EGNOS SERVICE PROVISION

JOINT ACAC/ICAO MID WORKSHOP ON GNSS
RABAT – 07/11/2017
EGNOS System: how does it work?
**EGNOS** is the European SBAS system augmenting GPS L1 signal over the ECAC area.

**EGNOS** was born to meet stringent Aviation requirements (ICAO) for all phases of flight.

**EGNOS** might also be used in a wide range of other application domains.

**EGNOS** is fully interoperable with all other SBAS worldwide.
IFR/SBAS benefits

**SAFETY**

- Increases airport accessibility
- **↑ SAFETY due to INSTRUMENTAL aid**
- Reduces environmental impact

**IFR**

- Higher performances → Lower minima
- Not Temperature/Pressure dependent
- LPV Procedure is ILS look alike
- No RAIM check
- No ground infrastructure at the airport

**SBAS**
The RIMS (Ranging and Integrity Monitoring Stations) receives the GPS, Glonass and GEO signals, the main source of the data used by the system, sending the information to the MCCs.
The **CPF** (Central Processing Facility) processes the RIMS data and constructs the correction and integrity messages sent to NLES to be uplinked to the GEO.

The **CCF** (Central Control Facility) provides Monitoring and Control of the Ground Segment and perform data archiving of all input data of the system.
The NLES (Navigation Land Earth Stations) perform the transmission of the navigation message generated by the CPF to the GEO, selecting the best message of all of them.
Signal in Space

Four GEOstationary satellites (two in the OP platform and two in the TEST) broadcasting corrections and integrity information for GPS satellites in the L1 frequency band (1.57542 MHz) over the whole service area.
EGNOS System: how does it work?

EGNOS: how Service Provision works
EGNOS Service Provider (ESP):

- Certified EGNOS services provider.
- Management of the operations and the maintenance of the EGNOS system.
- Provision of the Safety of Life (SoL) Service compliant with ICAO SBAS SARP.
Shareholders & location

- NATS
- DFS Deutsche Flugsicherung
- dgac
- DSNA
- NAV
- ENAV
- ENAIRE
- Toulouse
- Madrid
Since 2009

**OPEN SERVICE**

**OS** Open Service
The service for applications where human life is not at stake, such as personal navigation, goods tracking and precision farming.

Since 2011

**SAFETY OF LIFE**

**SoL** Safety of Life
The integrity message provided by EGNOS is essential when satellite navigation is used for applications where human lives could be endangered.

Since 2012

**EDAS service**
EDAS service Internet access to GNSS data in real-time and also through an historical archive.
Describe the characteristics, terms and conditions of access to the corresponding EGNOS services offered to users.

Service Notice Documents

Temporal amendments to the EGNOS SDDs complementing their contents depending on the SN status (in-force, superseded, expired)

https://egnos-user-support.essp-sas.eu/new_egnos_ops/content/official-docs
- EGNOS SiS is unique compliant with ICAO SBAS standards. The same SiS for OS and SoL services.
- EGNOS OS service provides improvement of positioning accuracy by correcting several error sources affecting the GPS signals for users equipped with an appropriate GPS/SBAS enabled receiver for which no specific certification is required.
- EGNOS SoL service provides improvement of positioning accuracy and integrity to users equipped with a GPS/SBAS enabled certified receiver making it suitable for safety critical applications.

EDAS is the single point of access to the GNSS data collected and generated by the EGNOS ground infrastructure through the Internet in real and non-real time to authorized users.

Position Integrity (bounding of the position errors) is key for Civil Aviation and the main "differentiator" of SBAS w.r.t. GPS.
EGNOS Safety of Life service

EGNOS NPA Service Level

PBN navigation specifications other than RNP APCH, for all the phases of flight

EGNOS APV-I Service Level

PBN navigation specification RNP APCH down to LPV minima as low as 250'

EGNOS LPV200 Service Level

PBN navigation specification RNP APCH down to LPV minima as low as 200'

(1) Non SBAS receivers for these PBN specs
(2) The Final segment of the approach is not covered by these PBN specs
EGNOS Safety of Life service

Availability

Continuity
LPV: Who does what?

**EGNOS Service Provider**
- Certified as SES ANSP (Navigation)
- EGNOS SoL Service Safe introduction
- EGNOS DoV produced

**ATS Service Provider**
- Certified as SES ANSP
- Standard Approach Procedure Approval Process:
  - Operational Safety Assessment
  - IFP Design (PANS-OPS)
  - Flight Validation, etc.
  - Specific National Requirements

**Airlines / Operators**
- Airworthiness/ops app. (AMC-20-27/28, TGL 2/10)
- Authorised Equipment (ETSOs C144, C145 or C146)
- Crew Trained/Qualified, etc.

SUPERVISORY BODY

Competent NSA

EASA

Final users
The **EGNOS Working Agreement (EWA)** is the dedicated ESSP IF with the ANSPs implementing EGNOS based procedures in the Aviation Domain.

The EWA is a **facilitator** allowing ANSPs to:

- Comply with applicable SES regulation.

- Defining the **Liability Scheme** between the ANSP and ESSP (GSA/EC):
  - Only contractual liability: between the signing parties.
  - Both parties may terminate the agreement for convenience.
  - No assignment of the EWA is authorized without the prior written consent of the other party.
  - Roles and responsibilities of the parties: ANSP and ESSP as established by the applicable regulations and in Annex 1 and Annex 2 of the EWA.
  - Duration of the contract (undetermined duration, and at least until 31st Dec 2021).
Complies with Applicable Regulation

Provides support to ANSPs

Working Interfaces (fair and equitable treatment)

EGNOS SoL Service Definition Document (SDD)

Service Arrangements

NOTAM Proposal Origination

GNSS Data Recording (incident/accident investigation)

Collaborative Decision Making (CDM)

Contingency Management

Airport Data Tool (to register new EGNOS based procs)
### LPV Implementation Status

#### 12th October 2017

<table>
<thead>
<tr>
<th>COUNTRY</th>
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<th>LPV Procedures</th>
<th>RNP 0.3 Procs</th>
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#### RNP 0.3 Procs

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#### 56 EWAs
56 EWAs in place

Non-EU expected EWAs

- Explicit interest expressed by several neighboring regions/countries:
  - A Coordination Scheme (between EC and the non-EU State), defining the overall framework for the use of the EGNOS SoL Service.
  - International Agreement if needed.
  - A Regulatory Compliance Scheme: the National CAA has to oversee that the applicable Regulation is complied with.
  - EWA (EGNOS Working Agreement with ESSP): Established on the basis of the previous schemes.

- EU Members
- Non-EU Members

In the short time: Iceland, Serbia, Montenegro and Faroe Islands.
Conclusion

EGNOS
is there, use it

Satellite-based system improving GPS, Galileo

Owner: the European Union
Users: European citizen

Excellent and stable performances

Application in Aviation, Maritime, Rail, Road, LBS…

Customer: European GNSS Agency (GSA)

Open, safety-of-life, EDAS services

→ Able to cover SoL service in North African / Middle East Countries through EWA.

Ready for more challenges & diversification

→ Assist States implementing SBAS solutions

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Thank you!

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