EGNOS System Test Bed (ESTB) Status and Evolution

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Agenda

- Introduction
- ESTB Architecture Overview
- ESTB Operations Management
- Recent and Forthcoming ESTB Upgrades
- Performance
- ESTB User Trials
- Summary

Introduction

Introduction

ESTB is an EGNOS prototype that has an important role for the system designers and users

- The ESTB has been available since January 2000
- It serves a similar region to EGNOS, although with a much smaller ground segment
- ESTB is important for system designers
 - the algorithm design benefits from the ESTB experience
- ESTB is important for users
 - it enables users, application product developers, and receiver manufacturers to become acquainted with the services to be provided by EGNOS and Galileo



ESTB Architecture Overview

ESTB Architecture

The ESTB ground segment imitates EGNOS and allows operational capabilities to be assessed



ESTB Architecture

Recent upgrades include an interface to the MTB RIMS and NLES and two additional RIMS in Spain

- The MTB interface was tested and validated in February 2001, although a permanent connection has yet to be achieved
 - 2 RIMS (Matera & Fucino)
 - 1 NLES (Fucino)
- AENA has deployed two new RIMS (Canary Islands and Palma de Mallorca)
- It has also moved the Cadiz RIMS to Malaga



Gran Canaria RIMS Site



ESTB Operations Management

ESTB Operations

ESA is responsible for ESTB operations and has outsourced key activities

- ESA is responsible for overall ESTB operations performed by different parties
 - CNES: Euridis ground segment (ranging messages) and signal generation
 - NMA: for the Reference Stations and the Central Processing Facility
 - Telespazio: for the Mediterranean Test-Bed operations
 - Thales Geosolutions: for the Network operations
 - AENA for Malaga, Canaries and Palma stations operations
- Ground segment operators are available during working hours, but the system runs continuously
- Maintenance is held by Industry (GMV, THALES, ASPI, Seatex)



ESTB Operations

Signal availability is undergoing a process of continuous improvement

- January July 2001: SIS availability with GIC/WAD is about 85%±5%
 - major losses due to CPF interruptions during weekends when unmanned, and long loop failures
- Oct. 2001: Duplication of CPF for system redundancy, industrial tests and maintenance
- May 2002: target SIS availability >95% with GIC/WAD
 - CPF S/W processing upgrades
 - NLES long-loop auto-restart



Recent and Forthcoming ESTB Upgrades

Recent Upgrades - Service Expansion

The ESTB has been upgraded with a service expansion capability and with DO229A format

- This can be used to provide an ESTB service outside the ECAC zone (e.g. in Africa, Middle East, South America ...)
- The ESTB SIS (conforming to RTCA MOPS DO229A) is augmented
 - a new ionospheric grid with GIVEs and GIVDs is provided for the expansion area using MT18 and MT26
 - a UDRE increments for the expansion area is defined using MT27
- This has been tested and used during the ECUREV project with one additional RIMS in Tenerife during March 2001



The SIS format will be upgraded to RTCA MOPS DO229B in early 2002

- New software release conforming to RTCA MOPS DO229B with :
 - Geo corrections, enabling GEO ranging in differential mode
 - Addition of MT17 in GIC/WAD mode (almanacs and health status)
 - MT27 format change (for utilisation outside ECAC area)
 - MT12 and MT24 (broadcast in ranging mode only) format change
 - IODP management when switch from « ranging only » to GIC/WAD mode



Performance

Performance - Improved Coverage

ESTB coverage with 10 RIMS cover most of the EGNOS core area (VNSE performance)



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Service level availabilities with 10 RIMS are nearby 85% for APV2 (VAL 20m) and 100% for APV1 (VAL 50m)





- HPE/HPL (Toulouse)
- 24 H static NovAtel data
- > APV2: 99.9%

ESTB User Trials

Developing the User Base

The ESTB signal gives users the first opportunity to assess the potential benefits of EGNOS & Galileo

- Some of the EGNOS demonstrations performed with ESTB signal in 2001:
 - Maritime Trials in the Aegean Sea have demonstrated key safety benefits in a region lacking DGPS beacons (March 2001)
 - flight trials carried out in March 2001 in northern Norway have confirmed EGNOS availability at high latitudes
 - Precision farming in the UK, involving ESA, LH Agro and Booz Allen
 - Curved approaches in NICE involving EUROCONTROL, ESA, DGAC and NLR (Septembre 2001)



Trials – Planned

ESA is involved in other trials that will help to grow the market for EGNOS services and products

- ESTB trials using expansion mode are planned during 2002
 - Aviation in the Middle East involving ENAV, Telespazio and ESA
 - Aviation in China (under discussion), involving China CAA
 - Aviation in Senegal involving ASECNA, ESA and EC
 - Aviation in South America involving AENA, European Commission



Summary

Summary

The ESTB provides a pre-operational signal to open and condition the market for EGNOS and Galileo

- ESTB is an operational EGNOS prototype that has an important role for system designers and users
- EGNOS signal availability is undergoing a process of continuous improvement resulting from system upgrades
- The ESTB signal gives users the first opportunity to assess the potential benefits of EGNOS and Galileo
- Experience with the ESTB gives us confidence that EGNOS will meet its system requirements and deliver benefits to users



Finally, ESTB useful addresses

For general operational information <u>www.esa.int/EGNOS/pages/indexEST.htm</u>

- For technical information and utilisation request: ESTB Helpdesk: estb@esa.int
- Subscribe for « daily mail » on SIS status:

Operation team: christophe.texier@cnes.fr

