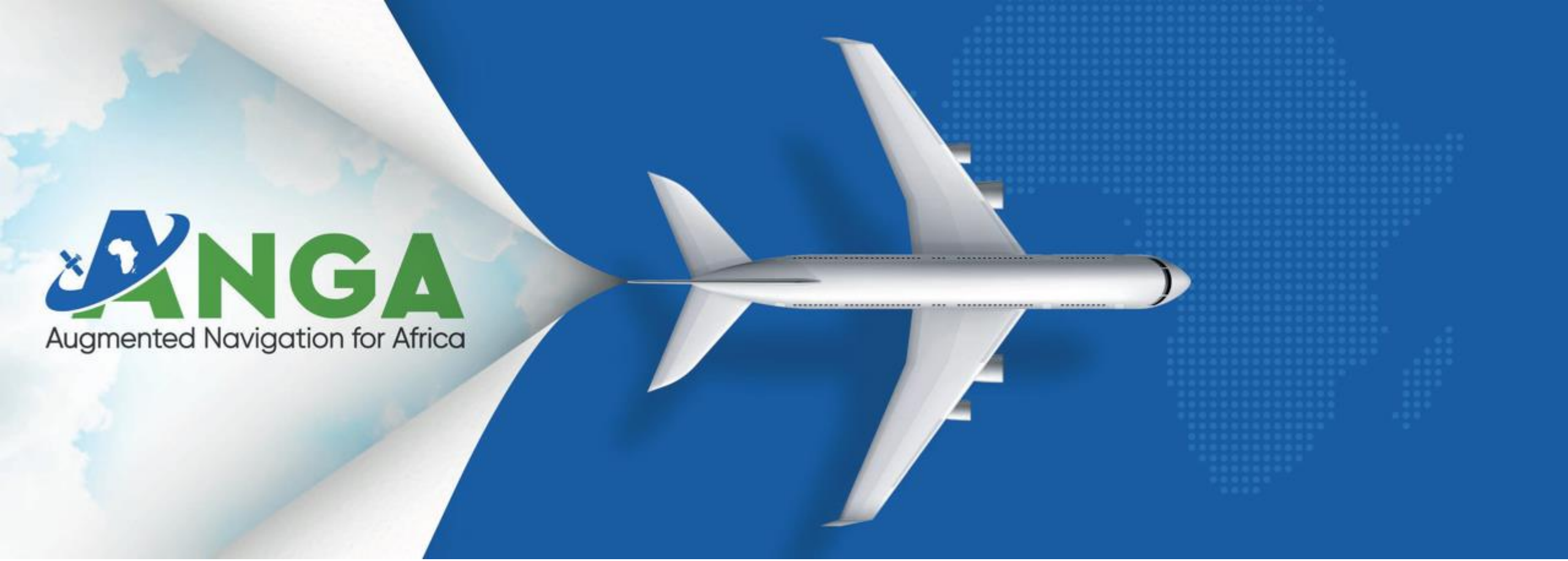


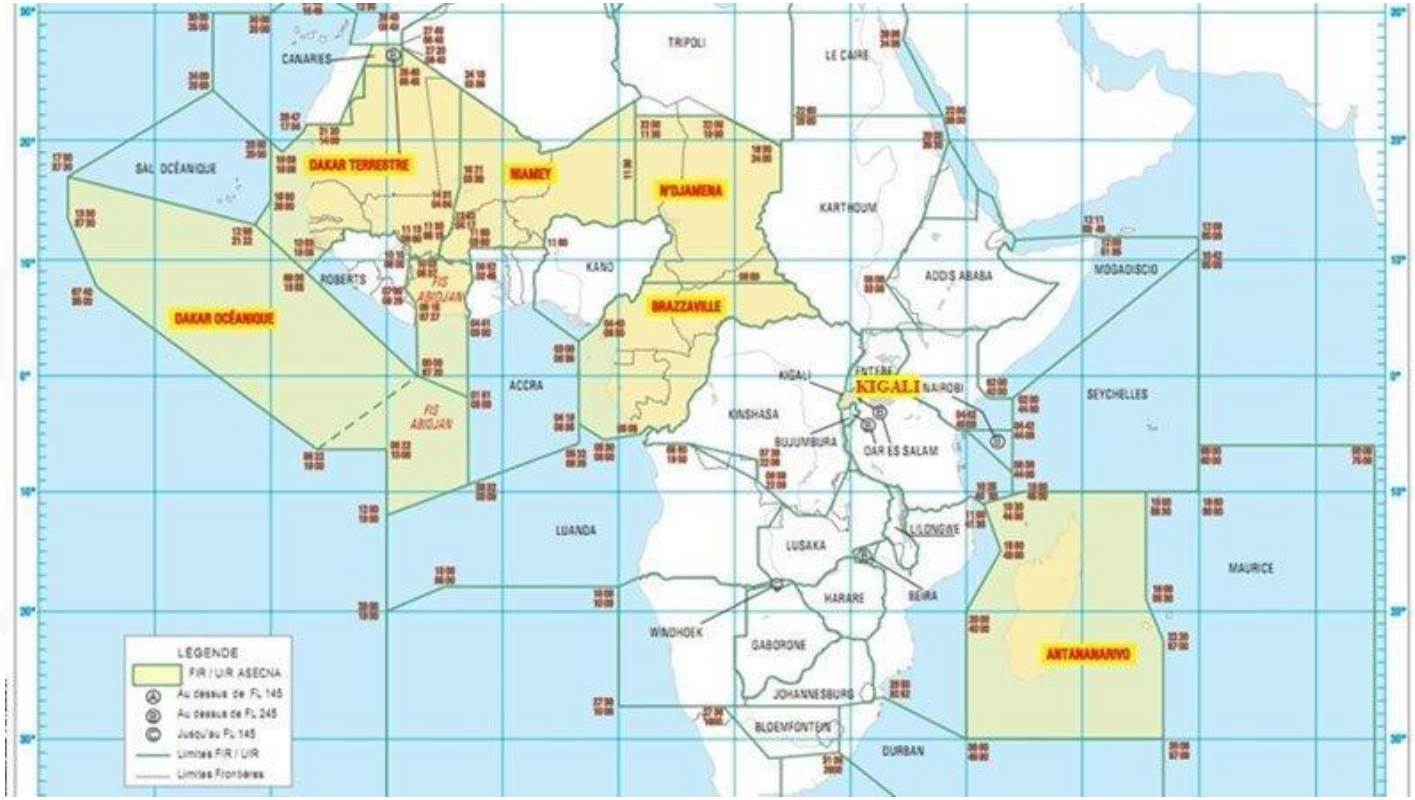

# ANGA, the African solution for safe navigation

EGNOS Workshop 2025

Berlin, 1st October 2025

# ASECNA at a glance

- International public organisation
- Mission: air navigation safety
- 19 Member States
- Created in 1959
- 7 Flight Information Regions (FIRs)
- > 16 millions km$^2$ of single sky airspace




ANGA
Augmented Navigation for Africa

# ANGA programme

## A VISION FOR AFRICA

**A satellite navigation solution developped and operated by Africa for Africa**

## GOALS FOR AFRICA

- **Prepare the future of Africa** in a growing competitive international environment, in which satellite navigation services provision crosses by essence the natural borders of States
- **Develop the positioning of Africa** in the worldwide value chain of satellite services provision
- Provide **high-added value satellite navigation services** for the benefit of the African economy
- Develop an **African-wide native infrastructure** and develop **African capacities for its exploitation**
- Use, adapt and improve **existing technologies**

# ANGA services

## Services roadmap

**Step 0:** **Demonstration service** (since **2020**)

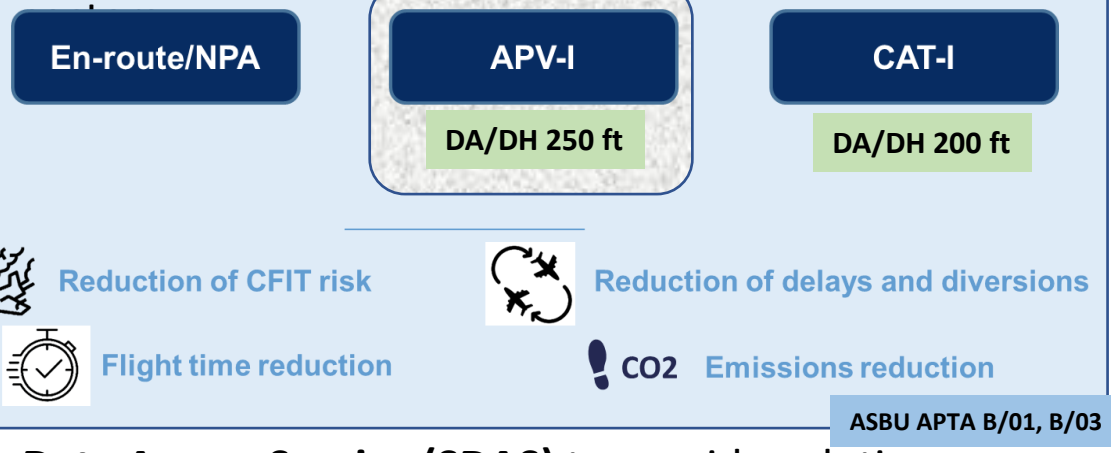
**Step 1:** **L1 services** (from **2029/30**)

**Step 2:** **DFMC services** (beyond **2032**)

SARPs compliance

- **Open Service (OS)** to be used by mass-market receivers for general purpose applications

- **Safety of Life service (SoL)** for safety-critical applications in civil aviation and other transport

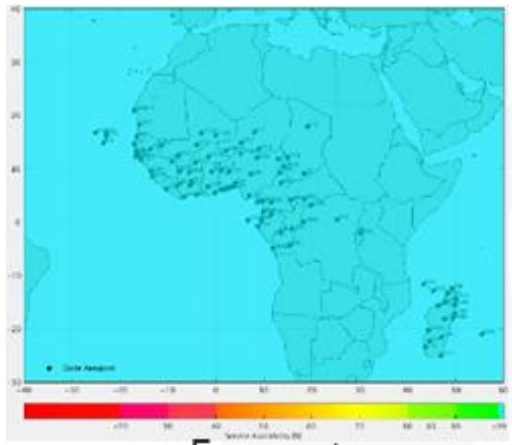



- **Data Access Service (SDAS)** to provide solutions with enhanced performance for professional use

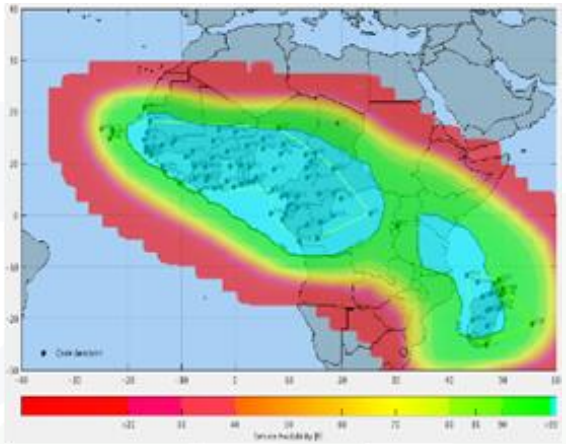
**Service Provider identifier n°7**

# ANGA services

2029/30

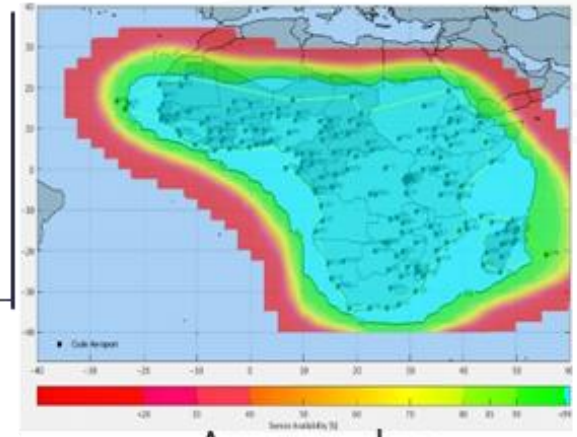


En-route



Approaches

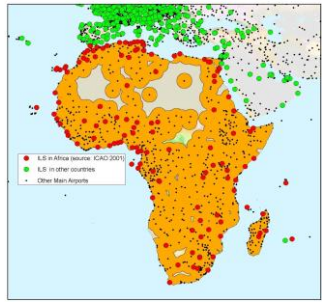
Post-2030



Approaches

- Complement to existing navigation services

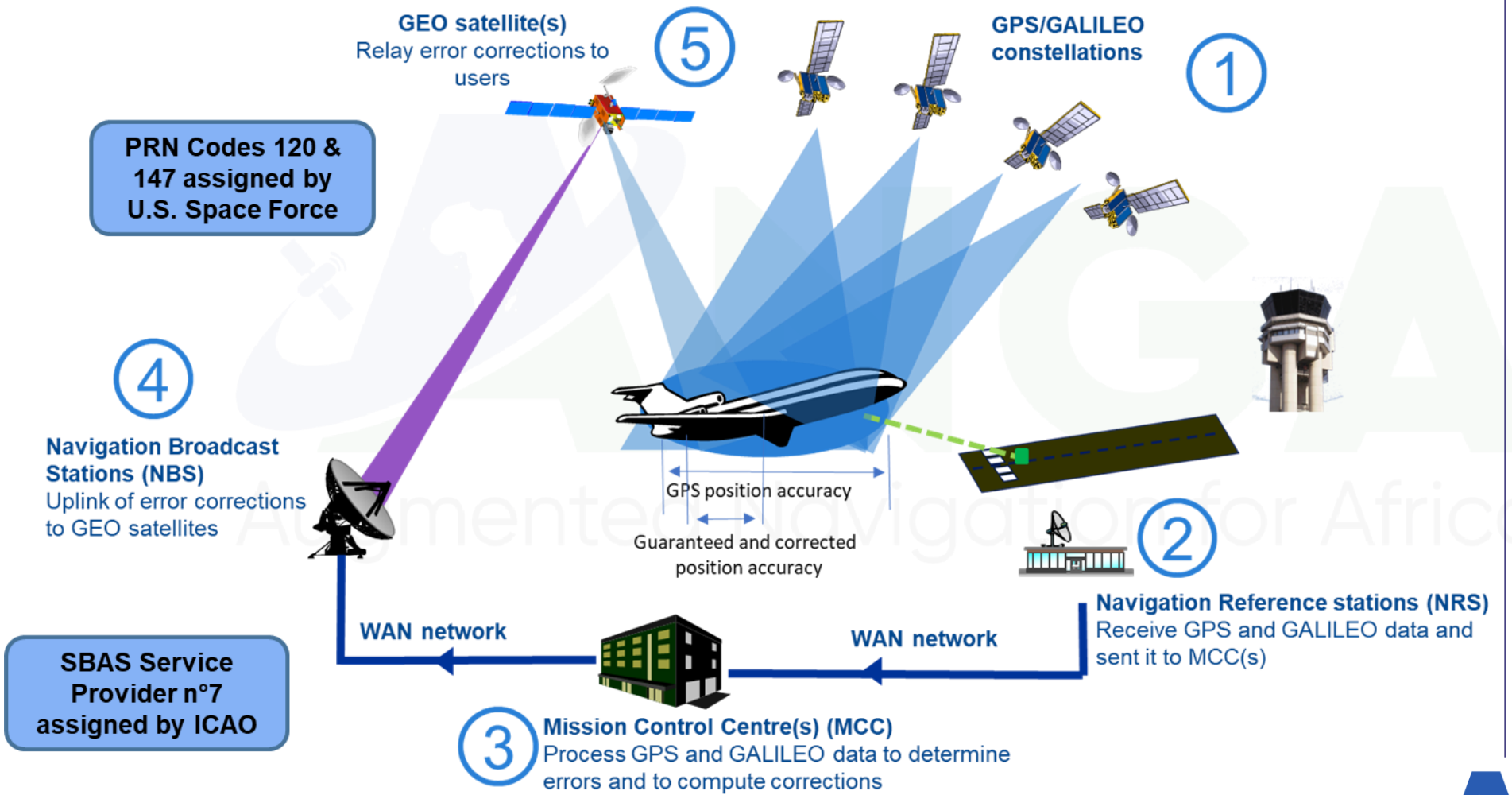
**CAT-I equivalent services « everywhere every time »**



- Existing conventional navaids, including ILS, to be maintained with an evolution towards a Resilient Operating Network (RON) to support back-up operations in case of GNSS outages
- Consideration of on-going development of airborne EFVS capabilities as enabler of straight-in landing operations beyond CAT-I minima

**Towards a full and resilient navigation infrastructure supporting all weather operations**

# An African « native » infrastructure




Possible heritage of EGNOS

Use of Galileo constellation

Technical partners

# ANGA system development roadmap

| Versions | ANGA V1 | Evolutions (ANGA V1+) |
|---|---|---|
| Services levels L1 | En-route/NPA and APV-I (L1) | En-route/NPA, APV-I (and CAT-I, tentative) |
| Services levels DFMC | - | En-route/NPA, APV-I and CAT-I |
| Service area | En-route/NPA : FIRs of AFI region<br>APV-I : ANGA Member States and neighbouring areas | Extended areas |
| Key features | GPS + GAL for iono monitoring<br>1 GEO<br>Native security resilience<br>Expandability towards continent coverage<br>HW design enabling DFMC upgrade | Additional Navigation Reference Stations (NRS)<br>Additional GEO<br>Anomalies correction<br>Additional functionalities (e.g. authentication)<br>… |
| Entry into operations | 2029-2030 | TBD |

On-going procurements:

- ANGA system design, development, deployment, qualification and entry into exploitation
- ANGA NRS sites preparation
- ANGA GEO service preparation and provision

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# Business case for a fictive airline

*courtesy of*

SatNav Africa Joint Programme Office

## Fleet

- **18 aircraft** with 8-year average age
  - A320s
  - B737s
  - A330s
- **Retrofitting** start year of **2023** for all models
- **Retirement** trigger at **20 years**

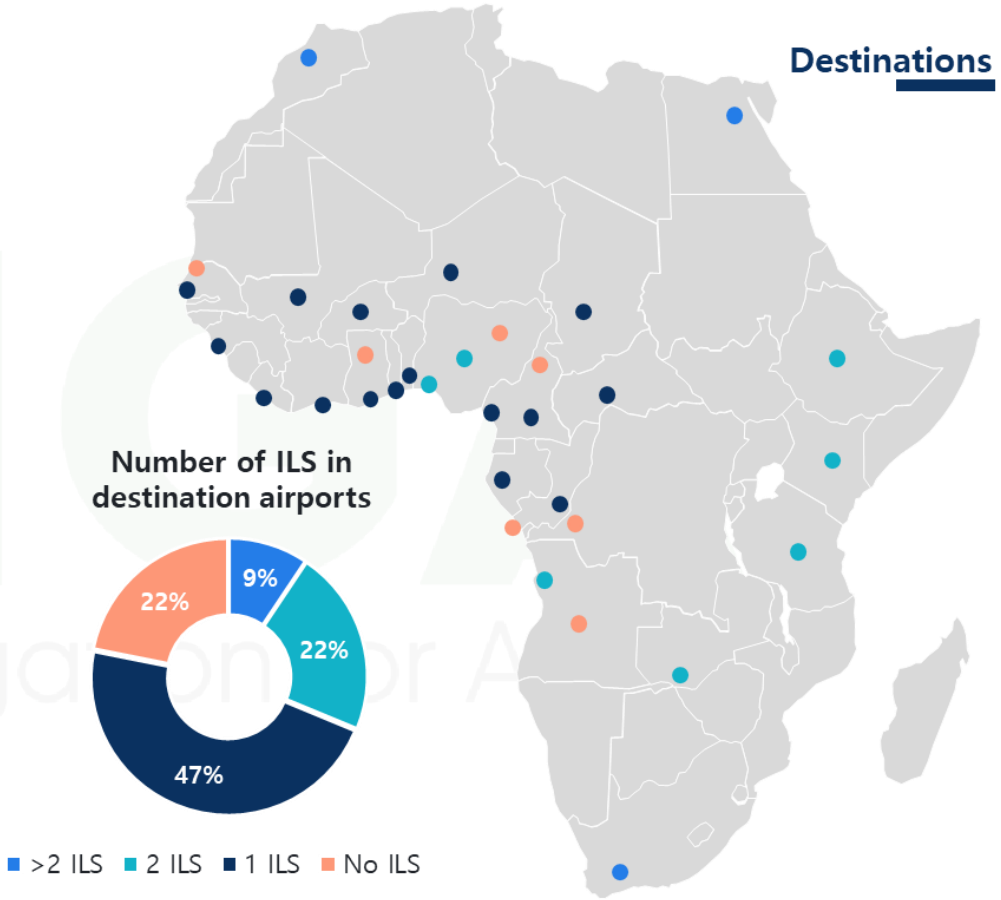
## Traffic forecast

The base traffic figures for the airline are:

- **250 aircraft arrivals per week**
- **760,000 passengers per year**

Growing at a **4.8 % CAGR** over the analysis timeframe

## Destinations



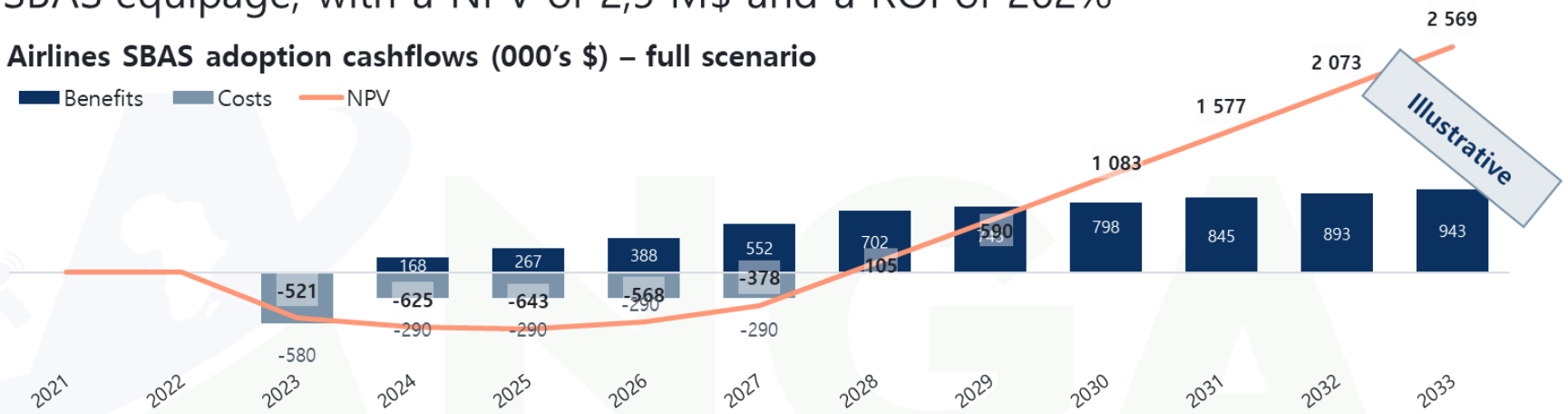

Airline flying to a set of 32 African destinations, including various types of airports in terms of ILS equipage

# Business case for a fictive airline

*courtesy of*

The economic results of the full scenario demonstrate the attractiveness of the SBAS equipage, with a NPV of 2,5 M$ and a ROI of 262%

**Airlines SBAS adoption cashflows (000's $) – full scenario**

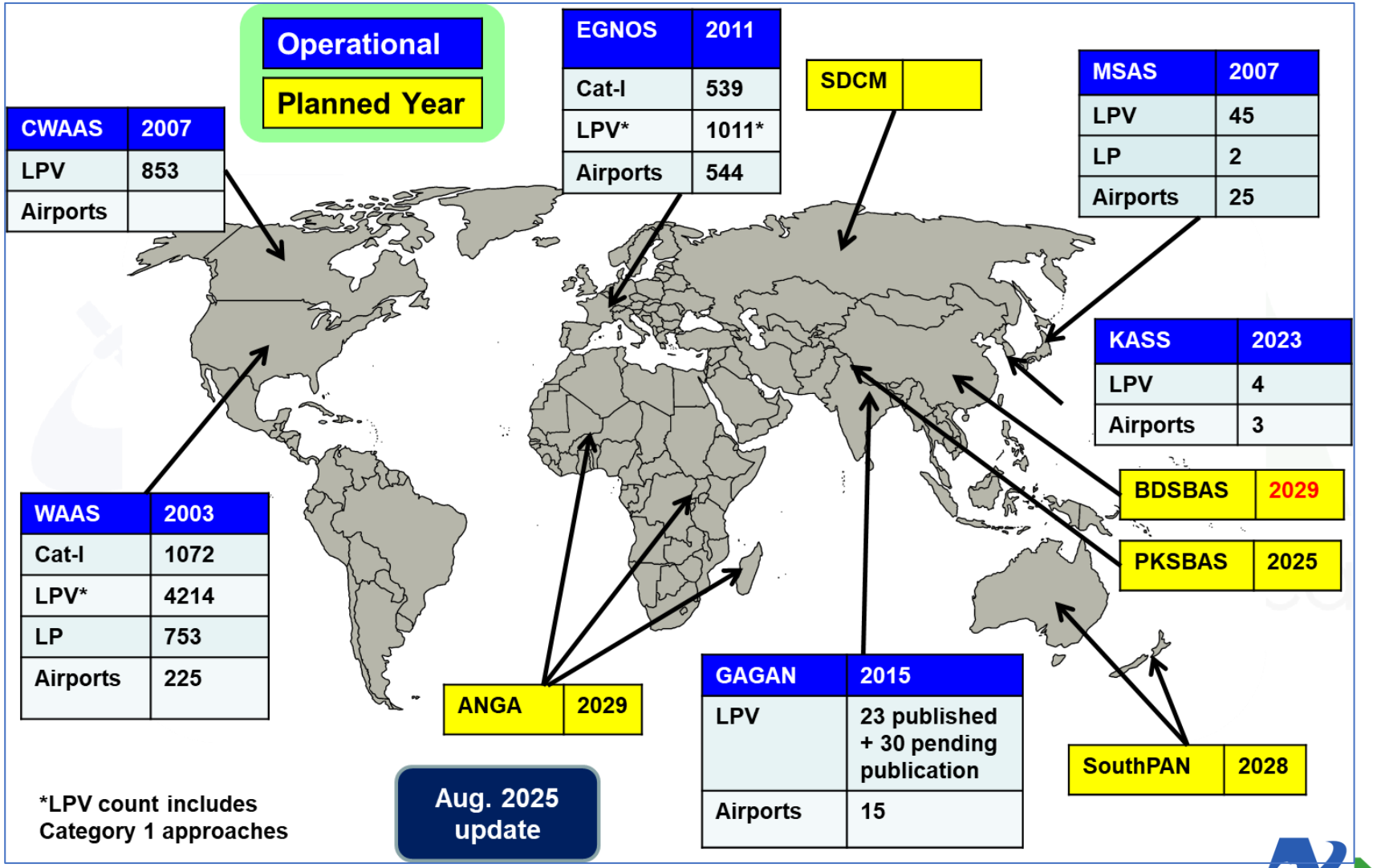



**Economic results per aircraft**

| Aircraft | Return on Investment (ROI) | Internal Rate of Return (IRR) | Payback period | Cost of investment | Cumulated benefits | NPV (2033) |
|---|---|---|---|---|---|---|
| **1 Airbus A320** | 500% | 58% | 4 years | 70,000 $ | 420,000 $ | **208,300 $** |
| **1 Airbus A330** | 200% | 28% | 6 years | 70,000 $ | 210,032 $ | **75,000 $** |
| **1 Boeing 737** | 180% | 26% | 6 years | 150,000 $ | 420,000 $ | **143,200 $** |
| **Global (all airline aircraft)** | **262%** | **35%** | **5 years** | **1,740,000 $** | **6,300,900 $** | **2,570,000 $** |

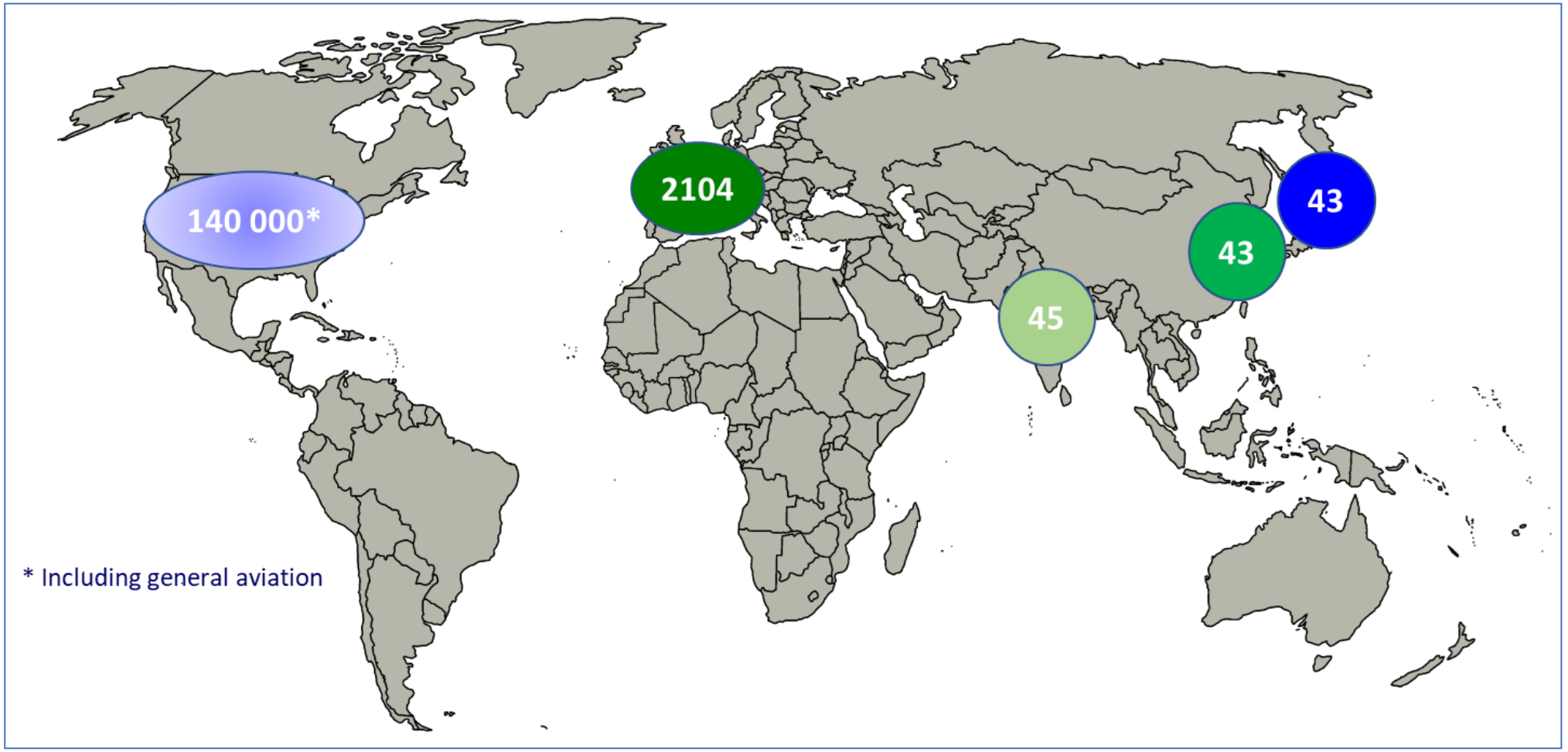
Additionally, the analysis has been performed from an individual aircraft point of view for the different models, all with positive financial results

# Global SBAS/LPV procedures status




Source: SBAS IWG

# Global SBAS/LPV equipage status (for operational SBAS)




Source: SBAS IWG

# Conclusion

- ANGA Augmented Navigation for Africa provides a fully-fledged native solution for SBAS services provision in Africa
- Airlines acknowledge the important SBAS benefits and support ANGA Augmented Navigation for Africa deployment
- ANGA Augmented Navigation for Africa services will benefit, beyond aviation, to the African economy in many areas

- ANGA Augmented Navigation for Africa demo services (L1 and DFMC) to be resumed, operational L1 services expected from 2029/30

- Membership of ANGA Augmented Navigation for Africa includes today the 19 Member States of ASECNA and Seychelles SCAA Seychelles Civil Aviation Authority
- ANGA Augmented Navigation for Africa is supported by JPO SatNav Africa Joint Programme Office for SBAS markets development
- ANGA Augmented Navigation for Africa is a key infrastructure/services solution for the African Outer Space Programme
- ANGA Augmented Navigation for Africa benefits from a tremendous support from Europe European Commission EUSPA esa cnes

**With ANGA Augmented Navigation for Africa, Africa is ready to provide native SBAS services for the end benefit of the African citizens**

ANGA Augmented Navigation for Africa

# ANGA media resources

- ANGA programme video
- Lome SBAS/LPV demonstration for commercial aircraft
- Abuja SBAS/LPV demonstration for commercial aircraft
- Brazzaville SBAS demonstration beyond aviation

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# The African solution for safe navigation

Aviation | Agriculture | Maritime | Land | Geo-location | Drone


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