

# EGNOS NEWS

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## Editorial

The countdown to EGNOS is nearly completed and we have reached the final check-point: the Operational Readiness Review when ESA accepts the EGNOS system delivered by industry. This issue of EGNOS News provides a great overview of what is happening in and around the EGNOS programme. Our Countdown to EGNOS article not only discusses the performance being achieved and the route to operations but also describes plans for the next couple of years. As we approach operations, it is absolutely the right time to be shouting loudly about the benefits of EGNOS for a range of

applications. Looking at this issue, we report on the recent inauguration of the Performance Assessment and Check-out Facility in Toulouse. We are also shining the spotlight on two interesting and recent demonstrations: in the first, EGNOS was trialled as a way of improving safety and security at big sporting events like the Olympics; while in the second, we report on its use during a particularly strenuous stage of "Le Tour" – the Tour de France.

As usual, we always look forward to your comments – let us know what you want to see in the next issue. Enjoy!

**Stop Press:** EGNOS Operational Readiness Review started on 26th April 2005.

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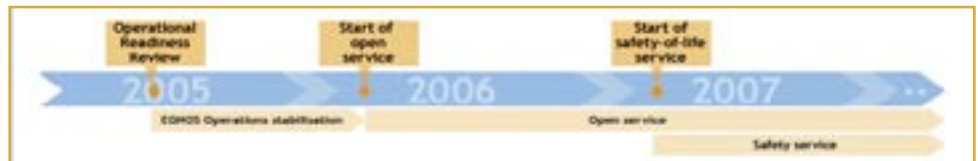
## Countdown to EGNOS

The countdown to EGNOS is nearly completed following the start of the EGNOS Operational Readiness Review on the 26th April 2005. In this article we present the infrastructure deployment status, outline the complexity of the system test process, summarise the route for declaring EGNOS operational, present the excellent performance being achieved and look to future developments.

EGNOS is a complex safety-critical system that has been designed to meet exacting and challenging performance requirements:

- there are over 600 000 lines of software;
- redundant processing chains;
- a complex EGNOS wide area network (EWAN);
- 34 ranging and integrity monitoring stations (RIMS);
- 6 navigation land earth stations (NLES) providing redundant communications to the geostationary satellites (GEOs); and
- 4 mission control centres (MCCs) that provide redundant processing capabilities.

The infrastructure deployment is nearly complete with only three RIMS remaining to be deployed. The first EGNOS test signals were broadcast in December 2003 and these



### Plans for EGNOS service provision

have been broadcast on a daily basis since July 2004.

Moving from the development phase to the operational phase means that EGNOS has to be sound not only technologically but also operationally:

- technologically, each redundant processing chain and the processes that switch seamlessly between the chains need to be tested; and
- operationally, the EGNOS operator has to be in place, the operations procedures need to be complete and the operations teams need to be trained.

Getting all this right is essential if EGNOS is going to deliver stable and robust services that can be certified to support challenging, safety-critical applications. ESA, its industrial partners and the EGNOS operator (ESSP) are working hard and taking great care to ensure a successful outcome.

We are now very close to declaring the EGNOS signal available. This has two dimensions:

- firstly, EGNOS itself has to be proved technically. This has been achieved and our initial analysis has demonstrated excellent performance results. These will be reviewed formally during the ORR;
- secondly, the EGNOS operator has to be in place and ready to operate EGNOS in its nominal state.

Tests across Europe during the last year are giving us the confidence that EGNOS will exceed its original performance requirements:

- accuracies of about 1 meter horizontal and better than 2 meters vertical (95%) are being obtained routinely across the entire coverage area (see Table). We are meeting the demanding aviation approach with vertical guidance requirements (level one and two - APV I and APV II) with a high level of availability;

| Place         | Paris | Toulouse | Madrid | Brussels | Geneve | Palma de Mallorca | Lisbon | Cork | Berlin |
|---------------|-------|----------|--------|----------|--------|-------------------|--------|------|--------|
| HNSE (95%, m) | 1.0   | 1.0      | 1.1    | 0.8      | 0.9    | 1.1               | 1.1    | 1.3  | 1.1    |
| VNSE (95%, m) | 1.3   | 1.6      | 1.4    | 1.6      | 1.5    | 1.5               | 1.7    | 1.9  | 1.6    |

EGNOS accuracy measured during the SIS-2 tests (inputs provided during the ESA IMAGE Workshop by different partners)

# Countdown to EGNOS (continued from page 1)

The future plans for EGNOS service provision are illustrated in the figure shown on the previous page. Once the ORR has been concluded, system operations will be performed by ESSP under contract to ESA.

The EGNOS open service will be declared available in early 2006 when the operations have proven to be stable and robust. The open service will be free of direct user charges and will support all except safety-of-life applications.

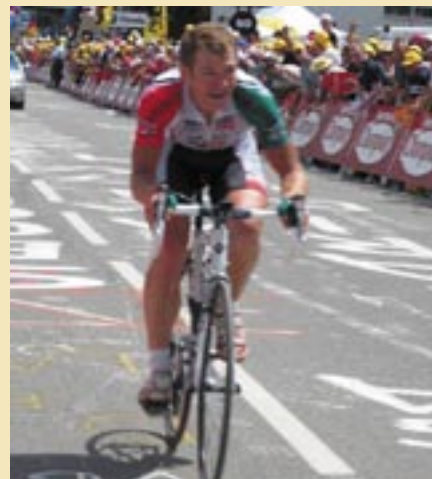
In early 2007, the EGNOS Safety-of-Life Service will be declared available following the certification process.

## Tracking "Le Tour" through hell's cauldron

The Tour de France – "Le Tour": 3400 kilometres of hell, 126 cyclists, 21 teams, 20 stages and one winner! It's July 21st 2004 and Lance Armstrong is feeling the pain as he toils his way up the legendary stage from Bourg-d'Oisans to L'Alpe d'Huez. This is hell's cauldron: 21 hairpin turns over 15 kilometers of ascent and an estimated one million spectators. Simultaneously, at the finish line, ESA experts are glued to the action as it happens, using EGNOS to pinpoint his position and speed and comparing his progress with his competitors. Some time later, an exhausted Armstrong crosses the finishing line and

celebrates the stage win, but this was no surprise to the ESA experts who had been tracking him throughout the race.

Armstrong was one of ten riders who was monitored during this stage. EGNOS receivers were fitted to the team directors' cars that closely follow each cyclist through the race. The data from each car's receiver were transmitted using GPRS modem links over a mobile telephone network to the control centre sited at the prized summit of the mountain. EGNOS corrections were then applied to compute very accurate positioning and velocity data and combined with map-matching, its improved



accuracy meaning that riders can be located unambiguously on the tight hairpin bends. The results were displayed using Trimaran's advanced graphics: a real-time map displaying the gaps between riders and a computer model of their ascent.

This exciting demonstration during the 2004 Tour de France dramatically highlighted the potential of EGNOS. The next phase of the project is to place a mini-receiver directly on the rider to enable every cyclist to be monitored continuously. The benefits are widespread: allowing tour organisers to improve safety and security; providing team directors with a great real-time tracking and performance monitoring tool; and giving spectators an entirely new way to follow Le Tour with up-to-the-minute knowledge of the "classement general". In the future, virtual reality may even allow Armstrong fans to ride each kilometre with their idol – all the excitement with none of the pain!



Route of the 2004 Tour de France

## News from Brussels

On 10 December 2004 the Council of the European Union decided in favour of moving to the deployment and operational phases of Galileo and confirmed that the European Union will contribute to the funding of those two phases. It also confirmed technical characteristics of the system, with particular regard to the services offered.

The Galileo Joint Undertaking (GJU) extended the tendering phase for the Galileo concession after the first tenders were received. The remaining two bidders, Eurely and iNavsat, were asked to provide additional information on risk allocation along with a firm commitment on their

position. Too close to call, in March 2005 the GJU announced that it is going to negotiate in parallel with both consortia.

The GJU issued its 2nd call for tender under the Sixth Framework Programme in Summer 2004 with a total available budget of 70 million Euros. Over 110 proposals were received for the seventeen activities. The results have been announced and contract negotiations are under way.

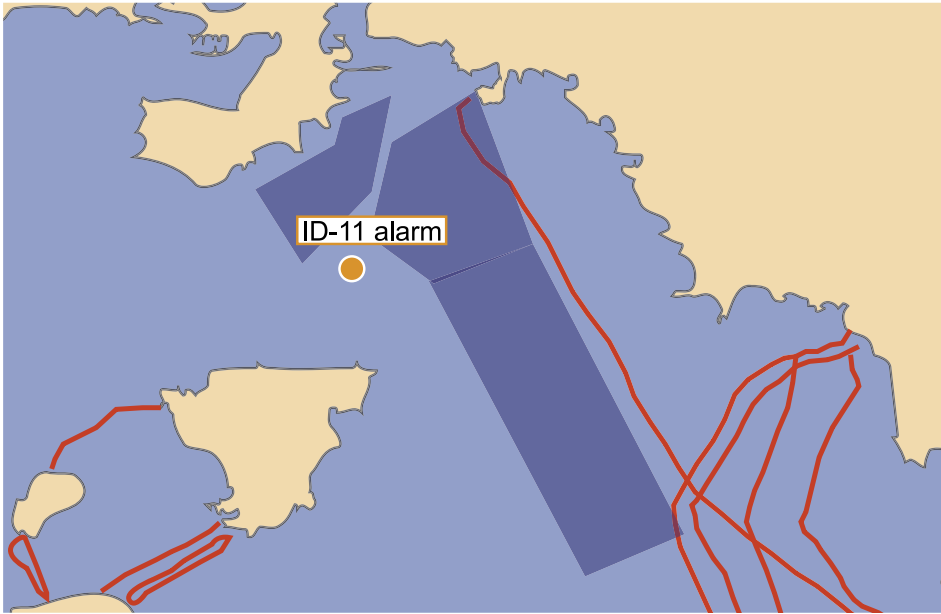
The Chinese NRSCC (National Remote Sensing Center) is now becoming a member of the GJU. Chinese companies will actively participate in the development phase of

Galileo and Chinese activities will contribute to the development of worldwide markets and will develop Galileo applications.

Negotiations are still ongoing with, Russia, India and Ukraine. Japan, Australia, Brazil, South Korea and Morocco are interested to join Galileo. The Israeli MATIMOP is at present negotiating with the GJU in order to become a member.

Finally, formation of the Galileo Supervisory Authority has begun. The Commission has been invited by the Transport Council to set up the Authority step-by-step from the beginning of 2005.

# Improving safety and security at the Olympics



Monitoring leisure yachts during the INSTANT Olympic project

At large sporting events like the recent Olympics in Athens, safety and security are of paramount importance. Recent trials have shown how EGNOS can be used to improve the safety of such big events.

At the recent Athens Olympics, over 4.5 million spectators watched about 400 events at 35 venues over the seventeen-day period. Getting all these spectators to their events on time is in itself a major challenge. After all, nobody wants to pay for the experience of a lifetime and then miss the men's 100m final due to transport delays! But transporting and looking after over eleven thousand highly-tuned athletes from 202 countries as well as

potentially vulnerable VIPs is the real headache. At Athens, the security alone is estimated to have cost 650 million Euros.

EGNOS was trialled before the start of the Olympics as a way of improving security and safety by enhancing situational awareness and response times. Funded through the European Union's 5th Framework Programme, the INSTANT Olympic project was co-ordinated by NEXT and included a number of small and medium-sized enterprises including Algosystems.

The project demonstrated three pilot projects to support emergency, maritime

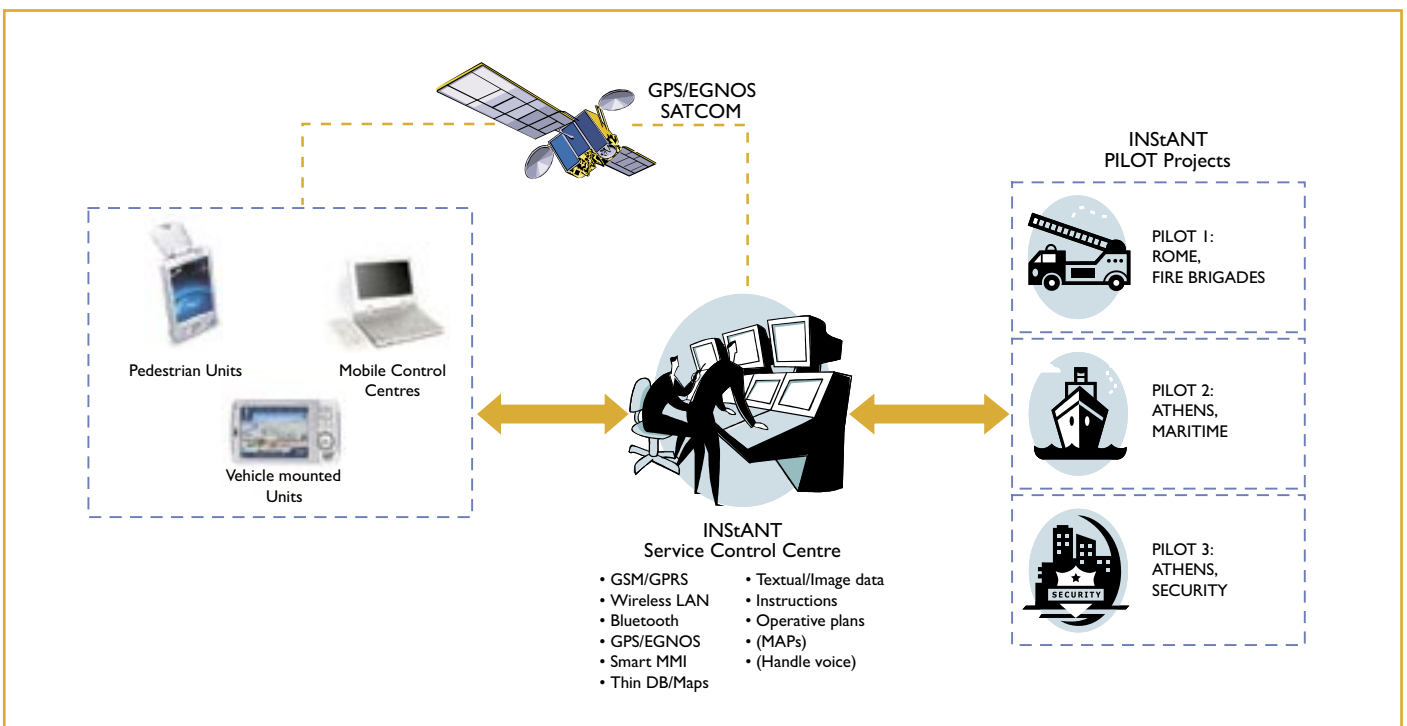
and security services. In the first of these, EGNOS was used to provide full support of emergency management and operations with user terminals and a mobile control centre connected to a remote service centre. This reduced intervention time and improved operational efficiency, thus increasing safety.

In the second, a fleet of leisure yachts was equipped with waterproof, hand-held devices that provide accurate positioning and data communications. If a problem occurs, the crew can alert the ship owners at their headquarters. Pictures sent from the boat can help them to gain a clear understanding of what is happening and plan their response.

Finally, a security company's guards were equipped with personal digital assistants (PDAs) that could send alarms to their headquarters. Applications trialled included lone-worker protection and the tracking of high-value or dangerous goods.

Knowing the exact position of staff on duty and being able to receive real time images and sound from an evolving situation helps the control room to plan its response better. Knowledge of the position of specially-equipped patrol cars then gives improved situational awareness and allows the control centre to improve response time.

Trials in Athens and its surroundings of projects using the European Geostationary Navigation Overlay Service (EGNOS) satellite navigation system have been showing how it can be used to improve the safety of big events like the Olympics as well as improving security and safety in our daily lives.



INSTANT Olympic Concept

# EGNOS PACF inaugurated in Toulouse



Gilles de Robien, the French Minister of Transport, and Francois d'Aubert, the French Minister for Research, at the inauguration ceremony

On Thursday 24 March 2005 the inauguration of the EGNOS Performance Assessment and Check-out Facility took place at the Toulouse Space Centre. Present at the event were the French Minister for Research and the Minister of Transport.

The EGNOS Performance Assessment and Check-out Facility (PACF), now opened in Toulouse, will be operated jointly by CNES (Centre National d'Études Spatiales) and the Direction des Services de la Navigation Aérienne of the French civil aviation

authority. The PACF is designed for planning and monitoring operations, checking the status of the system and analysing its way of working. The PACF together with the Application Specific Qualification Facility (ASQF) operated by Aena in Spain are the EGNOS Support facilities.

## Frequently Asked Questions

### Q1 – Are EGNOS and ESTB the same system?

A1 – EGNOS and ESTB are two independent systems using different GEO satellites to broadcast different signals.

The ESTB is an EGNOS prototype available in Europe since early 2000 and now being re-deployed to Africa.



### Q2 – Which satellites will be used to broadcast EGNOS signals? Which satellite is currently broadcasting the ESTB signal?

A2 - EGNOS signals will be broadcast from three satellites: ESA's ARTEMIS satellite (PRN 124); and Inmarsat's Atlantic Ocean Region-East (AOR-E, PRN 120) and Indian Ocean Region-West (IOR-W, PRN 126) satellites. The ESTB signal is currently broadcast using Inmarsat's Indian Ocean Region (IOR, PRN 131) satellite. It is also available over the Internet ([www.esa.int/SISNET](http://www.esa.int/SISNET))

## Forthcoming Events

Integrated Nav Systems, St Petersburg, Russia, 23-25 May 2005, [www.elektropribor.spb.ru](http://www.elektropribor.spb.ru)

European ITS Congress, Hannover, Germany, 1-3 June 2005, [www.itsineurope.com](http://www.itsineurope.com)

ELMAR-2005, Zadar, Croatia, 8-10 June 2005, [www.vcl.fer.hr/elmar/2005/](http://www.vcl.fer.hr/elmar/2005/)

Paris International Air Show, Paris, France, 13-19 June 2005, [www.paris-air-show.com](http://www.paris-air-show.com)

Oceans '05, Brest, France, 20-23 June 2005, [www.oceans05europe.org](http://www.oceans05europe.org)

Euro Safety and Reliability, Gdynia, Poland, 27-30 June 2005

ENC/GNSS 2005, Munich, Germany, 19-22 July 2005, [www.enc-gnss2005.com](http://www.enc-gnss2005.com)

ION GNSS2005, Long Beach, USA, 13-16 September 2005, [www.ion.org](http://www.ion.org)

Geosolutions 2005, Birmingham, UK, 28-29 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, [www.egnosworkshop.com](http://www.egnosworkshop.com)

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

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

ESA EGNOS Help Desk: [Egnos@esa.int](mailto:Egnos@esa.int)

SISNeT lab  
[www.esa.int/navigation/sisnetlab](http://www.esa.int/navigation/sisnetlab)

EGNOS News:  
[EGNOS-News@esa.int](mailto: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](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  
[www.galileoju.com](http://www.galileoju.com)

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