to the call.

EGNOS into Galileo, and this long awaited paper has established the way forward for both systems.

Critically, the Galileo Joint Undertaking (GJU) has been given control of the EGNOS programme and is responsible for supervising the programme orientation of EGNOS after the

Frequently Asked Questions

Q1: Which satellites are currently used by the ESTB?

A1: The ESTB is currently only using the IOR satellite (PRN131) and hence ESTB coverage may currently be limited in the more westerly parts of the core EGNOS service area. Access is also provided over Internet using the ESA SISNeT technology (www.esa.int/sisnet)



Q2: Does EGNOS provide an accurate time reference?

A2: EGNOS distributes Co-ordinated Universal Time (UTC) for the benefit of time and frequency users. EGNOS receiver processing is referenced to EGNOS Network Time (ENT) and this is broadcast with an accuracy of 1.5ns. The offset between ENT and UTC with respect to the Observatoire de Paris is given in one of the messages (MT12).

Forthcoming Events

GNSS 2004, Rotterdam, The Netherlands, 16 – 19 May 2004,
<http://www.enc-gnss2004.com>

AIS 03, London, UK, 24 – 25 Nov 2003,
<http://www.rin.org.uk>

Nordic Radionavigation Conference, Stockholm, Sweden, 2 – 4 December 2003

ION National Technical Meeting 04, San Diego, USA, 26 – 28 January 2004

Munich Satnav Summit 04, Munich, Germany, 23 – 25 March 2004

Navigation 2004, Cairo, Egypt, 13 – 15 April 2004

Links and Contacts

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

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

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

ESA SISNeT Web Page:
<http://www.esa.int/sisnet>

ESA ESTB Help Desk:
ESTB@esa.int

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

ESTB News:
ESTB-News@esa.int

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

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

ESA EGNOS for Professionals:
<http://www.esa.int/navigation/egnos-pro>

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.mil/gps>

Galileo Joint Undertaking:
www.galileoju.com

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