SBAS-ASECNA Programme Status

EGNOS Annual Workshop
”SBAS in the world” agenda item
3-4 October 2017
Athens, Greece
ASECNA at a glance

Agency for Air Navigation
Safety in Africa
and Madagascar

Cooperative management of a Single Sky of 16.1 millions km$^2$
(1.5 * Europe)
**SBAS-ASECNA genesis & history**

- **2003-06**
  - AFI GNSS/EGNOS test bed

- **2005**
  - Resolution taken by ASECNA Member States on GNSS, including EGNOS/GALILEO, service implementation in ASECNA

- **2005-06**
  - ISA feasibility studies

- **2007**
  - Deployment of Nouakchott RIMS (EGNOS)

- **2007**
  - Cooperation agreement between ASECNA and European Space Agency on EGNOS services

- **2011-16**
  - Resolution taken by ASECNA Member States on ASECNA involvement in the EGNOS/GALILEO introduction in Africa
  - Preliminary feasibility study on SBAS-ASECNA + R&D activities
  - SAGAIE network exploitation & related iono studies
  - Signature of the ASECNA-EU international agreement

- **2017**
  - Mandate of Mohamed Moussa => Accelerate and extend the provision of SBAS services as a key enabler of the SAS
SBAS-ASECNA services

Safety lessons learned

% of runways ends ILS equipped

IATA forecasting 2013-17 CAGR : 5.3%

Need for RNP APCH APV
(ASBU Block 0 essential element)

LNAV/VNAV (Baro) (short-term)
LPV/LP (SBAS) (medium-term)
SBAS-ASECNA services

• Key enabler of Single African Sky
• Enhancement of PBN and ADS-B operations
• Benefits much more important than in any other part of the world
• For approach services
  • Effective solutions for CAT-I operations
  • Significant and sustainable improvement of flight efficiency and safety in the very large numbers of runway ends not served by ILS today
  • Service continuity during ILS maintenance and renewal periods
  • Overcome of the known safety and operational limitations of the technical constraints of LNAV/VNAV operations
• Not requiring any local ground infrastructure and staff
SBAS-ASECNA strategic directions

**Strategic vision:**
- Prepare the future and strengthen the positioning of the Agency as an added-value services provider and as the reference instrument of the African Union for air navigation safety

**Directions:**
- Ownership of the SBAS infrastructure
- Control of SiS and autonomous provision of SBAS services to end users
- Potential for SBAS services outside ASECNA area
- Accelerate the development of SBAS in the whole African continent in cooperation with the African Union

**Service provision objectives:**
- En-route, terminal and approach PBN operations
- Support to ADS-B operations
SBAS-ASECNA strategic directions

CAT-I equivalent services « everywhere every time »
enabled by ILS + SBAS ... + GBAS (tentative)

Main driver

• Timeframes:
  • Step 1: Early SBAS services (L1) from 2021/2022
    => Service levels: APV, CAT-I …
  • Step 2: Full SBAS services (DFMC) beyond the horizon 2028/30
    => Service levels: CAT-I autoland …

Open service to be also provided for non-aviation applications
SBAS-ASECNA users

• Benefits of SBAS today acknowledged by airspace users
  • Flight safety benefits
  • Flight efficiency benefits
• « Best capable - best served »
• Positive worldwide tendency:
  • Most of the new aircraft models offer or are planning to offer SBAS capability
  • Most of the aircraft expected to be SBAS capable in 2025
• Upcoming dialogue with ASECNA-airspace users to support the integration of SBAS in their navigation strategy
SBAS-ASECNA architecture concept

1. GPS and GALILEO satellite constellations

2. SBAS-ASECNA RIMS

3. SBAS-ASECNA Mission Control Centre(s) (MCC)

4. SBAS-ASECNA uplink stations (NLES)

5. SBAS-ASECNA GEO satellites
SBAS-ASECNA architecture concept

(only) indicative infrastructure locations

- SBAS-ASECNA RIMS
- SBAS-ASECNA MCCs
- EGNOS RIMS

Indian Ocean

Western & Central Africa
R&D: **MAGNIFIC**

- Flight campaign the week of 21\(^{st}\) November 2016
- Route Dakar-Lomé at night with ASECNA ATR42-300 to collect GPS and Galileo data

- Evaluate ionosphere impact in GNSS signals during an equatorial flight at night
- Characterise Galileo performances for aeronautical user
- Share experience with potential users (ASKY)

- First time in Africa an aircraft can be positioned using only Galileo signal. And second time worldwide!
R&D: Magnificent

- Procedures designed and flown by ASECNA and PildoLabs (using PildoLabs Platero platform). Signal generation by Thales Alenia Space.
- Decision Height improved compared to LNAV (250 ft vs. ~400 ft) at both runway ends
- Asky pilots feedback extremely positive: SBAS can change their day to day safety.
Early services: phase B

- **Preliminary Architecture Definition Study**
  - **Objectives:**
    - Define the incremental/evolution path for Early Services with the best architecture options, taking into consideration:
      - coverage * performances, benefits / costs (CAPEX/OPEX) … => supported by CBA
      - expendability and upgradability towards DFMC
    - Prepare and provide a clear view on the implementation phase (C/D) including detailed development/implementation and evolution plans for Early Services, and a transition plan towards Full Services
  - **Partners:**
    - Agence Française de Développement (AFD)
    - European Commission (EC), European GNSS Agency (GSA)
    - French Space Agency (CNES)
EGNOS Annual Workshop, 34 Oct. 2017, Athens, SBAS-ASECNA Programme Status

EGNOS in Africa Support Programme

Executed by the JPO, a pan-African entity to coordinate and support harmonised SBAS/EGNOS development and services provision in Africa

- Implementing measure of the Africa-EU Strategic Partnership

- Phase 2016-17 (funded by EU and ASECNA): to accelerate the adoption of SBAS/EGNOS in Africa

- Regional modular approach foreseen:
  - Northern (M1),
  - West-Central (M2),
  - Eastern Africa (M3),
  - Southern (M4)

- Status: on-going consultations with RECs for the creation of modules
THANK YOU FOR YOUR ATTENTION

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