EGNOS Bilateral Working Agreements
the Italian experience

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Agenda

• ENAV presentation

• ENAV role in Medusa

• Guidance on the implementation of RNP APCH

• Regulatory framework

• Bilateral Agreement Contents

• Italian status and experience

• Next steps

• Conclusions
ENAV presentation

- ENAV is the Company to which the Italian State delegates the management and control of civilian air traffic in Italy. Is entirely controlled by the Ministry of Economy and Finance and supervised by the Ministry of Infrastructures and Transport.

- In 2006, ENAV acquired 100% of Vitrociset Sistemi S.r.l., today Techno Sky S.r.l., thereby internalising the management and maintenance of flight assistance systems and their related software.

- From 2012, ENAV own 100% of SICTA a consortium of professionals working on ATM Systems and Architectures, Airspace Engineering, R & D Validation.
Memberships and Certifications

**Memberships**
- EUROCONTROL – European Association for the Air Navigation Safety
- CANSO – Organization of various ANSP’s
- CONFINDUSTRIA – Italian Industrial Confederation

**Certifications**
- Certified by ENAC (NSA) for the provision of Air Navigation Services and Training
- Quality Certification UNI EN ISO 9001:2008
Regional ATM development project aiming towards the creation of a Functional Air Block (FAB) in the South East Mediterranean area under the Single European Sky Objectives

Harmonise a large portion of the Mediterranean airspace joining the EU core area with the African and Middle-East borders

- **2007-2008**: BLUE MED Feasibility Study
- **2009-2011**: BLUE MED Definition Phase
- **2011-2012**: BLUE MED Implementation Phase

On October 2012 Cyprus, Greece, Italy and Malta signed on Limassol Blue Med FAB State Level Agreement

[www.bluemed.aero](http://www.bluemed.aero)
Blue Med (2/2)

- Countries involved:
  - Italy
  - Greece
  - Cyprus
  - Malta
  - Tunisia (associated partner)
  - Albania (a.p.)
  - Egypt (a.p.)
  - Jordan (observer)
  - Lebanon (observer)
ENAV provides aeronautical consultancy, training, technical services and engineering services to national and international customers.

ENAV currently provides services in more than 15 Countries in the world.
ENAV role in MEDUSA

• ENAV, as the aircraft operator, will be responsible of performing the flight trials.
• The objective of this proof-of-concept is to design one LPV procedure for each airport runway-end and then to perform approaches using a Piaggio P-180 Avanti II equipped with a Rockwell Collins GPS-4000S receiver and a LPV capable Flight Management System (FMS).
Flight Inspection Capabilities

- ENAV Flight Inspection Department has the capability to inspect any kind of NAVAIDs, including optical systems (PAPI), RNAV and GNSS GBAS procedures (FAS Data and Data Link) and PBN procedures.

- Currently ENAV has 3 Piaggio P180 II

- Service is provided in total compliance with latest ICAO standards on Instrument Flight Procedure Validation.

- Specific Flight Inspection and Validation PILOT TRAINING courses are provided in line with the relevant ICAO documents (QA Manual DOC9906).

- After 30 years of experience ENAV can assist other organizations to develop their own capabilities in flight inspection covering all aspects such as: choice of aircrafts, measurement and data processing platform, pilots and technicians training.
Staff

In our staff, on top of the fully qualified ranks of Commanders, Co-pilots and Flight Inspection System Operators we have representatives in international organizations:

• One Member of ICAO IFPP (Instrument Flight Procedure Panel)

• Two Members of ICASC (International Committee on Airspace Standards and Calibration)
Measurement and data processing platform

The NSM UNIFIS 3000 platform
This fully integrated system provides the following capabilities:

- ILS (CAT I II and III)
- MLS
- VOR TACAN DME
- NDB
- PAPI
- RADAR and SSR
- DATA LINK
- VDF, UDF and COM systems
- INSTRUMENT FLIGHT PROCEDURES VALIDATION (All Commanders are qualified as Instrument Flight Procedures Validation Pilots)

Real time processing allows for immediate corrections when required and immediate provisional report after the flight can be issued.
ENAV and EGNOS (1/2)

• 1996: with an Italian law ENAV start its participation to the International GNSS Programs
• 1997: first SBAS flight trials on Ciampino airport
• 1998: Bilateral Agreement with ESA for the first step toward EGNOS implementation
• 2001: together with 7 key European Air Navigation Service Providers (AENA-E, DFS-D, NATS-UK, Skyguide-CH, Nav-P, DSNA/DGAC-F), foundation of ESSP EEIG
• 2002: SBAS flight trials using EGNOS on Il Cairo Airport
• 2004: Installation of the 2 italians RIMS (Catania and Roma) and the Mission Control Center managed by ENAV
• 2005: kick off of the EGNOS Initial Operations Phase
• 2008: transformation of ESSP into a new company of limited liability - ESSP SAS, and moving of headquarters from Brussels to Toulouse
• 2012: participation to EGNOS V3
ENAV involvement in EGNOS (2/2)

- ENAV permanently attends all international meetings dealing with GNSS
  - ICAO PBN TF
  - ICAO NSP
  - Eurocontrol RNAV Approach Implementation Support Group
  - LATO TF
  - ESA PB NAV
  - ESA ANSP Experts Panel Meeting
  - European GNSS Program Committee (advisor)
  - EC SoL Experts Working Group
  - EOIG (EGNOS Operator and Infrastructure Group) Steering Committee
  - ESSP SaS Board of Directors
ICAO Assembly Resolution A37-11

• Urges all States to implement RNAV and RNP air traffic services (ATS) routes and approach procedures in accordance with the ICAO PBN concept laid down in the Performance-based Navigation (PBN) Manual (Doc 9613).

• PBN benefits:
  – Environment-Friendly
  – Improving Safety
  – Improving Operating Returns
  – Increasing Airspace Capacity
  – The Global Rollout
## Guidance on the implementation of RNP APCH (PBN TF)

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# The Regulation Framework

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<th>ICAO</th>
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| • Annex 10 Vol I Radio Navigation Aids [performance requirements]  
• Annex 15 Aeronautical Information Services [Status monitoring and NOTAM]  
• Doc 4444 Procedures for Air Navigation Services — Air Traffic Management | • Reg 550/2004 Provision of air navigation services in the SES  
• Reg 552/2004 Interoperability of the European Air Traffic Management Network  
• Reg 1035/2011 common requirements for the provision of air navigation services | • RTCA/DO-229C/D [SBAS receiver]  
• EASA AMC  
• Eurocae |
Roles and Responsibilities

- **Design Authority**: ESA
- **European Commission** (customer)
- **Industrial Consortium**: Thales
- **EGNOS Service Provider** [AENA, DGAC, ENAV, NATS, NAV, Skyguide, DFS]
- **Contract**: PSS, Service, Certification
- **ANSPs**
- **Procedures**: EASA
- **Aeronautical users**

Flowchart:
- ESA to Design Authority
- ESA to European Commission (customer)
- Thales to Industrial Consortium
- EGNOS Service Provider to ESA
- ESA to Service
- Service to Certification
- Certification to EASA
- EASA to ANSPs
- ANSPs to Procedures
- Procedures to Aeronautical users
# The current picture in Europe

- **ESSP (EGNOS Service Provider)**
  - System Safety Case
  - Declaration of Verification (DoV)

- **ANSP (CNS-ATM Service Provider)**
  - Operational Safety Case
  - Procedure Design
  - Procedure Flight check
  - Local requirements
  - EWA

- **AIRCRAFT OPERATORS**
  - Airworthiness OPS Approval
  - Equipment certification
  - Flight Crew qualification
Bilateral Agreement Contents

**WHO**
- ANSP and EGNOS Service Provider

**WHY**
- Define roles and responsibilities of actors involved
- Formalizing the working procedures and interfaces

**WHAT**
- Contractual document (including liability)
- Contingency Process
- NOTAM proposal
- Data Recording
- Collaborative Decision Making

**WHEN**
- As soon the implementation process is defined
Contractual document

The contract contain elements concerning:

• Liability
• Service Commitment with reference to EGNOS SoL Service Definition Document
• Contingency coordination
• Identification of the main Focal Points
• Service Arrangements
NOTAM proposal (1/2)

The document describes the coordination for the origination of EGNOS NOTAM proposal.

- Framework: Annex 15 Aeroanutcal Information Services

![Diagram]

EGNOS Service Provider

Generation  Formatting

National NOF

Validation  Distribution

ENAV
NOTAM proposal (2/2)

- **Objectives:**
  - Predict (based on prediction model developed for this purpose Euronotam Tool) APV-I service outages at given airports.
  - Create and format the corresponding NOTAM proposals into an ICAO format.
  - Distribute the NOTAM proposals to the concerned NOFs through the AFTN network.

- **Triggering events:**
  - GPS, RIMS and GEO predicted outages: minimum tbd h in advance
  - GPS unplanned outages: handled within tbd h after detection
  - RIMS and GEO unplanned outages: handled within tbd h after detection

- **Note:**
  - No replacing NOTAM (NOTAMR) will be generated. NOTAM proposals distributed will be replaced by a cancel NOTAM (NOTAMC) following by a new NOTAM (NOTAMN).

**NOTAM N example**

```
Q) LFFF/QGAAU/I/NBO/A/000/999/4900N00232E005
A) LFPG) 1010061700
C) 1010061758
E) 0002/10 NOTAMPN
EGNOS IS NOT AVAILABLE FOR LPV
This NOTAM is a new NOTAM (NOTAMN). Its reference is 0002/10
```

**NOTAM C example**

```
Q) LFFF/QGAAK/I/NBO/A/000/999/4900N00232E005
A) LFPG
B) 1010060721
E) 0011/10 NOTAMPC 0002/10
EGNOS RESUMES NORMAL OPERATION
This NOTAM is a NOTAMC. Its reference is 0011/10 and it cancels NOTAM reference 0002/10. NOTAMC can cancel NOTAMN. NOTAMC does not include Item C and D. Item E of a NOTAMC includes the text of the decoded NOTAM Code, together with details of the NOTAM subject (ref OPADD 2.4.3).
Alternatively: In the case the Q code is QGAXX in the NOTAMC, the XX indicates that a NOTAMN immediately will follow (ref OPADD 2.4.3). Item E) should include the remark NOTAM TO FOLLOW at the end of the text.
```

(Q) LFFF/QGAXX/I/NBO/A/000/999/4900N00232E005
A) LFPG
B) 1010060714
E) 0006/10 NOTAMPC 0002/10
EGNOS IS NOT AVAILABLE FOR LPV NEW NOTAM TO FOLLOW)
Data Recording

- **Objective:**
  - Get the necessary GNSS data recording for investigation of occurrences, incidents or accidents happened during the EGNOS service based provision

- **Applicable regulations:**
  - ESARR 2
  - Annex 10

- **Possible data to be provided by ESP:**
  - GPS data (C/N0, raw, nav mess, etc)
  - EGNOS data (GEO C/N0, SBAS messages, receiver status, etc)
Collaborative Decision Making

• Objective:
  – Define working relationships between ESP and the ANSP describing ANSP’s involvement in the ESP decision making process whenever any decision could lead to a material impact on the service provided

• Events:
  – Planned outages
    • Service degradation
    • Service outage

• Different levels of CDM can be defined depending on the conditions (maintenance on ESP side, ANSP constraints, etc)
Italian experience

- 2 March 2011: EGNOS has been certified for SoL application
- 16 May 2012: ENAV has signed the EGNOS Working Agreement with ESSP, the review process has taken around 6 months
- June 2012: PBN Implementation Plan Italy published
- September 2012: Generic Safety Case was approved by Italian NSA
- 13 December 2012: Publication of first LPV procedure for Milano Linate Airport on runway 36
- 2013: around 12 LPV procedures are planned to be published
  - Fiumicino
  - Ciampino
  - Genova
  - Torino
  - Bologna
  - Venezia
  - Olbia
Current EGNOS Performances (1/2)
Current EGNOS Performances (2/2)
EGNOS evolutions: short term

- **ESR 2.3.2** (2013)
  - Ionospheric performance improvement
  - Obsolescence resolution
  - New RIMS: Agadir, Abu Simbel

- **ESR 2.4.1M** (2015)
  - Obsolescence resolution
  - Qualification of new GEO satellite
  - Improvement to iono algorithms
  - New RIMS: Haifa and Tamanrasset
  - Mission evolutions: LPV200, MOPS D, Certification
  - Qualification of new TWAN

- **ESR 2.4.2** (on consolidation)
  - Obsolescence resolution
  - RIMS procurement & deployment for full ECAC coverage, algorithms improvement
  - Security requirements
EGNOS evolutions: long term

EGNOS V3

- Project managed by ESA under EC contract
- Study phase (end mid 2014)
- Implementation (around 2015-2018)
- Deployment (2019 onwards)
- Features
  - Avionics Legacy Service (GPS L1 – NPA, APV-I, LPV 200) guaranteed until 2030
  - GPS Dual Frequency (GPS L1/L5 - LPV-200 over an extended coverage)
  - GNSS Dual Constellation (GPS/GALILEO – LPV 200, Cat I Autoland on EU27)
  - Tolerance to loss of one frequency
  - Expandability capabilities
  - New Services (e.g. maritime)
Conclusions

• Involve all stakeholders early
• Prepare the Safety Case and understand local needs
• Start discussions at State level with the European Union for the use of Safety of Life (RNP APCH)
• Once EU agrees on the usability of EGNOS the EWA process can be initiated with the EGNOS Service Provider
• Awareness
• Note: EGNOS can be used as Open Service without any bilateral agreement
References

• Documents
  – PBN TF/5 WP/05: Draft Guidance Material for the Implementation of RNP APCH Operations
  – ICAO GNSS Manual (Doc 9849)
  – ICAO PBN Manual (Doc 9613)
  – EGNOS SoL Service Definition Document
  – ESSP Monthly Performance Report September 2012 ESSP-DRD-7911

• Weblinks
  – ESSP http://www.essp-sas.eu/home
  – GSA http://www.gsa.europa.eu/
  – Eurocontrol http://www.ecacnav.com/
  – ICAO http://www.icao.int/safety/pbn/Pages/default.aspx
THANKS FOR YOUR ATTENTION!

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