



# SBAS for Africa & Indian Ocean (A-SBAS) update

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ICAO Regional Workshop on AFI GNSS/SBAS

4-5 March



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# Background

## Policy Framework

- **Mandate from States to implement SBAS since 2005**  
Provide a continental augmentation system, in line with Africa Union Space Policy (Navigation and Positioning)
- **Key enabler a Seamless African Sky and a Single African Air Transport Market (SAATM), flagship programme of the African Union under its Agenda 2063**



- Autonomous services provision to users
- Use of EGNOS technology and assets

**SBAS solution deployed by Africa for Africa**

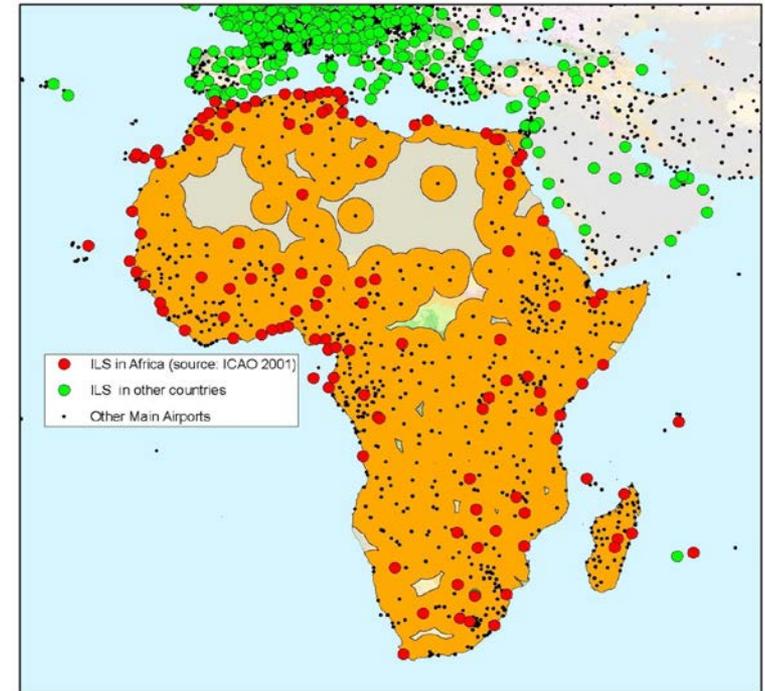
# Background

## Need for CAT-I operations

2011-2015 [IATA annual review 2016]  
CFITs = 20% of fatalities, most of them occurring in the approach/landing phase and being often associated with imprecise approach

< 20 % of runways ends ILS equipped

Operational and safety limitations of LNAV and Baro-VNAV operations



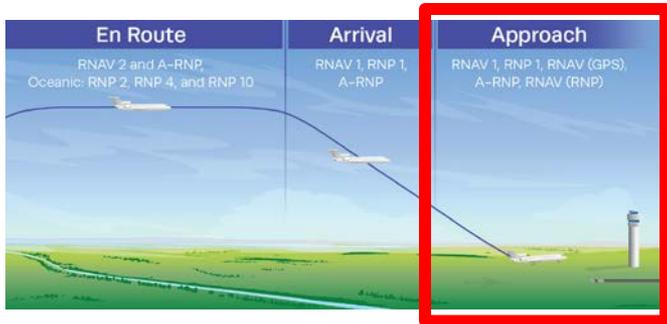
**Need for CAT-I operations on all QFUs**

**SBAS as the cost-effective solution in complement to ILS**

# Background

## Operational benefits

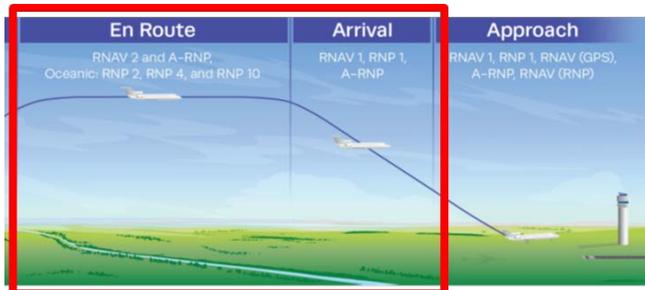
Enhancement of PBN and ADS-B operations for all phases of flight



**CAT-I equivalent services**  
**« everywhere every time »**

supported by ILS + SBAS

- Effective solutions for CAT-I operations
  - CAT-I equivalent services in the very large number of IRE not served by ILS today
  - Service continuity during ILS maintenance and renewal periods
- Geometric guidance: overcome of the known safety and operational limitations of the technical constraints of LNAV/VNAV operations



- More RNAV and RNP capabilities
  - Improves availability for all RNAV routes
  - Flexibility to design more efficient airspace and instrument procedures
- Position source for most-stringent ADS-B reqts

# A-SBAS services

## Feasibility

- Perturbations of GPS and GAL signals propagation due to specific dynamic of the equatorial ionosphere
- SAGAIE project (from 2013):



- Dedicated network of GNSS stations to collect data from core constellations
- Ionosphere characterisation: analysis of scintillations and plasma's bubbles
- Development of:
  - adapted ionosphere models
  - dedicated and advanced SBAS correction algorithms and processing set
- SBAS emulation using representative SBAS test platform



**Feasibility of SBAS services provision in compliance with ICAO SARPs demonstrated, including during high ionosphere activity**

# A-SBAS services

## Services provision strategy

**SBAS to enable new and advanced navigation (en-route down to CAT-I) and ADS-B operational capabilities**

**CAT-I equivalent services « everywhere every time »  
supported by ILS + SBAS**

**Complement to existing navigation conventional and GNSS (NPA) services**

**Conventional nav aids (ILS, VOR, DME) to evolve towards a Minimal Operating Network (MON) to serve as a back-up in case of GNSS outages**



**Full capable and resilient navigation infrastructure**



# A-SBAS services

## Services provision plan

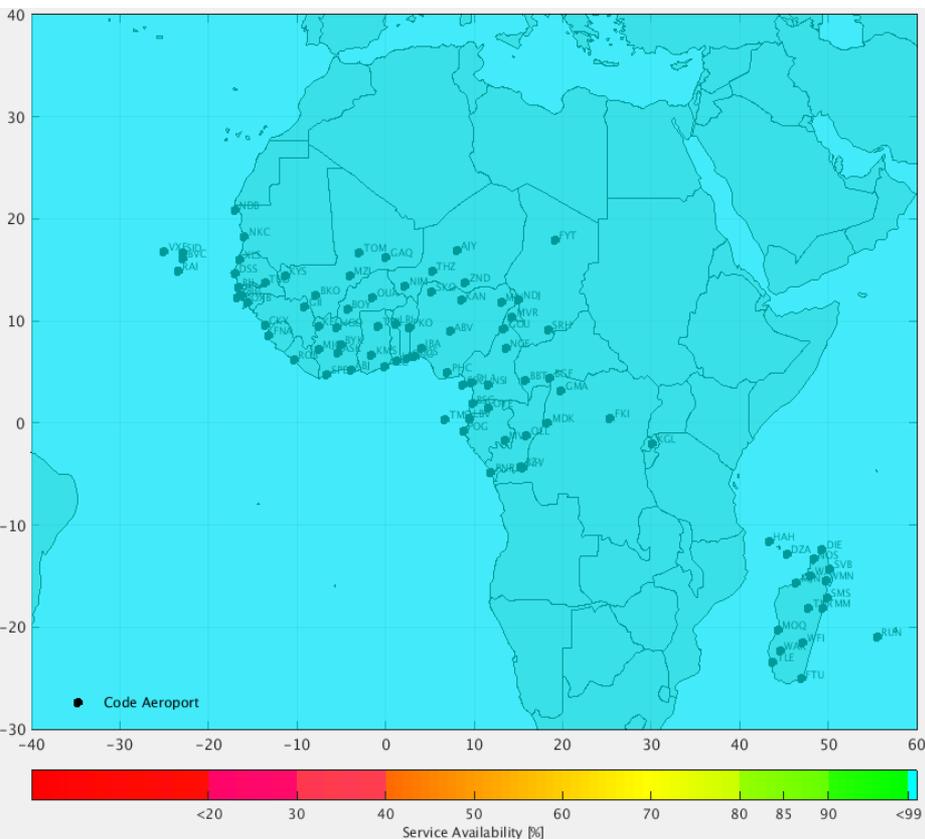
**SBAS for Africa & Indian Ocean (A-SBAS) = ICAO SP identifier n°7**

- Step 0:** Pre-operational / open service (L1, L5) (effective since 2020)
- Step 1:** (L1) services from 2024 for en-route/NPA, APV-1 (DH/250 ft) and CAT-I (DH/200 ft) operations
- Step 2:** (DFMC) services beyond 2028/2030 for CAT-I auto-land operations and potentially further

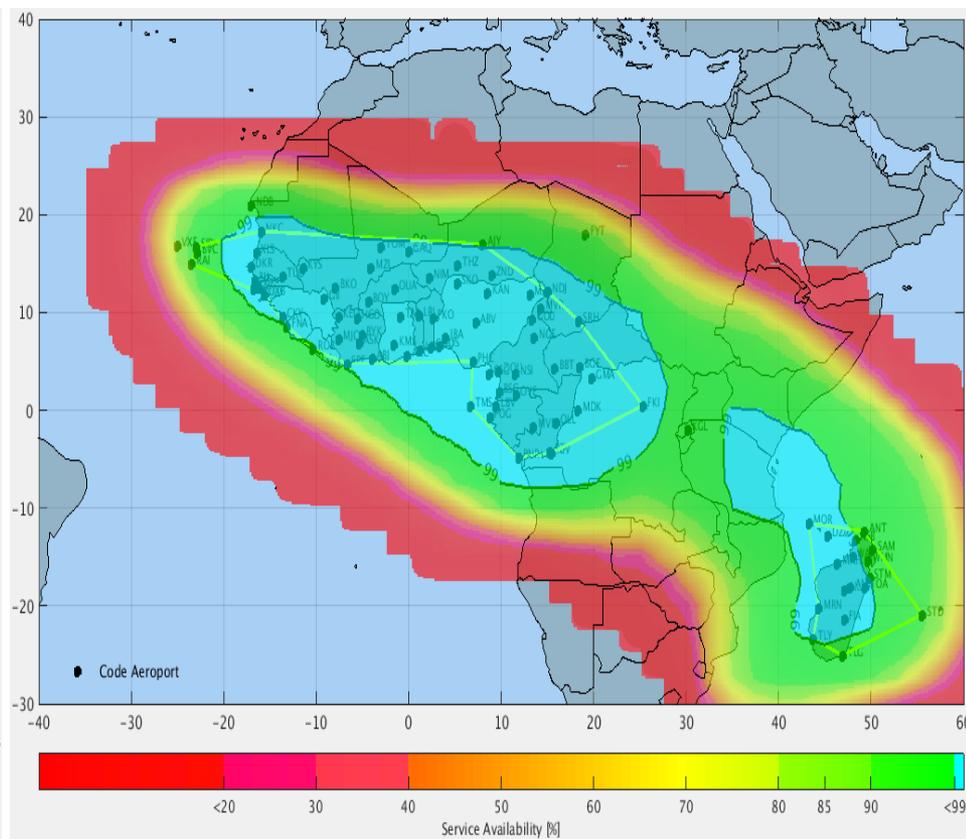
SARPs compliance

# A-SBAS services

## Coverage & performances



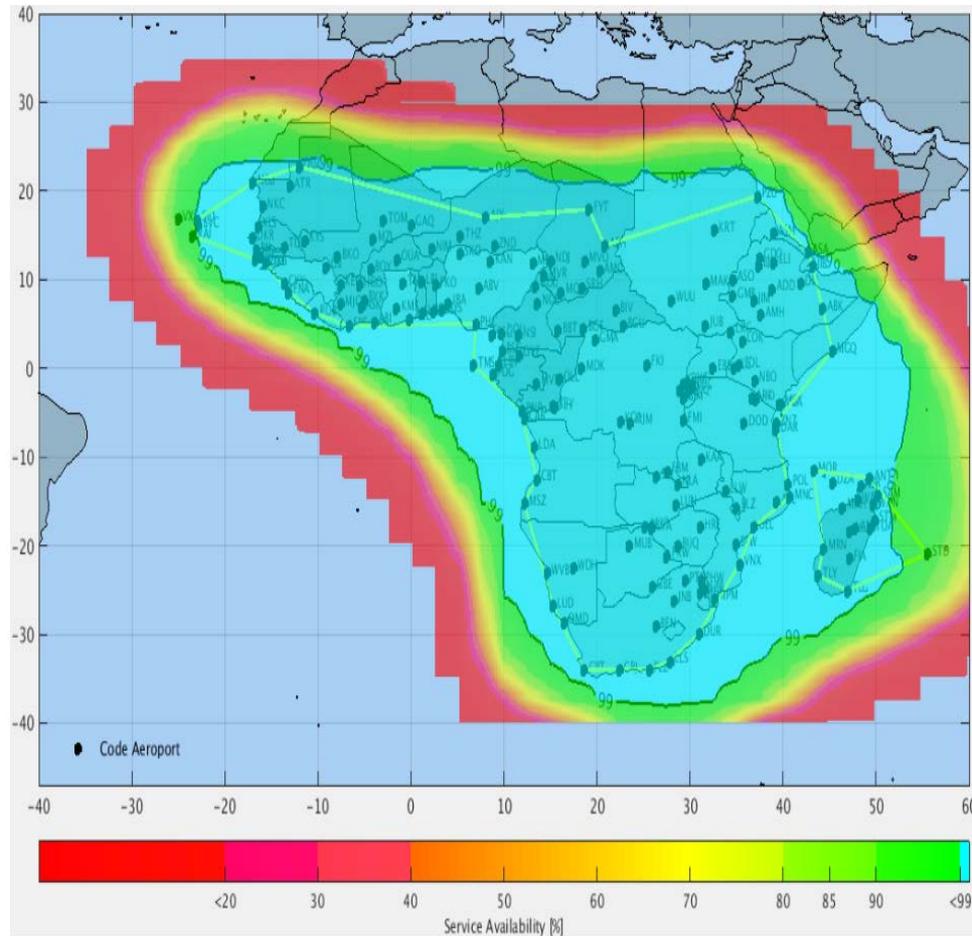
**En-route/NPA availability (L1) - 2024**



**APV-1 availability (L1) - 2024**

# A-SBAS services

## Coverage & performances

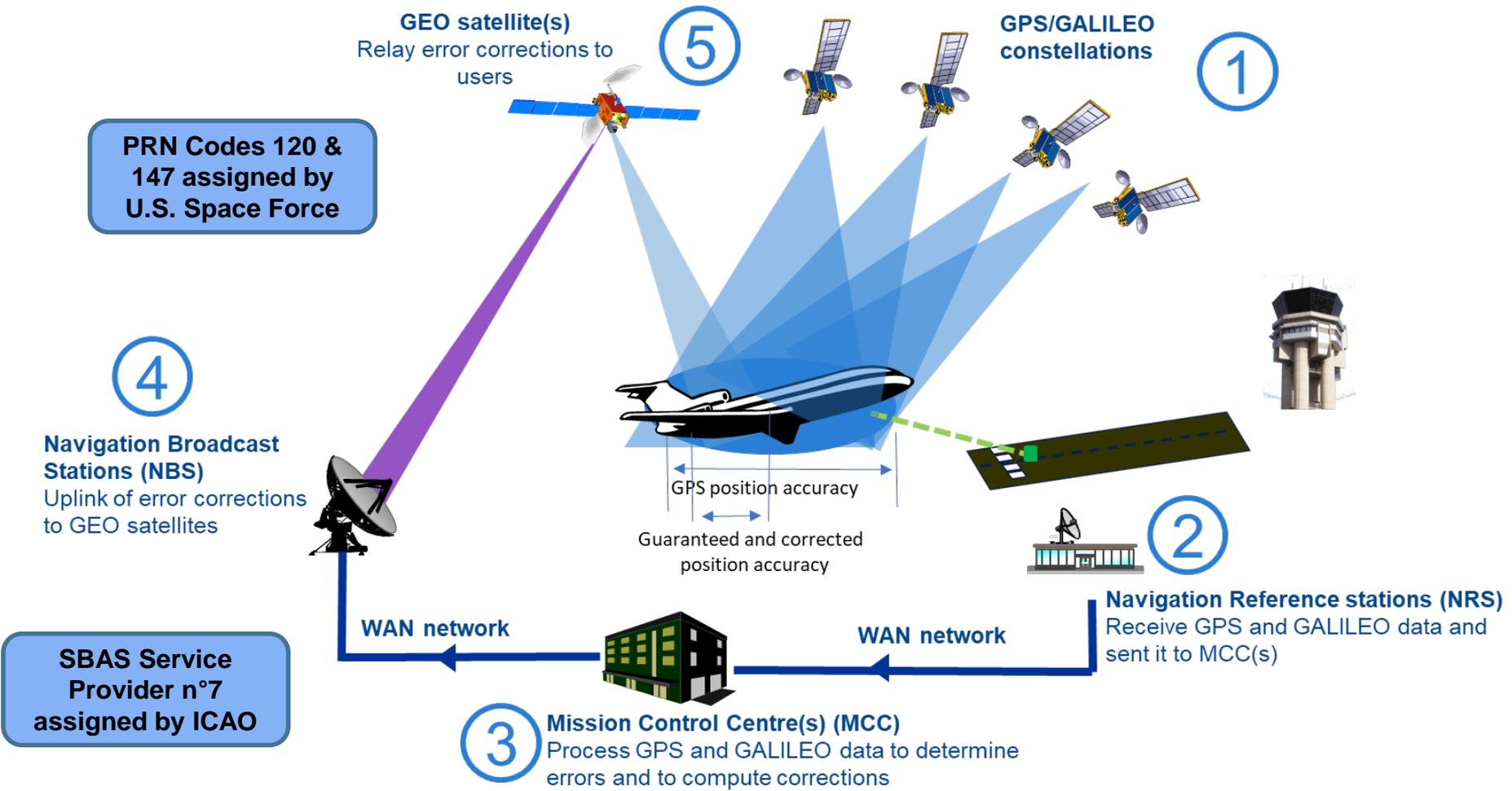


**APV-1 availability (L1) - potential for 2025+**



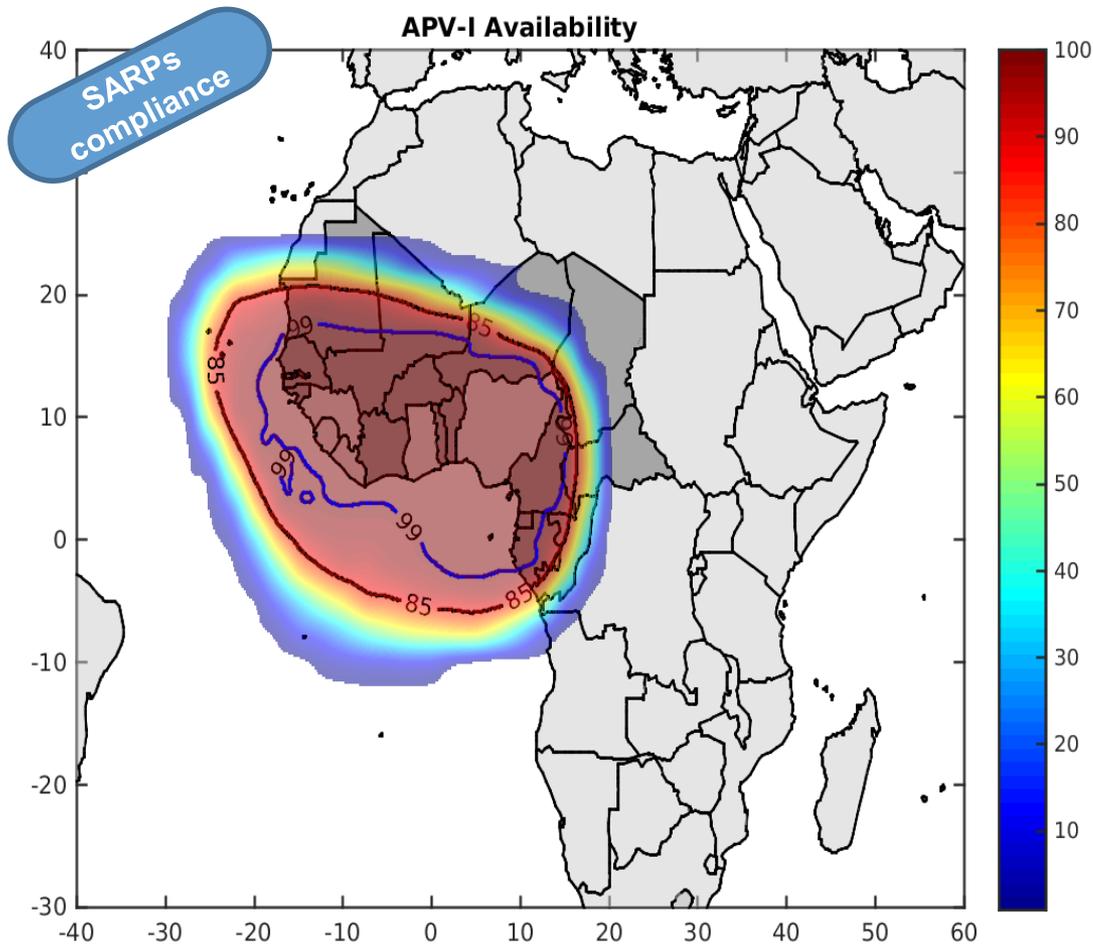
# A-SBAS system

## An indigeneous infrastructure



# A-SBAS pre-operational service

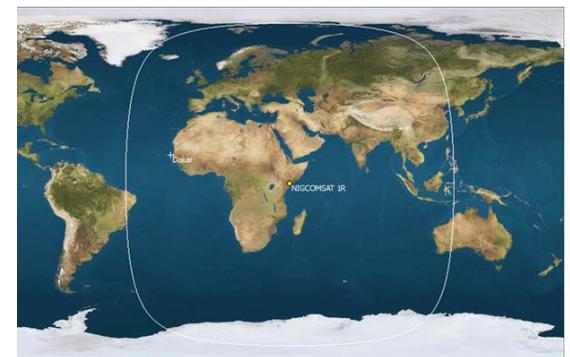
## A dedicated test-bed (broadcast since Sept. 2020)



Pre-operational APV-1 availability



with



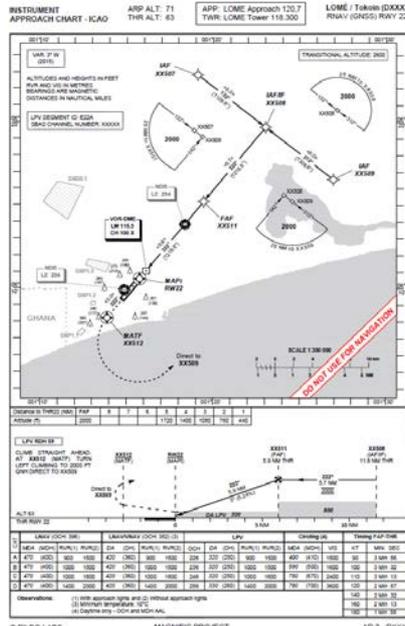
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# A-SBAS pre-operational service Flight demonstrations (Lomé, 27 January 2021)



Platero

SBAS Flight Validation Platform



SBAS LPV final approach on RWY22 (DH 250ft)

Operational (safety & efficiency) benefits demonstrated



« SBAS can revolutionise navigation for the approach phase »

Capt. Patrice Moevi



« SBAS means flight safety through approaches with minima equivalent to ILS CAT-I everywhere at all times »

Capt. Zouel Bayli

# A-SBAS users

## Perspectives

- **Flow of events is directing towards SBAS introduction over the world as baseline operations**
  - SBAS benefits today widely acknowledged by airspace users
  - Exponential development of SBAS services in the world
  - Impact of regulations (e.g. EU PBN regulation)
  - Forward-fit and retrofit solutions more and more available at lower cost
  - Growing number of airlines operating having integrated or, planning to integrate SBAS in their navigation strategy, based on their own assessment of the positive benefit/cost ratio
- **Aircraft operators not yet interested in SBAS will not be penalised:**
  - Existing navigation (conventional/GNSS) services will continue to be delivered
  - No mandatory equipage will be applied
  - No additional air navigation charges due to A-SBAS services

# A-SBAS users

## Perspectives

**Users of African airspace are already interested in or requesting expedition of SBAS deployment :**



« SBAS provides a great opportunity to develop air transport in Africa through the MUTAA »

« SBAS improves flight safety and efficiency »

« SBAS will quickly supersede conventional navigation, including ILS Cat I »

« Support to SBAS deployment, especially in Africa »



# Conclusion

## A-SBAS in few words

- A-SBAS services expected from 2024 in Western/Central Africa and IO
- Potential for a global development and deployment in the entire AFI region
- A-SBAS is an autonomous SBAS for Africa built by Africa for Africa
- Support en-route down to CAT-I (DH/200 ft) operations
- Enhancement of PBN and ADS-B operations
- Significant safety, efficiency (operational costs reduction) and environmental protection benefits
- Feasibility and benefits of SBAS demonstrated on the field at LFW
- No specific increase of air navigation charges due to the introduction of A-SBAS services
- No penalisation for airlines not yet interested

**A-SBAS, a fully-fledge African solution for Africa**



# Conclusion

## Way forward

**A-SBAS is an African programme for Africa,  
open to any stakeholders interested in developing  
SBAS services in the continent**

**A-SBAS is a flagship programme for the continent**

**A-SBAS will be presented in detail to the African Union Commission**

**A-SBAS further development and deployment can be coordinated  
under the aegis of the African Union Commission**

