Navigation

The EGNOS concept

EGNOS Delivered by industry

A key step forward for satellite navigation in Europe was achieved in June, with the formal completion of the technical qualification of the European Geostationary Navigation Overlay Service (EGNOS) and the acceptance of the EGNOS system delivered to ESA by an industrial consortium led by Alcatel Space and involving more than forty European companies. This formal review, known as the Operational Readiness Review (ORR), marked the completion of more than eight years of intensive work by ESA and European Industry.

More than 60 international experts from ESA gathered in Toulouse (F) in May for the comprehensive ORR, in which Eurocontrol, the Galileo Joint Undertaking and the EGNOS Operator and Infrastructure Group also took part. These experts focussed on such aspects as the functional qualification of the system and its operability, the stability of the system in its real environment, the system's performance and compliance with the requirements, and safety and product-assurance issues, including the qualification of the software and the completeness of the deliverables.

Following the ORR, EGNOS initial operations were started through a contract with the European Satellite Service Provider (ESSP). By early 2006, the EGNOS open service will be declared formally and freely available across Europe to the general public for non-safety-of-life applications.

EGNOS is a joint project involving ESA, which is responsible for the systems development and technical qualification, the European Commission, and Eurocontrol (the organisation overseeing air navigation safety in Europe). It is Europe's contribution to the first stage of the Global Navigation Satellite System (GNSS), paving the way for Galileo, a joint ESA/EU initiative, which will be the first satellite navigation system geared to the needs of civilian users and offering the enhanced accuracy, reliability and continuity of service required by modern applications.

Galileo In-orbit Validation Contract Signed

In December, ESA and Galileo Industries GmbH signed a 950 million Euro contract for the development and construction of the first four satellites of the Galileo navigation system and their associated ground systems. Following the preliminary authorisation to proceed with work worth 150 million Euro, signed a year earlier, this contract covers the overall In-orbit Validation Phase, drawing on ESA and EU funds accessible under the GalileoSat programme. This contract comprises four satellites (the basis for satellite navigation), in order to set up a 'mini constellation' along with its associated ground segment to validate the Galileo system concept.

Following the in-orbit validation, the full deployment phase of Galileo will cover the manufacture and launch of the remaining 26 satellites, plus the completion of the ground segment comprising a worldwide network of stations and service centres.

First Galileo Satellite in Orbit

GIOVE-A, the first Galileo in-orbit validation element, was launched on 28 December from Baikonur in Kazakhstan, by a Soyuz-Fregat vehicle operated by Starsem. This 600 kg satellite, built by Surrey Satellite Technology Ltd. (UK), has a threefold mission. The first is to secure the use of the frequencies allocated by the International Telecommunication Union (ITU) for the Galileo system; the second is to demonstrate critical technologies for the navigation payloads of future operational Galileo satellites; and the third is to characterise the radiation environment in the orbits planned for the constellation.

Formerly known as GSTB-V2/A (Galileo System Test Bed Version 2), GIOVE-A carries two rubidium atomic clocks, each with a stability of 10 nanoseconds per day, and two signal-generation units, one of which is able to generate a simple Galileo signal and the other more representative Galileo signals. These two signals are to be broadcast via an L-band phased-array antenna designed to cover all of the visible Earth beneath the satellite. Two instruments will monitor the types of radiation to which the satellite is exposed during its two-year mission. All systems on the satellite, which is being controlled from SSTL's own ground station, are performing well.

The GIOVE-A satellite at ESTEC, during the naming ceremony conducted by Dutch Minister Karla Peijs on 9 November

A second demonstrator satellite, GIOVE-B, built by the European Galileo Industries consortium, is currently being tested and will be launched later. It will demonstrate the Passive Hydrogen Maser (PHM), which, with a stability of better than 1 nanosecond per day, will be the most accurate atomic clock ever launched into space. PHMs will be used as primary clocks onboard the operational Galileo satellites, with rubidium clocks serving as backups.