



ICAO DAKAR



ICAO 2019

75 YEARS OF  
CONNECTING  
THE WORLD

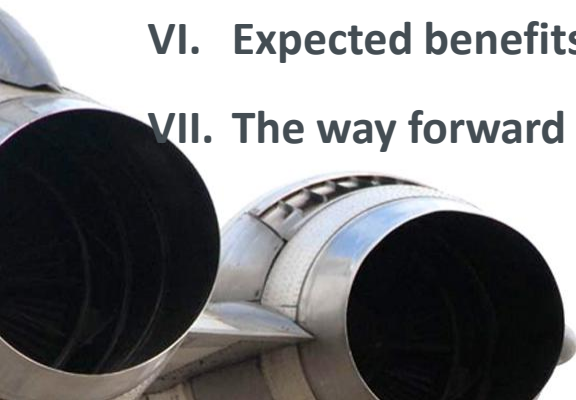
**Twenty-Eighth Meeting of the AFI Satellite Network Management Committee  
(SNMC/28) Abuja, Nigeria 06-10 May 2024**

# **Agenda Item 3: Surveillance data Sharing through AFISNET**

**François-Xavier SALAMBANGA**  
*Regional Officer CNS, ICAO WACAF*



- I. Operational Requirements**
- II. Surveillance data sharing Principles**
- III. Regional Targets**
- IV. Regional initiatives**
- V. Challenges and constraints**
- VI. Expected benefits**
- VII. The way forward**





ICAO DAKAR



ICAO 2019  
75 YEARS OF  
CONNECTING  
THE WORLD

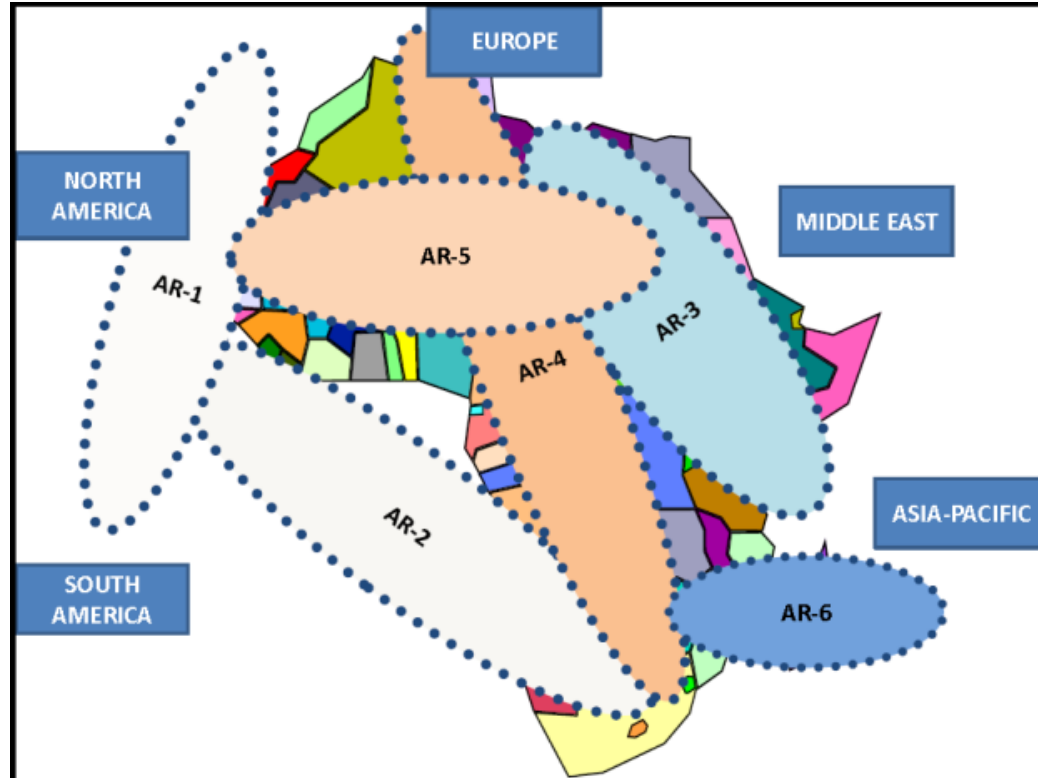


# Operational Requirements





## ATM HOMOGENEOUS AREAS IN THE ICAO AFI REGION





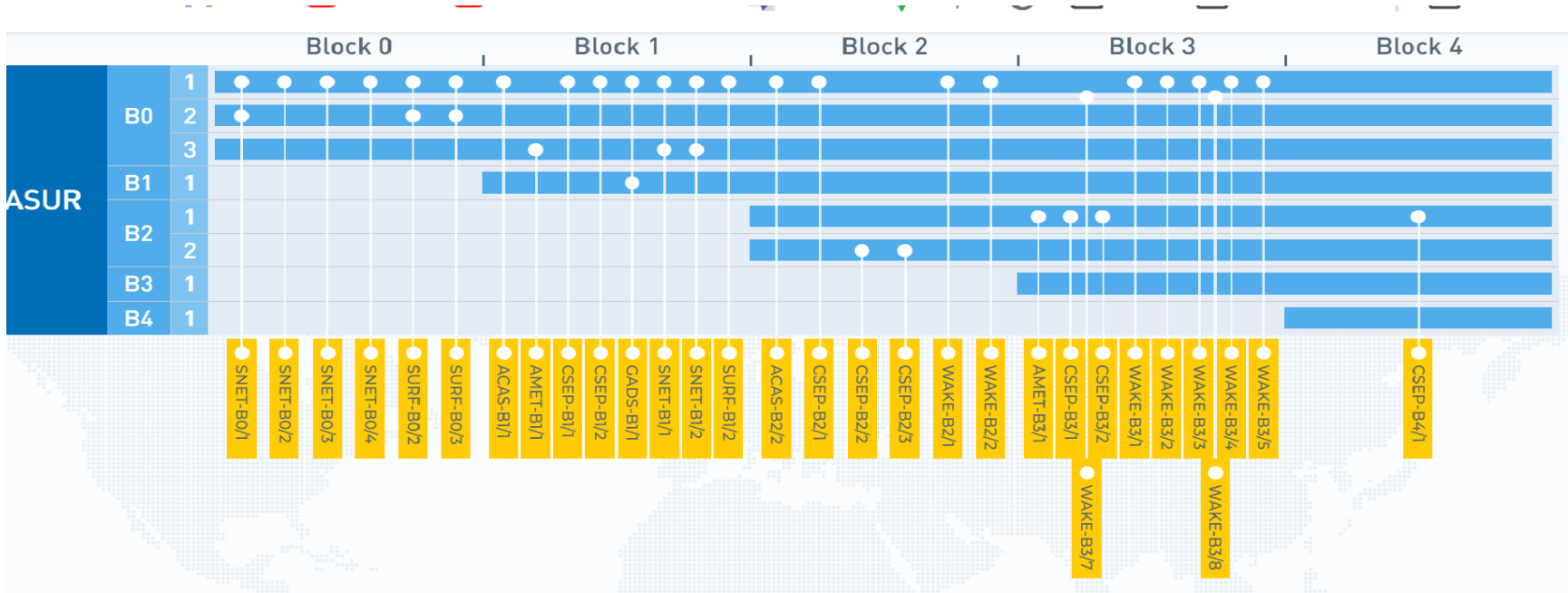
Areas of routing (AR)	Traffic Flows	Areas involved	Type of area covered	Remarks
<b>Africa-Indian Ocean (AFI) Region</b>				
AR1	Europe — South America (EUR/SAM) (oceanic)	Atlantico <sup>1</sup> , Canarias, Casablanca, Dakar Oceanic, Recife, Sal Oceanic	Oceanic en route low density in southern part and oceanic high density in northern part	Major traffic flow EUR/SAM
AR2	Atlantic Ocean interface between the AFI, NAT and SAM Regions	Accra, Dakar, Johannesburg, Luanda, Sal	Oceanic en route low density	Homogeneous ATM area AFI/NAT/SAM
AR3	Europe — Eastern Africa routes including the area of the Indian Ocean	Addis Ababa, Antananarivo, Asmara, Cairo, Dar es-Salaam, Entebbe, Khartoum, Mauritius, Mogadishu, Nairobi, Seychelles, Tripoli	Continental en route/ oceanic low density	Major traffic flow AFI/EUR
AR4	Europe to Southern Africa	Algiers, Beira, Brazzaville, Cape Town, Gaborone, Harare, Johannesburg, Kano, Kinshasa, Lilongwe, Luanda, Lusaka, N'Djamena, Niamey, Tripoli, Tunis, Windhoek	Continental en route low density	Major traffic flow AFI/EUR
AR5	Continental Western Africa including coastal areas	Accra, Addis Ababa, Brazzaville, Dakar, Dar-es-Salaam, Entebbe, Kano, Khartoum, Kinshasa, Nairobi, Ndjamena, Niamey, Roberts	Continental/oceanic low density	Homogeneous area AFI (this is a growing traffic, developing into major traffic flow)
AR6	Trans-Indian	Antananarivo, Bombay <sup>1</sup> , Johannesburg Male <sup>1</sup> , Mauritius, Melbourne <sup>1</sup> , Seychelles	Oceanic high density	Homogeneous ATM area AFI/ASIA



## 23 Key Performance Indicators KPIs 23 Key Performance Indicators KPIs

SUMMARY OF THE GANP PERFORMANCE AMBITIONS “A high performing system by 2040 and beyond”	
KPA	Ambition
ACCESS AND EQUITY	No aviation community member excluded or treated unfairly.
CAPACITY	Nominal capacity easily scalable with demand.
	Disruptive events do not interrupt service provision and do not significantly affect the performance of the system.
COST-EFFECTIVENESS	No increase of total direct ANS cost while maintaining the safety and quality of service.
	Significant increase of ANS productivity, irrespective of demand.
EFFICIENCY	Reduction of the gap between the flight efficiency achieved and the desired optimum trajectory of airspace users.
ENVIRONMENT	ANS-induced inefficiencies to be progressively removed to contribute to the global ICAO aspirational goals for CO <sub>2</sub> emissions.
	To benefit from achieved flight efficiency gains.
FLEXIBILITY	To absorb required changes to individual business and operational trajectories.
INTEROPERABILITY	Essential at an operational and technical level.
PARTICIPATION BY THE ATM COMMUNITY	Pre-agreed level of participation to make the maximum shared use of the air navigation resources.
PREDICTABILITY	No increase in ANS delivery variability including asset availability.
SAFETY	Achieve continual safety performance improvement in aviation in each ICAO region
SECURITY	Zero significant disruptions due to cyber incidents

# GANPDoc. 9750





## ASUR

ASUR-B0/1	Automatic Dependent Surveillance – Broadcast (ADS-B)
ASUR-B0/2	Multilateration cooperative surveillance systems (MLAT)
ASUR-B0/3	Cooperative Surveillance Radar Downlink of Aircraft Parameters (SSR-DAPS)
ASUR-B1/1	Reception of aircraft ADS-B signals from space (SB ADS-B)
ASUR-B2/1	Evolution of ADS-B and Mode S
ASUR-B2/2	New community based surveillance system for airborne aircraft (low and higher airspace)
ASUR-B3/1	New non-cooperative surveillance system for airborne aircraft (medium altitudes)
ASUR-B4/1	Further evolution of ADS-B and MLAT

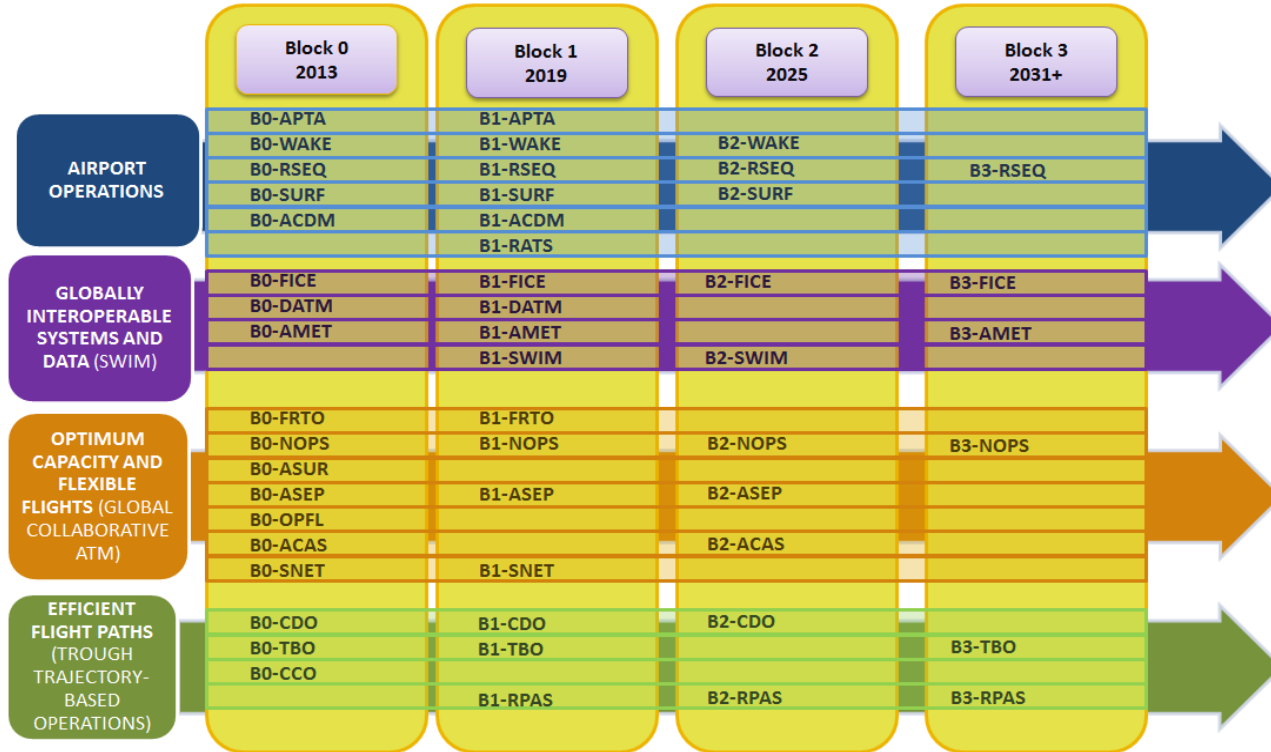




## SNET

SNET-B0/1	Short Term Conflict Alert (STCA)	Operational
SNET-B0/2	Minimum Safe Altitude Warning (MSAW)	Operational
SNET-B0/3	Area Proximity Warning (APW)	Operational
SNET-B0/4	Approach Path Monitoring (APM)	Operational
SNET-B1/1	Enhanced STCA with aircraft parameters	Operational
SNET-B1/2	Enhanced STCA in complex TMAs	Operational

# GANP Timelines





ICAO

UNITING AVIATION

NO COUNTRY LEFT BEHIND



# Surveillance data sharing Principles



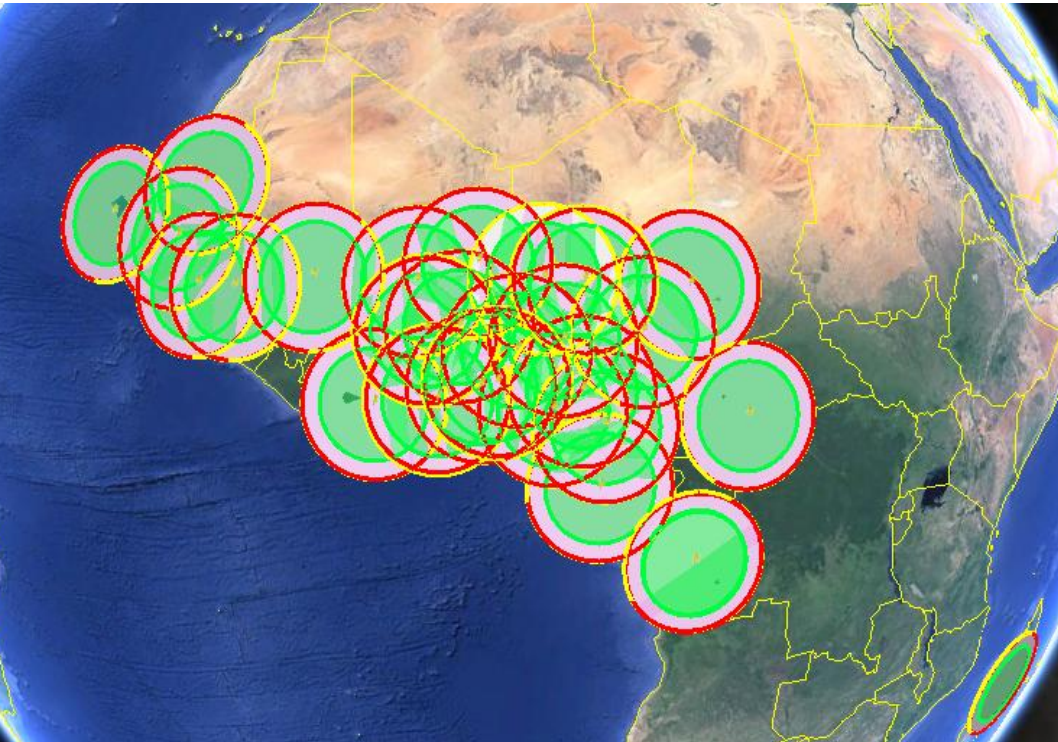
**To provide to an ATU with Surveillance Data from:**

- **Various types of sensors (SSR, ADS-B)**
- **Various sites (ACC, COO..)**

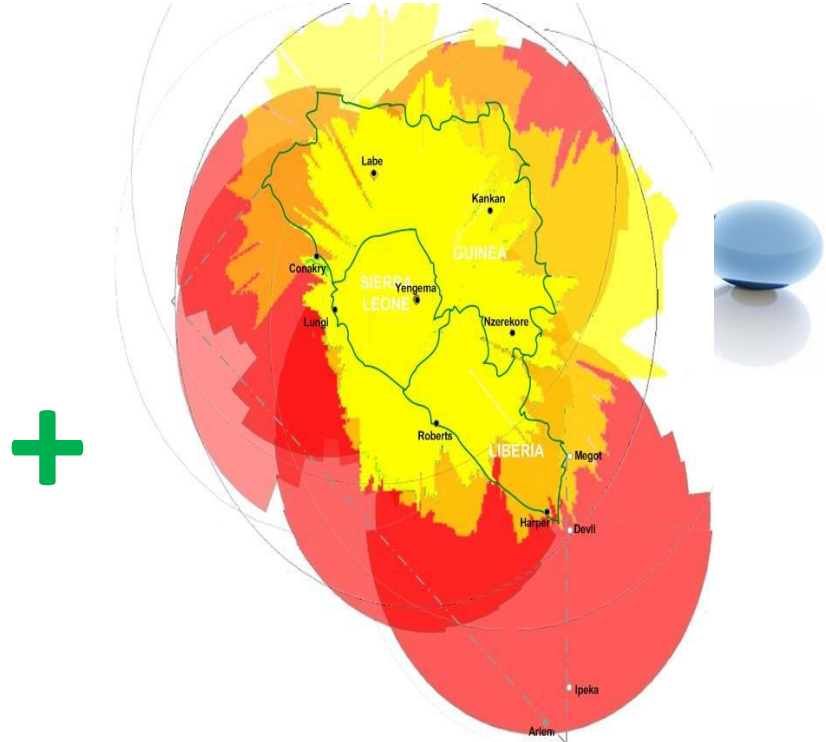




### SSR Coverage ASECNA , ASA, GCAA NAMA



### ADS-B Coverage Robert FIR





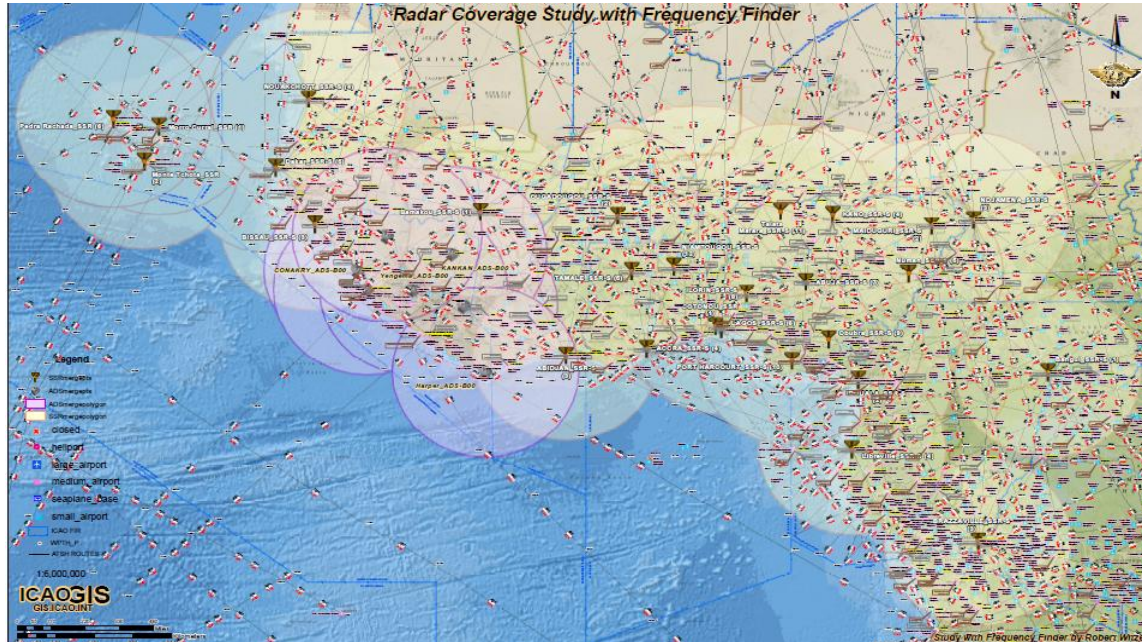
## To Synchronise surveillance Data :

- Coming from various satellite VSAT location
- Subject to multiples overlapping coverage





## Full SSR & ADS-B Coverage over the air space of Gulf of Guinea





- **To display aggregated and shared relevant surveillance Data to ATSU's;**
- **To maintain accurated surveillance shared Data;**
- **To ensure that the shared data exercize meets criteria agreed for service availability**







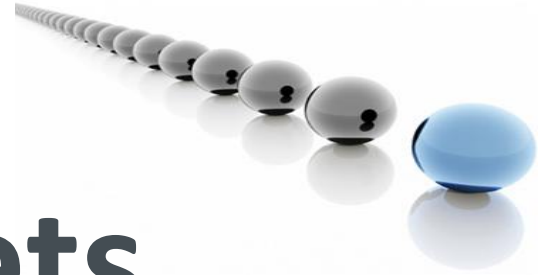
ICAO

UNITING AVIATION

NO COUNTRY LEFT BEHIND



# Regional Targets



## Regional Targets – Surveillance to be updated

### ASBU B0-SURF: Planning Targets and Implementation Progress

Elements	Targets and Implementation Progress (Ground and Air)
<b>1. Surveillance system for ground surface movement (PSR, SSR, ADS-B or Multilateration)</b>	<b>December 2017 Service provider</b>
<b>2. Surveillance system on board (SSR transponder, ADS-B capacity)</b>	<b>December 2017 Service provider</b>
<b>3. Surveillance system for vehicle</b>	<b>December 2017 Service provider</b>
<b>4. Visual aids for navigation</b>	<b>December 2015 Service provider</b>
<b>5. Wildlife strike hazard reduction</b>	<b>December 2015 Aerodrome operator / Wildlife Committee</b>
<b>6. Display and processing information</b>	<b>December 2017 Service Provider</b>



## Regional Targets – Surveillance (To be updated)

### ASBU B0-SNET: Planning Targets and Implementation Progress

Elements	Targets and Implementation Progress (Ground and Air)
1. Short Term Conflict Alert (STCA)	June 2014 / Service provider 2013-2018
2. Area Proximity Warning (APW)	June 2014 / Service provider 2013-2018
3. Minimum Safe Altitude Warning (MSAW)	June 2014
4. Dangerous Area Infringement Warning (DAIW)	2013-2018





ICAO

UNITING AVIATION

NO COUNTRY LEFT BEHIND



# Regional Initiatives



- Taking benefit on AFI States commitment on Safety
  - APIRG Conclusion 16/31: **Collective approach for the Management of CNS/ATM system elements**
- APIRG Conclusion 19/39: Development of integrated programmes based on major ATM Routing Areas and Air Traffic Flow
- Taking benefit on Existing mature implemented services and facilities (AFI VSAT Communication, infrastructure, SSRs and ADS-C/CPDLC, AMHS, RVSM, PBN programme)





**Workshop on the Interconnection of Aeronautical Surveillance Systems**  
**Dakar, 14 – 16 April 2014**



- **Identification of existing surveillance technologies in Area of Routing 5 (AR-5)**
- **Identification of opportunities for the interconnection of surveillance systems in the AFI Region (example for Areas of Routing 5 (AR-5) & 6)**
- **Tentative planning for surveillance Data Sharing**



## Coordination Meeting on the implementation of AIDC and Surveillance Data Sharing Lomé, Togo, 27-29 April 2016

- Identified/Confirmed Surveillance Coverage (SSR Mode S & ADS-B);
- Decided to share Surveillance Data via point to point SATCOM links in priority and assess on case by case basis any other solution;
- Agreed on the principle of a project to be tailored in order to implement surveillance data sharing on a step by step basis with periodic assessment;
- Decide for a short term trials exercise that should be conducted by 31 December 2016.





# Challenges and Constraints







# Building One sky to provide a seamless ANS

## Context

- Air Transport : key stakeholder in a huge continent
- Air Transport in Africa: **3-5%** of the Global Market
- For next two decades
  - Annual Growth estimated trend: **5,9%** Vs **4%** for Global growth
  - **125** Millions PAXs to **377** Millions PAXs
- Air Transport based on Safety of life

## Challenges

- Need for Efficient and cost effective utilization of airspace
- Weakness of internal industry
- Various national purchasing processes
- Threat of emerging technologies on Civil Aviation system (spectrum, cyber security)

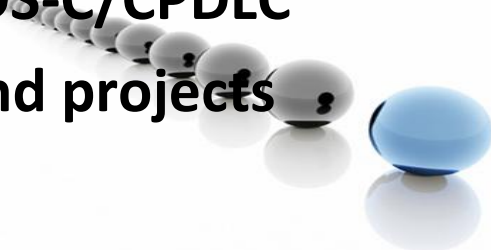




## Building One sky to provide a seamless ANS

Currently: Good pace of implementation of SSRs, ADS-C/CPDLC

- Lack of harmonization of implementation plans and projects
- Lack of interconnectivity and data sharing
- Challenge: How to insure seamless surveillance function along A-R?
- **Awaited requirements from ATM: Separation minima criteria along A-Rs**





- **Taking benefit on AFI States commitment on Safety**
  - **APIRG Conclusion 16/31: Collective approach for the Management of CNS/ATM system elements**
- **APIRG Conclusion 19/39: Development of integrated programmes based on major ATM Routing Areas and Air Traffic Flow**
- **Taking benefit on Existing mature implemented services and facilities (AFI VSAT Communication, infrastructure, SSRs and ADS-C/CPDLC, AMHS, RVSM, PBN programme)**
- **SNMC Conclusions/Decisions**



ICAO

UNITING AVIATION

NO COUNTRY LEFT BEHIND



# Expected Benefits





## Safety

- Detection and mitigation of risk of conflict
- Easier coordination between ATCs
- Contingency capability

## Capacity

- Reduction of minima of separation
- Flexible tracking (CCO, CDO, PBN)
  - ✓ *Adequate planning*
  - ✓ *Increased capacity of ATCs*





## Efficiency

- **Regularity**
- **ATFM**
- **Preferred users routes (FLS/Trajectories)**
- **Regular/continuous surveillance capability**



## Environment

- **Reduced fuel consumption & CO2 Emission**
- **Reduction of noise**



## Economic impact/Cost effectiveness

- Reduced additional investment
- Reduced operations costs for stakeholders
- Reduced Maintenance costs
- Reduced Fuel quantity and cost
- Increase income for ANSPs





## Institutional

- **Sub Regional Integration**
- **Sharing of Best Practices**
- **Enabling and empowering Capacities**







ICAO

UNITING AVIATION

NO COUNTRY LEFT BEHIND



# The Way forward





# Where are we?



- Sub Regional Agreement through a MoU between ASECNA, GCAA, NAMA, the Roberts FIR April 2018;
- MoU Annex 6-Agreement for the shared use of Surveillance data between ASECNA, GCAA, NAMA, the Roberts FIR;
- Agreement on the principle of prefunding the project by an ANSP on a cost recovery basis;
- ASECNA volunteered, prefunded and purchased equipment;
- Training provided to technical personnel of ASECNA, GCAA, NAMA and Roberts FIR
- COVID-19 outbreak postponed the installation



# Where to go?



- Satellite spectrum to be secured;
- Refreshment training for technical personnel may be necessary;
- Coordination for installing equipment and conducting trials;
- Operational and technical LoAs to be developed/ revised.



# Where to go?



- Awaited requirements from ATM
- ✓ Separation minima criteria along A-Rs and along routes;
- ✓ Surveillance service requirements;
- ✓ Operational coordination requirements;
- Operational and technical LoAs alignment when developed/revised.



## Conclusion

- **The Seamless ATM provision requires Surveillance capability to support PBN, CCO, CDO implementation to ensure agreed level of separation minima;**
- **Aeronautical Surveillance Systems interconnection can be a solution for seamless surveillance capability**
- **Need of Regional coordination;**
- **Need of Interregional coordination (AFI/EUR);**
- **Need of updated data on SSR Mode S ground stations**
- **ICAO Regional Offices and HQs are working to assist States harmonize their implementation projects**



**François-Xavier SALAMBANGA**  
 Regional Officer CNS, ICAO, WACAF Office  
 Tel Direct : +221 33 869 24 15  
 E-mail : fsalambanga@icao.int  
 Route de l'Aéroport, Aéroport  
 International Leopold Sedar Senghor  
 Bp : 2356 Dakar -Yoff, Senegal

THANK YOU!

