ICAO

Air Traffic Management



CNS Infrastructure


Airport Operations


AFI Air Navigation Report (AANR)

Aeronautical Information Management

Aviation MET

First Edition, November 2022

PREPARED BY THE SECRETARIAT OF APIRG WITH THE ASSISTANCE OF APIRG MEMBERS

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1.5.1. Africa Air Passenger Traffic Outlook

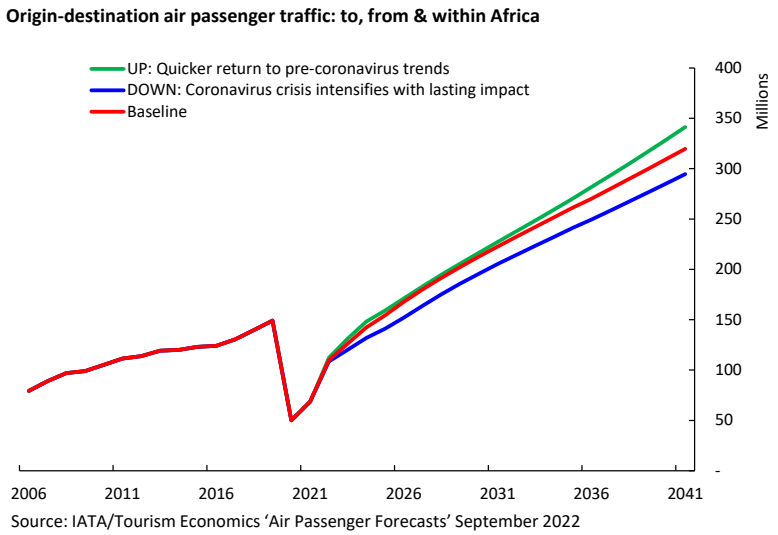
- Over the next 20 years the number of airline passengers travelling to, from and within Africa is expected to more than double, and possibly triple from 2022.

- Current trends in the economy and aviation policy look set to deliver a passenger market back to its 2019 level by 2025, and will reach 2.9x as large as 2022 in 20 years forecast horizon (the red line in Chart 1).

- Even on the downside scenario, where coronavirus crisis intensifies with lasting impact (the blue line in Chart 1), the underlying drivers of air travel in Africa are projected to bring the number of passengers back to pre-pandemic level by 2026, and to more than double passenger traffic in 2022 by the end of 2041.

- On the upper side, if a quicker return to pre-coronavirus trend is to be realized, then air passenger markets could more than triple in size (the green line in Chart 1).

Chart 1. Air passenger traffic to, from & within Africa forecast to more than double



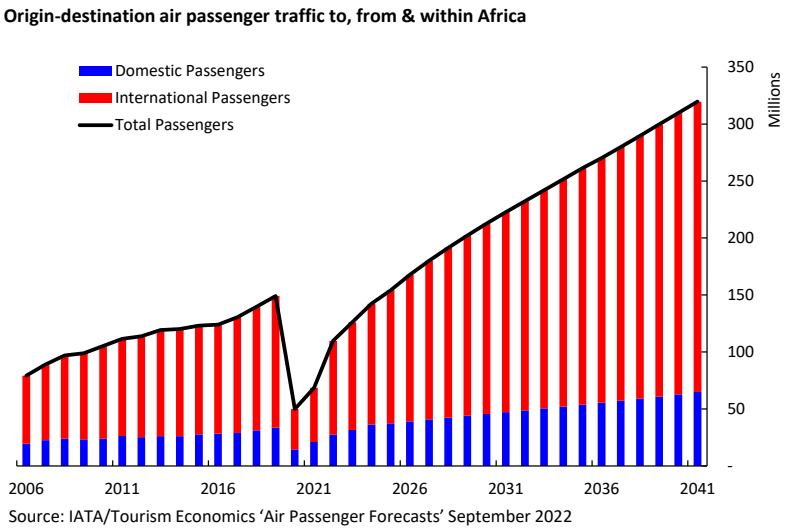
Source: IATA/Tourism Economics 'Air Passenger Forecasts' September 2022

- In line with the post-pandemic recovery, the air passenger traffic is expected to rebound. Among them, domestic passenger traffic is expected to increase by 31% from last year, while international passenger traffic is expected to increase by 73%, buoyed by the recovery of global economy. Indeed, in the 20-year forecast horizon, international air passenger traffic is expected to lead the growth, whose share in total air passenger traffic is expected to reach 80% (Chart 2).

- On the country level, South Africa is expected to recover to pre-pandemic level in 2024, and is expected to reach 2.9x as large as 2022 in the next 20 years. Other large markets including Egypt and Morocco in North Africa will also more than double from 2022, while Algeria will rise to four-folds as large in the forecast horizon (Chart 3). The four countries cover more than half of the total Africa air passenger traffic. Most of the Sub-Sahara Africa countries are forecasted to recover to pre-pandemic levels between 2024 and 2026, except that Congo Republic expected to recover earlier than its peers by 2023 (Chart 4 and Table 1).

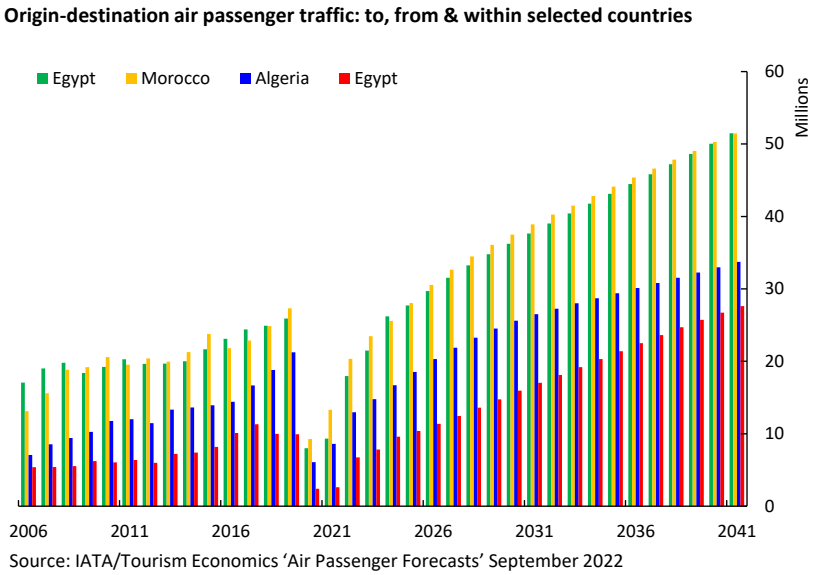
- The increase in air service connections between cities in Africa and to major cities outside the continent will bring both value to consumers and economic development, through the resulting flows of trade, investment and tourism.

Chart 2. International passengers leading the growth in total air passenger traffic



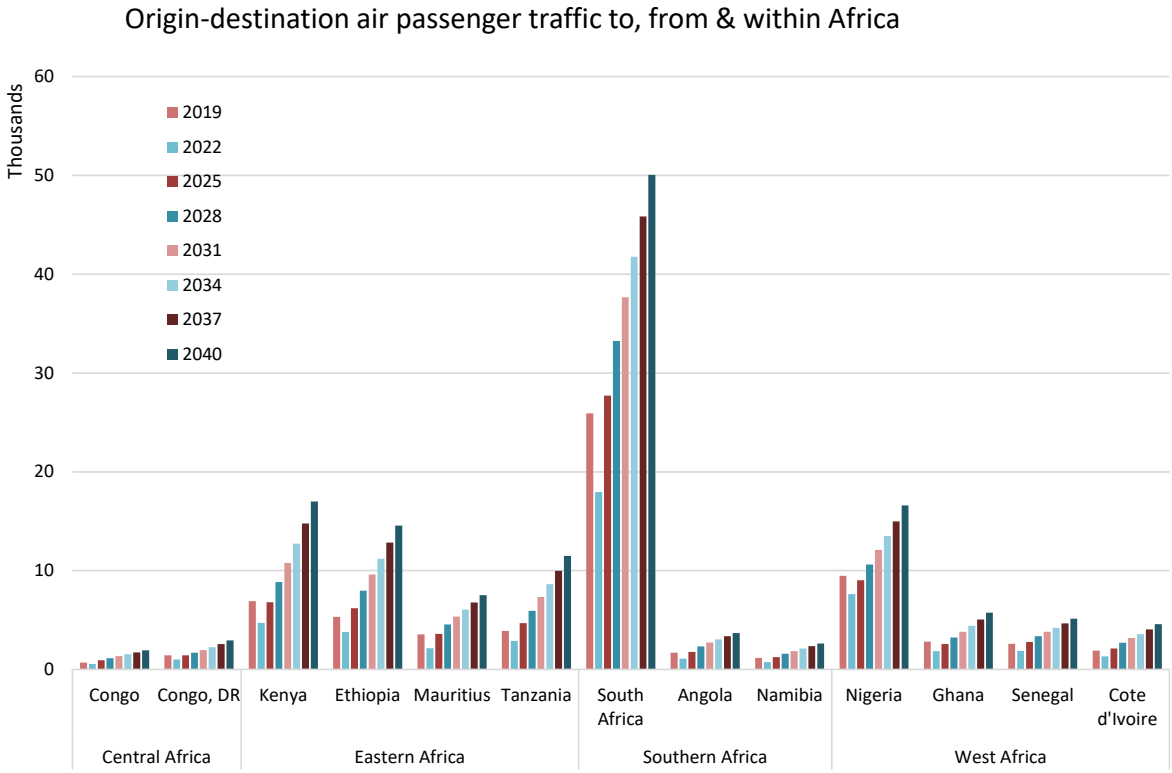
Source: IATA/Tourism Economics 'Air Passenger Forecasts' September 2022

Chart 3. Major North Africa markets expected to more than double in the next 20 years



Source: IATA/Tourism Economics 'Air Passenger Forecasts' September 2022

Chart 4. Major Sub-Sahara Africa markets expected to more than double in the next 20 years



Source: IATA/Tourism Economics Air Passenger Forecasts' September 2022.

Table 1. Year to recover to pre-pandemic levels for Sub-Sahara Africa countries

		Year to recover to pre-pandemic levels
Central Africa	Congo	2023
	Congo, DR	2025
Eastern Africa	Kenya	2026
	Ethiopia	2024
	Mauritius	2025
	Tanzania	2024
Southern Africa	South Africa	2024
	Angola	2025
	Namibia	2024
West Africa	Nigeria	2026
	Ghana	2026
	Senegal	2024
	Cote d'Ivoire	2024

1.6.Structure of the Report

2. Regional Air Navigation Priorities, Targets and Achievements

2.1.Abuja Safety and Air Navigation Targets

2.1.1. Implementation status of the Abuja safety targets (AST), incorporating AFI air navigation services performance indicators (ANS PIS) – December 2021.

2.1.1.1. Highlights on Status of Implementation

The qualitative analysis of available data was based on submissions by AFCAC Member States and supplementary data from IATA and ICAO iSTARS. This resulted in the observations summarized in **Table XX** below. The report on status of implementation of the Abuja Safety Targets for 2021 was summed up using baseline information provided by member States in for 2020 and additional information for year 2021 (see **Figure XX** below).

Figure XX: Status of implementation of the Abuja Safety Targets for December 2021.

Based on summed up points for each target, the average level of implementation for member States was **47%,** and this was below the target of 60%. This percentage point (47%) was the same compared to 2020 performance, since member States could not do much in terms of systems upgrade due to low level of flights conducted as a result of COVID-19 pandemic.

Further analysis of the 2021 performance resulted in the following observations:

- African States average EI as at 31 December 2021 was **57.82%** compared to **56.64% in 2021 indicating** a positive marginal increase of **1.18%.**
- Comparatively low level of implementation of air navigation related targets (ASTs) : –

AST # 14 – Implementation of ASBU B0 Modules – average **40%** (compared to the desired 60%)

AST # 13 – Establishment of seamless Air Navigation Services in the AFI Region – average **41%**;

AST # 10 – Implementation of the transition from AIS to AIM – average **15%**;

AST # 11 – Implementation of the PBN procedures for all instrument runways – average **75%**.

2.1.2. The Revised Abuja targets are captured in Table xx in Appendix 2.1.1 to this report.

2.2.ASBU Modules Categorization and Prioritization

2.3.Airports Operations Planning (AOP)

The AOP as a Sub Group is mandated by Airspace and the Aerodrome Operations Subgroup (AAO SG) of APIRG to carry out implementation projects in support of States areas of AOP in accordance with the ASBUs methodology and as guided by the Regional performance objectives, to support States in the implementation of SARPs and regional requirement.

Various projects are currently being implemented under the ASBU framework such as Aerodrome Certification, Runway Safety while two more namely; ACDM and Training and Qualification of Regulators and Aerodrome personnel are under development.

The priorities of the AOP are to ensure implementation of the Project as well as specific related conclusions and decisions as guided in the APIRG Procedural handbook which require that:

AOP ensures environmental initiatives related to Airport Operations and Planning are consistently identified and progressed, and report outcomes on the initiatives appropriately; as well as identify and collect, State by State, information on deficiencies in the areas of AOP in accordance with the Uniform Methodology approved by Council and the APIRG guidance; analyze and propose solution; report on progress and obstacles beyond the capacity of the sub-group.

The AOP Subgroup aims to ensure that deficiencies at aerodromes are identified and addressed in a systematic manner and the identified modules on ACDM in accordance with the 6th edition of the GANP is implemented in all the AFI States Aerodromes.

2.3.1. Aerodrome Certification

Various initiatives have been undertaken under the No Country Left behind initiative to increase the Aerodrome Certification Status in the AFI Region. By June 2022, 44.4% (28 airports over 63) for ESAF and 28% (15 airports over 54) for WACAF. Some of the identified key challenges slowing down the progress of Aerodrome Certification in AFI are inadequate training and qualification of aerodrome experts, the cost of the certification activities, and organizational issues.

However, in the midst of all these Zambia has made progress. After being assisted under the AFI Plan project to certify one International Airport in Lusaka, the State has Certified four more and build internal capacity to do so.

The ICAO ESAF Office has also conducted workshops to sensitize States on the need and Process for Aerodrome Certification. In May 2022, a workshop jointly organizes by ICAO ESAF and CASSOA was hosted by Kenya where ninety five (95) participants from the Five East African States namely; Kenya, Uganda, Tanzania, Burundi , Rwanda and South Sudan participated in sharing experiences and best practices on aerodrome Certification. A similar State specific workshop was conducted by the ESAF Office for Uganda in August 2022.

Aerodrome Certification workshop participants at training venue and at the taxiway at Jomo Kenyatta International Airport- Nairobi KENYA during the workshop held in May 2022

The SADC States have organized an Aerodrome Certification workshop to be facilitated by the ICAO ESAF Office in January 2023 to be hosted by South Africa. Similarly, the ICAO ESAF Office and WACAF office held a Hybrid workshop in October 2023 for Cameroon and Djibouti under the AFI plan with experts from Senegal and Burkina Faso as Donor States.

2.3.2. Basic Building Blocks

Zambia Constructed a new Green field international Airport In Ndola to Replace the existing Ndola Airport. The New Simon Kapwepwe International Airport has gone through the five phases of Certification and a PFA has been initiated for it to be included in the next edition of the AFI ANP. Angola has recently upgraded the Runways, Taxiway and Apron at Luanda Airport and recruited more than one hundred and fifty RFFS personnel who are getting trained on site by experts from Brazil with plans to take them for more specialized training outside the country. Angola is also in the process of acquiring new RFFS equipment with all the personnel recruited having been issued with PPEs for RFFS purposes.

New Simon Kapwepwe International Airport in Ndola Zambia (Control tower and terminal building)

In 2020/2021 Uganda resurfaced the primary runway and extended the Apron at the Entebbe Airport and is in the process of installation of new signage.

On 16-19 August 2022 ICAO ESAF conducted a training workshop on Airport Master planning for Green Airports in Kigali Rwanda where States participants from the Civil Aviation Authority, Rwanda Airlines, Ministries of Environment, Ministry of Water and the State Military attended. This training was aimed at impacting knowledge and skills to the participants to effectively plan for the proposed new international Airport in Rwanda.

Expert from Zambia carrying out Aerodrome Certification assistance mission in Botswana

2.3.3. Global Reporting Format for Runway Surface Conditions (GRF)

The applicability date for GRF was 4th November 2021 after being extended by 1 year from 5th November 2020 due to COVID 19. States have rushed to ensure implementation of the GRF. By August 2022, the Status of implementation of GRF was at 29% for WACAF States and 55% for ESAF States. States have been to ensure full implementation of GRF and address any challenges that are hindering the progress.

2.4.Air Traffic Management (ATM)

2.4.1. Performance – Based Navigation (PBN)

The Abuja Safety and ANS Target number 11 is on Performance Based Navigation (PBN). The Target required that all States implement PBN procedures for all instrument runways. It required:

- ✓ 75% of Instrument Runways to have PBN procedures by end of 2020;
- ✓ 100% of Instrument Runways to have PBN Procedures by end of 2025.

Available information indicated that 33 out of 48 RASG-AFI States attained target of 100 percent PBN implementation, representing 68.75 per cent. *(Source – ICAO iSTARS)*

As indicated by the results, although group average is high, a number of States have not initiated PBN procedures for their instrument runways. There is need for effective coordination amongst key stakeholders and appropriate regional interventions are required to ensure effective implementation of this target.

2.4.2. CCO and CDO

2.4.3. RVSM Airspace

A Reduced Vertical Separation Minima (RVSM) of 300 m (1000 ft) between FL 290 and 410 inclusive was safely and successfully implemented in the Africa-Indian Ocean (AFI) airspace on 25 September 2008. The AFI RVSM Post-Implementation Safety Case (POSC), a major deliverable by the AFI RVSM Safety Policy, a follow up from the AFI RVSM Pre-Implementation Safety Case (PISC), was accepted by APIRG/16 held in Rwanda 2007, it then forwarded to the ICAO Air Navigation Commission for consideration. It aimed to show by means argument and supporting evidence that the on-going application of the ICAO RVSM concept in the AFI Region satisfies the key AFI RVSM Safety Objectives set out in the AFI RVSM Safety Policy.

The Africa-Indian Ocean Regional Monitoring Agency (ARMA) is the designated RMA for the provision of monitoring and safety assessment activities in 48 States. Canarias, Sal Oceanic and Dakar Oceanic FIRs were not included in the scope, as RVSM was implemented in this airspace ahead from rest of the AFI Region, under the scope of South Atlantic Monitoring Agency (SATMA) which is responsible for providing post implementation safety assessment in that area. In 2014, Algeria made application to be accredited to the EUR RMA to join the States of Morocco and Tunisia. In 2018 the transfer process was completed and ARMA was responsible for the provision of monitoring and safety assessment activities for 27 FIRs.

The list of States and FIRs in the scope of ARMA is provided in *Appendix A* to this report.

Figure 1: Summary of available data for AFI RVSM CRA 16 2021 submissions

Key:

Colours represent the following. ***Green:*** *information was available and could be successfully processed.* ***Black:*** *no data submitted (Eritrea and Malawi)* ***Red:*** *States part of the MIDRMA.* ***Blue****: States part of EURRMA*

The AFI Tactical Action Group (TAG) is a multidisciplinary group established under the authority of the ICAO Special AFI RAN 2008 aiming to carry out on-going safety assessment of operations in the AFI airspace above FL290 by addressing the identified problems in the air navigation system on a tactical, short-term basis. This includes the collection, compilation, discussion, classification, and directed action in relation to Unsatisfactory Condition Reports (UCR). TAG concept encompasses all safety risk bearing events that are received from system users, ANSPs, pilots, air traffic controllers and/or the public.

The AFI TAG works in close coordination with the ARMA in the discharge of its duties. It contributed, from the provision of the data on reported safety occurrences (UCRs) and the unique and representative field of expertise of its members which include ICAO Headquarters in Montreal, WACAF and ESAF Regional Offices, ARMA, IATA, ASECNA, ATNS South Africa, Kenya, IFALPA and IFATCA. The ARMA Scrutiny Group was recommended by the ICAO Special AFI RAN 2008 under its Recommendation 6/6, in order to monitor and analyze operational errors and deviations in the AFI RVSM airspace and propose mitigation measures to control them. These include all RVSM incidents in the vertical plan and Large Height Deviations (LHD) data for incorporation into the various Collision Risk Assessments (CRAs).

States are sovereign and responsible for meeting their obligations in terms of the Convention on International Civil Aviation (Doc 7300) and in Annexes establishing international Standards and Recommended Practices (SARPs). In the RVSM context, such obligations include the operation of aircraft and operator approval processes, as per ICAO Annexes 2 and 6, and the provision of appropriate air traffic services in the airspace under their jurisdiction, together with the implementation and operation of State Safety Programme (SSP) and Safety Management System (SMS), as per ICAO Annex 11.

States are therefore, ultimately responsible for managing the safety of the on-going RVSM operations in their airspace. This responsibility includes the production of State-level post-implementation safety cases, as part of the ATS performance safety monitoring, and the reporting of operational errors and traffic data to ARMA. Where the responsibility for upper airspace have been delegated to Air Navigation Services Providers (ANSPs), the latter are responsible for carrying out their own RVSM post-implementation safety assessment as part of their SMS activity. States are responsible for overseeing this assessment in the framework of their State Safety Programmes (SSPs) activities.

As one of its core functions, the ARMA maintains the AFI Height Monitoring database and has a GMU Height Monitoring Service provider that monitors airframes that are restricted to AFI or that do not fly over the HMU installations in Europe. The AFI Height Monitoring plan is available on the ARMA website.

Over the 14 year period there has been a lot of improvements in the AFI Region regarding RVSM Airspace Safety Monitoring. States participation improved from only 14 out of 27 Flight Information Regions making Data Submissions to having 25 out of 27 Flight Information Regions submissions for the 2021 assessment year, to the increased population of RVSM Airspace Users and the compliance of ICAO Annex 6 Standard, Operation of Aircraft for Long Term Minimum Monitoring Requirements. ARMA has also developed a website which will assist users to have access to RVSM and Performance Based Communication and Surveillance (PBCS) information.

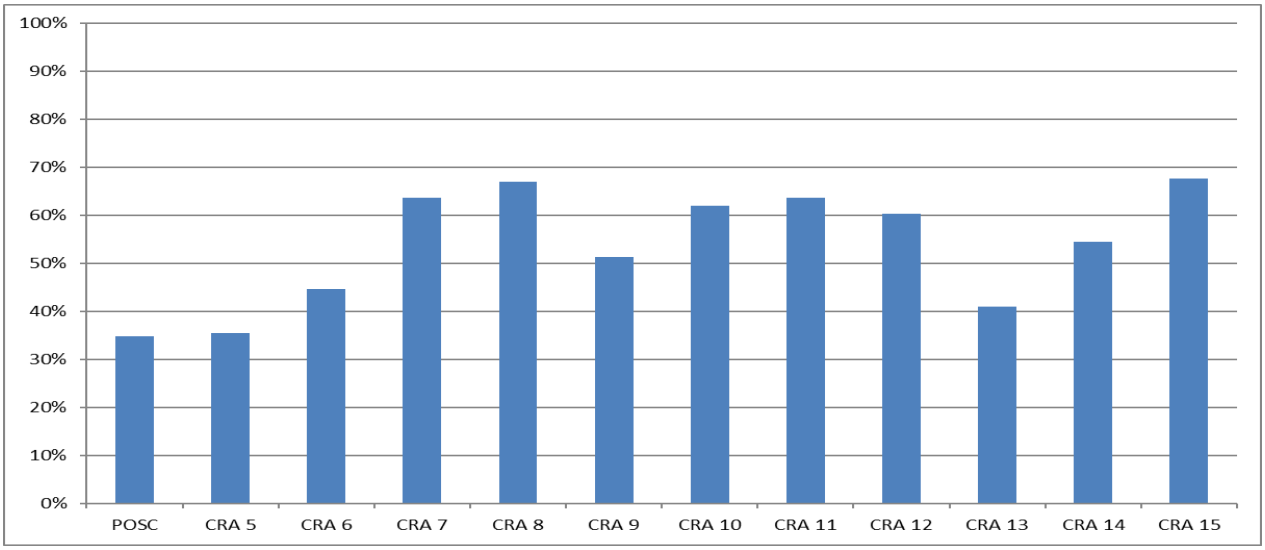


Figure 2: Histogram of the percentage of submitted and processed Form 4 data for the successive post-implementation CRAs under AFI RVSM

CRA	N_{az}^{total}	TOTAL VERTICAL TLS EXCEEDED BY A FACTOR OF
CRA 15 2020	71.9×10^{-9}	**14**
CRA 14 2019	10.9×10^{-9}	**2.2**
CRA 13 2018	75.4×10^{-9}	**15.0**
CRA 12 2017	58.6×10^{-9}	**11,7**
CRA 11 2016	36.4×10^{-9}	**7.3**
CRA 10 2015	141.2×10^{-9}	**28.2**
CRA 9 2014	63.7×10^{-9}	**12.7**
CRA 8 2013	31.4×10^{-9}	**6.3**
CRA 7 2012	8.0×10^{-9}	**1.6**

Figure 3: Nine-year comparison of the post-implementation CRAs under AFI RVSM

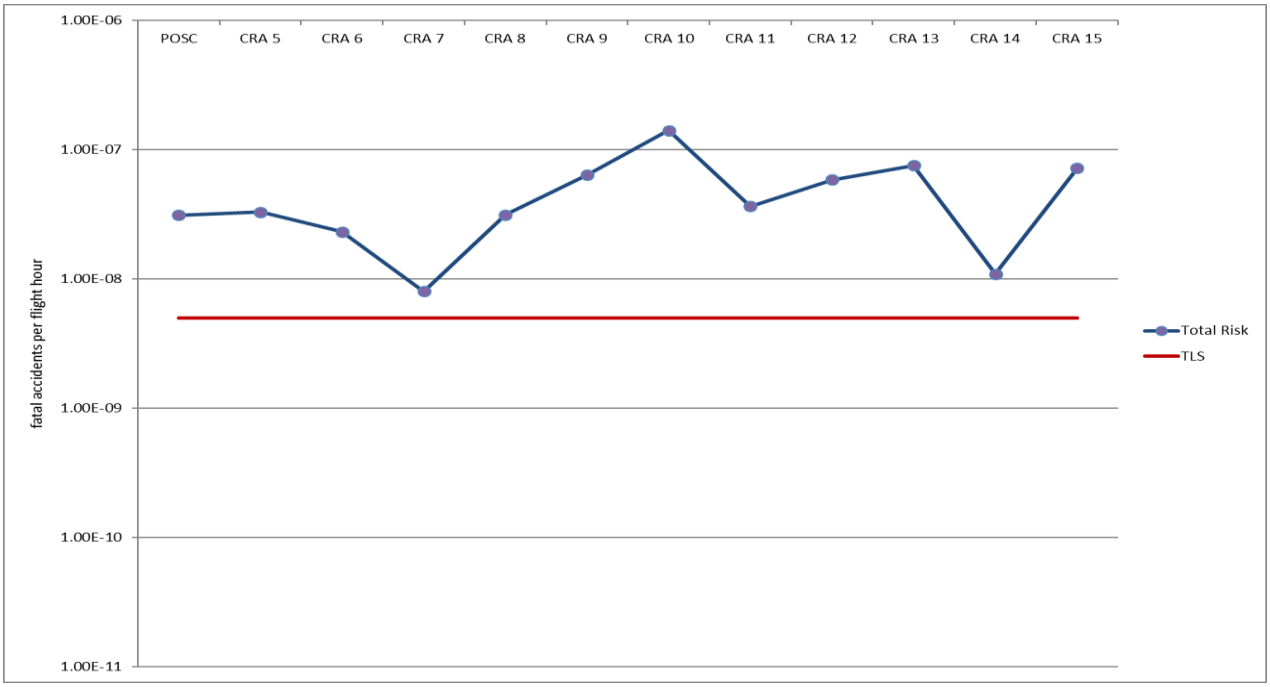


Figure 4: The total vertical collision risk estimates of the successive post-implementation CRAs on a normal scale (top figure) as well as on a logarithmic scale (bottom figure). The red horizontal lines indicate the TLS of ***5.0 × 10^{-9}*** *fatal accidents per flight hour*

Challenges

The AFI region continue to face a number of challenges related to RVSM, these include:

- ✓ Full Implementation of Strategic Lateral Off-Set Procedure (SLOP) in the AFI region is still pending, five States are yet to implement SLOP in their respective flight information regions.
- ✓ State-level practices and procedures related to the handling of non-RVSM civil aircraft in RVSM airspace require improvement; States need to put in place mechanism for ensuring the monitoring at state level.
- ✓ That States' discipline with regard to RVSM approvals and traffic flow data reporting through ARMA operating procedures should be improved, some States still have challenges submitting all the 12 months data of the assessment year.
- ✓ Continuous compliance with Annex 6 for Long Term Minimum Monitoring Requirements. Some States have 0% compliance while there are States like Togo, Seychelles, Senegal and Eswatini with 100% height monitoring compliance Levels for all their RVSM operating airframes which are registered in the AFI and Global RVSM Database.
- ✓ Most States still struggle with the use of F2 form; use of the new endorsed RVSM/PBCS form should be encourage as only 4 out of 48 States fully utilizes the new F2 forms.
- ✓ An updated list of RVSM Focal points remain a challenge; correct focal point for each of the 48 AFI States require to be updated and maintained.
- ✓ Skill/Knowledge transfer; when changes are made to the National Project Managers (old NPM to new NPM), knowledge is often not transferred.
- ✓ Reporting fatigue, number of reports on RVSM events have reduced, it is not necessary an indication of no events have occurred but it could be the lack of a Just Culture and reporting fatigue because of the same occurrence with no corrective/mitigating actions taken by States.
- ✓ Trans-regional Large Height Deviation (LHD) especially at the intersection with the MID region (Eritrea, Ethiopia, Djibouti, Somalia and Yemen) remains a major challenge.
- ✓ As the AFI Height Monitoring processes are valid, States/CAAs and aircraft operators must comply with the applicable height monitoring requirements, many are still not doing so.
- ✓ Lack of Policies to guide States on how to handle RVSM and PBCS non-compliance.
- ✓ Meeting of the ICAO RVSM Target Level of Safety(TLS) **5 X 10^{-9} ,** this remain a major challenge as the implementation of SLOP and collection of 100% RVSM data is yet to be realized.

2.4.4. PBCS

2.4.4.1.Objective

The performance-based communication and surveillance (PBCS) concept provides objective operational criteria to evaluate different and emerging communication and surveillance technologies, intended for evolving air traffic management (ATM) operations. The PBCS also provides a framework in which all stakeholders (regulators, air traffic service providers, operators, communication service providers (CSP), and manufacturers) continue to collaborate in optimizing the use of available airspace while identifying and mitigating safety risks.

2.4.4.2.PBCS implementation in the AFI Region

Performance-Based Communication and Surveillance (PBCS) implementation in the Africa-Indian Ocean region (AFI) is still under development. Although some AFI registered aircraft operate in region where PBCS is implemented mainly across the Atlantic into the Americas, the number of AFI States which have established the approval process are few.

The Twenty Second Meeting of the AFI Planning and Implementation Regional Group (APIRG/22) held in Accra Ghana, on 29 July 2019 – 2 August 2019, formed Conclusion 22/12 with regards to the establishment of the AFI Performance-Based Communication and Surveillance (PBCS) Monitoring. Performance-Based Communication and Surveillance (PBCS) operational approvals for Required Communication Performance (RCP) 240 and Required Surveillance Performance (RSP) 180 will be required for the application of reduced horizontal separation standards within portions of the Africa -Indian Ocean Region. At implementation, Aircraft operators need to obtain approvals from the appropriate State Authority/State of Registry to qualify their CPDLC performance against RCP240 and their ADS-C performance against RSP180. These approvals will allow them to indicate eligibility in their flight plans to use the reduced horizontal separation standards PBCS implementation in the Africa-Indian Ocean Region.

The AFI Regional Monitoring Agency (ARMA), along with the other RMAs around the world, are assisting the PBCS implementation with regards to collecting and maintaining the additional approvals, as well as supporting reports of aircraft with observed poor performance. The established lines of communication between States and RMAs is the most efficient and effective mechanism for Air Navigation Service Providers (ANSPs) that have identified performance issues to communicate with the States of operators throughout the world. Once State Authorities have these policies in place they should start providing the RCP240 and RSP180 approval information to the ARMA along with the RVSM approval information. Information required to process and maintain PBCS approvals is detailed in the attached ARMA **Form F2 "Record of Approval to Operate in AFI RVSM and PBCS Airspace."** The PBCS approval information should be provided to the ARMA with the RVSM approval information.

There have been concerns identified regarding the readiness of State Authorities to have policies in place to issue the necessary approvals. All State Authorities that currently issue RVSM approvals should assess whether their operators that are using data link will require RCP240 and RSP180 approvals. States that have started issuing RCP/RSP Approvals are Malawi, South Africa, Ethiopia and Tanzania. The below survey was developed to provide guidance to States in order to enable them confirm their status of implementation.

Instructions: States to complete the Survey and return by email to the ICAO Africa Indian Ocean Regional Monitoring Agency(ARMA) to determine readiness for PBCS Implementation				**Y/N**	**If NO, Planned Date**
2. Does your State submit data link problem reports to a recognized AFI Regional Monitoring Agency (ARMA)					
3. Does your State monitor and analyze data link performance in accordance with the following specifications and report the analysis to a recognized FANS Interoperability Team (FIT)?					
Communication	Normal	RCP240	FANS1/A CPDLC		

Specifications & Interoperability Standards	Alternate	RCP400	SATVOICE		
		RCP400	HF		
Surveillance Specifications & Interoperability Standards	Normal	RSP180	FANS1/A ADS-C		
	Alternate	RSP400	SATVOICE		
		RSP400	HF		
4. Has your State implemented or planned to implement the following performance-based horizontal separation minima?					
Navigation Specifications & Applicable ATM Operations	RNAV/RNP	RNAV/RNP 10	50 NM Lateral Separation		
			50 NM Longitudinal Separation		
		RNP 4	30 NM Longitudinal Separation		
			30 NM Lateral Separation		
			23 NM Lateral Separation		
		RNP2	30NM Climb-Descend Through		

Instructions: States to complete the Survey and return by email to the ICAO Africa Indian Ocean Regional Monitoring Agency (ARMA) to determine readiness for PBCS Implementation				**Y/N**	**If NO, Planned Date**
1. Has your State completed any of the following preparations for PBCS implementation?					
	Task Group	**Task ID**	**TAK Descriptor**		
PBCS Implementation Task List	Group A	A-1	AIP (Prescription of an RCP/RSP specification. Also see B-3 below)		
		A-2	PBCS policies, objectives supporting safety oversight of ANSP PBCS operations		
		A-3	PBCS policies, objectives supporting safety oversight of Aircraft Operator and Aircraft System PBCS operations		
		A-4	Proposal for Amendment to ICAO Doc 7030 - *Regional Supplementary Procedures* for PBCS operations , if applicable		
	Group B	B-1	PBCS Implementation Plan		
		B-2	Target dates for PBCS and relevant ATM operations		
		B-3	RCP/RSP specifications		
		B-4	PBCS awareness		
		C-1	Operational concepts and procedures for PBCS operations		

	Group C	C-2	ATM automation system changes to use flight plan RCP/RSP indicators		
		C-3	ATM automation changes for PBCS monitoring		
		C-4	Confirm initial ANSP compliance with RCP/RSP specifications		
	Group D	D-1	Aircraft operator readiness		
		D-2	Confirm initial operator and/or aircraft type/system compliance with RCP/RSP		
	Group E	E-1	PBCS monitoring, analysis and reporting - post implementation		

2.4.5. FRA

2.4.5.1. Introduction

The Global Air Navigation Plan, under ASBU Block 1 envisions improved operations through optimized ATS routing Introduction of free routing in defined airspace, where the flight plan is not defined as segments of a published route network or track system to facilitate adherence to the user-preferred profile.

The APIRG 22 Conclusion 22/36 on free routing airspace encourages States with the potential to implement free routing, to incorporate the FRA concept into their national airspace concept and ATM master plan in line with B1-FRTO ASBU module.

2.4.5.2. Rationale for Free Routing Airspace (FRA) in the AFI Region

The goal of creating the AFI FRA is to allow flight plans to be filed with a significant part of the intended route specified by the user-preferred profile. Maximize on the possibly freedom to be granted within the limits posed by the other traffic flows, with the overall benefits intended to reduce flight time, fuel consumption and CO2 emissions.

The AFI FRA will allow the AFI States / ANSPs to overcome the efficiency, capacity and environmental issues facing aviation and its full efficiency benefits will only be achieved if it is deployed over most of the continental AFI airspace, while acting appropriately to reduce its safety risks.

ICAO GANP advocates for application of FRA at Region or sub region level. The geographical extent of the airspace of application should be large enough; significant benefits arise when the dynamic routes can apply across flight information region (FIR) boundaries rather than imposing traffic to cross boundaries at fixed predefined points.

2.4.5.3. Progress made by the AFI Free Route Airspace Project Management Team (AFI FRA PMT)

The APIRG 22 Conclusion 22/36 lead to the creation of the AFI FRA PMT whose main task

is to guide and support states and the region in the implementation of FRA.

Since inception in 2019, the AFI FRA PMT has developed the first Edition and subsequent Second Edition of the AFI FRA Concept of Operations (AFI FRA CONOPS). The development of the FRA CONOPS 2nd Edition mainly addresses the standardization of FRA airspace publication.

The PMT also completed the translation of the FRA CONOPS 1st edition to French language, as well as conducted an AFI FRA gap analysis to determine the level of readiness by the AFI States for implementation of FRA.

2.4.5.4. Results of the gap analysis

Areas of focus in the analysis

As is informed by the Concept of Operations (AFI FRA CONOPS), the key enablers for implementation of FRA were considered in the evaluation of the States' readiness in implementation. The five areas of focus were; *Surveillance, Communication, Coordination, Navigation, Safety nets and Airspace procedures.* The region presentation of results are captured in Appendix xxx to this report. These areas of focus were weighted based on their application to FRA as shown below:

Criteria	Weights
VHF	10
CPDLC	8
HF	7
Space Based infrastructure (GNSS)	8
Ground Based infrastructure (VORs)	5
Ground Based infrastructure (DMEs)	5
ADS B (ground/space)	9
ADS/C	8
PSR	3
SSR	9
MLAT	4
Conflict Alert (STCA/MTCA)	6
Area Proximity Warning (APW)	6
Conflict Detection and Resolution (CD/R)	6
Monitoring Aids (MONA)	4
ATS/Aeronautical Message Handling System (AMHS)	8
Aeronautical Fixed Telecommunication Network (AFTN)	8
ATS Inter-Facility Data Communications (AIDC)-OLDI	6

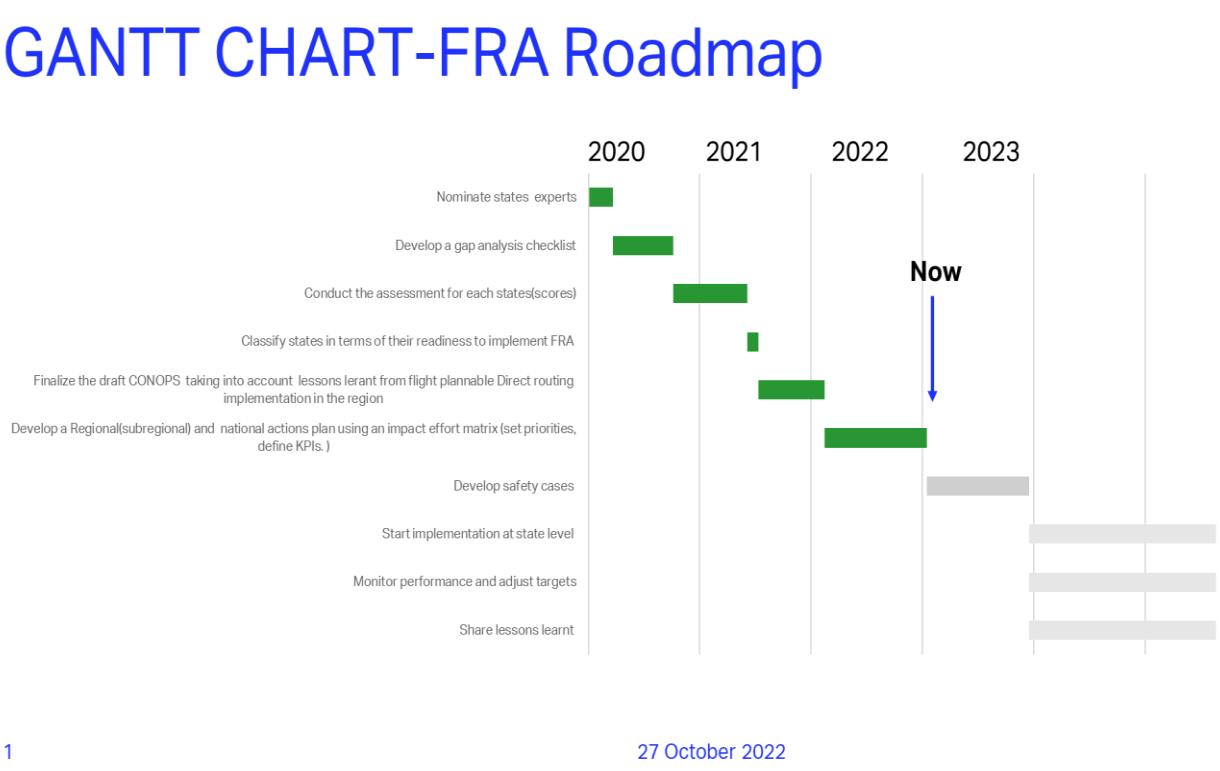
Table 1: Weighting of the facilities implemented by states.

To ensure harmony in the implementation of the improvements required to realize FRA and eventual realization of the regional application of FRA, the PMT resolved to organize cluster meetings to deliberate further on requirements as well as develop State level action plans.

The three clusters are Western and Central Africa, Southern Africa and the Eastern Africa regional clusters. These clusters have held virtual meetings to review the gaps identified, develop and consider safety assessments at regional level and agree on the action plans.

The cluster meetings culminated in a face-to-face meeting held from 24-28 October of 2022, in Mauritius, to review the level of preparedness at regional level and agree on the implementation date as guided by the road map.

The AFI FRA Road Map as developed in 2019 and updated by the AFI FRA PMT at the fourth meeting (AFI FRA PMT/4) held on 25-28 October 2022 hosted by Mauritius



The AFI FRA PMT at the Fourth meeting in Mauritius, 25-28 October 2022

The PMT at work at the AFI FRA PMT/4

The venue for the AFI FRA PMT/4 was selected based on the fact that Mauritius was a model state having taken the APIRG 22 Conclusion 22/36 to heart and implemented FRA in the oceanic airspace of the Mauritius FIR. During the workshop, the PMT had an opportunity to visit the Mauritius Area Control Center, to familiarize with newly implemented Mauritius FRA airspace operations.

The PMT at the Mauritius ACC, 28 October 2022

traffic thanks

2.5. Communications, Navigation and Surveillance (CNS)

2.5.1. Aeronautical Fixed Service ATS/DS

In the area of Air traffic Service Direct Speech (ATS/DS), the pace of implementation of the AFI planned Circuits is satisfactory and up to **100%** thanks to the support offered by the satellite based VSAT Networks (AFISNET, NAFISAT, SADC/2 and CAFSAT). However, the performance of the service is to be improved since the components of some networks are aging in an environment of lack of spare parts.

2.5.2. Aeronautical Fixed Service AFTN/AMHS/ AIDC

In the area of aeronautical messages exchanges the pace of implementation of the communication infrastructure for AFTN is completed (100%) with regards to the AFI Air Navigation Plan except one circuit that is disconnected due to non-technical reason. However, the region is still experiencing lack of operational messages such as Flights Plans, OPMETs and NOTAMs due amongst others to the technology obsolescence and operation procedures.

The implementation of Air traffic Message Handling Systems (AMHS) is ongoing although the pace has been slowed down in the COVID-19 environment. Lot of Air Traffic Service Units with AMHS capability continue to use AFTN gateways for the interconnection with neighboring centers.

The implementation of AIDC has been initiated and successfully conducted amongst some ANSPs in the AFI Region. Although ICAO Document 9694 provides clear guidelines for the implementation over AMHS of AIDC as a ground segment of the ATN the low pace of AMHS interconnection leads to AIDC implementation over the legacy AFTN.

The Status of implementation of AMHS and AIDC is presented in **the table below:**

Status of the implementation of AMHS, AIDC and VoIP

Number	States	AMHS	AIDC	VoIP	Remarks
1.	ANGOLA	✓			
2.	BENIN	✓	✓		AMHS node Registered at AMC
3.	BOTSWANA	✓			
4.	BURKINA FASO	✓	✓		AMHS node Registered at AMC
5.	BURUNDI				
6.	CAMEROON	❖	❖		IOT & POT testing on progress
7.	CABO VERDE	✓	❖		
8.	CENTRAL AFRICAN REPUBLIC	❖			IOT & POT testing on progress
9.	CHAD	✓	✓		
10.	COMOROS	❖			IOT & POT testing on progress
11.	CONGO	✓	✓		
12.	COTE D'IVOIRE	✓	❖		IOT & POT testing on progress
13.	DEMOCRATIC REP. OF THE CONGO		✓		
14.	DJIBOUTI				
15.	ESTWANI				
16.	EQUATORIAL GUINEA	❖			IOT & POT testing on progress
17.	ERITREA				
18.	ETHIOPIA	✓			
19.	GABON	❖			IOT & POT testing on progress
20.	GAMBIA				
21.	GHANA	✓	✓		

22.	GUINEA	✓			
23.	GUINEA-BISSAU	❖			IOT & POT testing on progress
24.	KENYA	✓			
25.	LESOTHO				
26.	LIBERIA	❖			
27.	MADAGASCAR	✓	✓		AMHS node Registered at AMC
28.	MALI	✓	✓		AMHS node Registered at AMC
29.	MAURITANIA	✓			AMHS node Registered at AMC
30.	MAURITIUS	✓	✓		
31.	MOZAMBIQUE	✓			
32.	NAMIBIA				
33.	NIGER	✓	✓		AMHS node Registered at AMC
34.	NIGERIA				
35.	RÉUNION (France)	✓			
36.	RWANDA	✓			
37.	SAO TOME AND PRINCIPE				
38.	SENEGAL	✓	✓		AMHS node Registered at AMC
39.	SEYCHELLES	✓			
40.	SIERRA LEONE	✓			
41.	SOMALIA	✓			
42.	SOUTH AFRICA	✓			
43.	SOUTH SUDAN				
44.	TOGO	✓	✓		AMHS node Registered at AMC
45.	UGANDA	✓			
46.	UNITED REPUBLIC OF TANZANIA	✓			
47.	ZAMBIA	✓			
48.	ZIMBZABWE	✓			

✓ Capability Implemented

❖ On-going project

VoIP: Not yet implemented

2.5.3. Aeronautical Mobile Service HF & VHF coverage

The AFI region has implemented the AFI Air Navigation Plan provision for HF in particular for continental remote and oceanic air spaces. The implementation of satellite-based Networks has significantly the VHF coverage in friendly remote continental areas. However, the evolving security concern in particular in part of western and central Africa, led to the loss of remote extended VHF Stations resulting in the reduction of VHF capability.

2.5.4. Aeronautical Mobile Service CPDLC

CPDLC is implemented to supplement HF deficiencies and VHF unavailability in continental remote and oceanic airspaces. The pace of implementation in concerned FIRs in the AFI Region is satisfactory with **100%** of WACAF and X% of ESAF concerned FIRs CPDLC capable and providing datalink service to equipped fleet.

2.5.5. Aeronautical Radio navigation Service

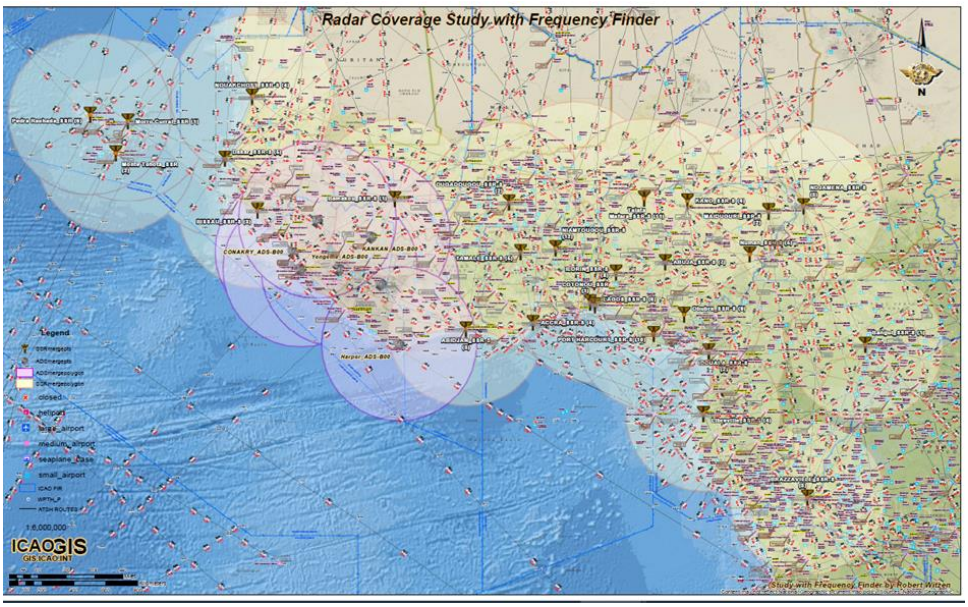
Aeronautical radio navigation service is provided in the AFI Region through the operation of conventional radio navigation aids (VORs, DMES and ILSs) and the Global Navigation Satellite System (GNSS) core and augmented.

The pace of completion of the implementation of Conventional NavAids is satisfactory with regards to the requirements of Recommendation 10/4 of the AFI/RAN 7th meeting on NavAids.

Core GNSS operation is ongoing for enroute operation and projects are being conducted for the implementation of SBAS. In this regard, AFCAC, with the assistance of ICAO conducted an independent Cost Benefit Analysis (CBA) for the implementation of SBAS in the Region

2.5.6. Aeronautical Surveillance Service SSR Mode S

Surveillance Secondary Radar (SSR) Mode S compatible have been implemented in compliance with the provision of the Recommendations of the 7eme meeting of the AFI/RAN. In consideration of the overlapping of SSR Coverage, ICAO is promoting collaboration amongst Administration and Organization for surveillance data sharing.



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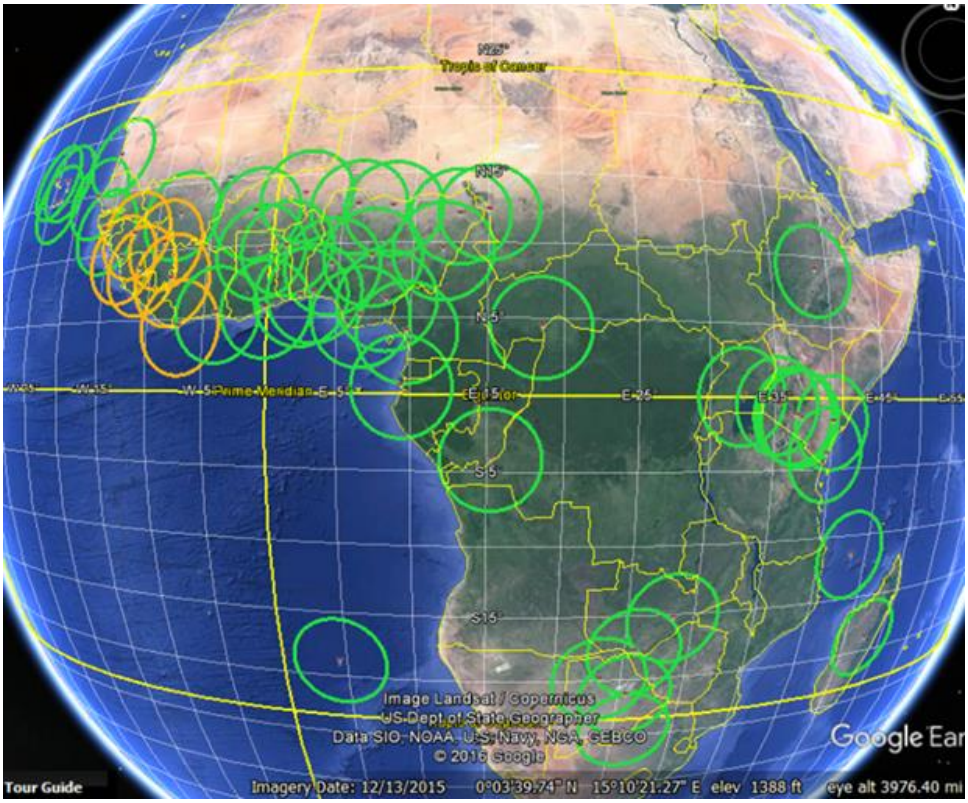
2.5.7. Aeronautical Surveillance Service ADS-C &ADS-B

Automatic Dependent Surveillance by Contract (ADS-C) is generally co implemented with CPDLC for operation in continental remote and oceanic airspaces. In WACAF 8 FIRs out of 9 are fully ADS-C capable, the Roberts FIR is not operating ADS-C. In ESAF 8 FIRs out of 9 are ADS-C Capable.

The implementation of ground based Automatic Dependent Surveillance Broadcast (ADS-B) to complement SSR Mode S is ongoing based on regional requirements. The opportunity given by Space based ADS-B for an extended coverage of all airspaces is taken into consideration by major ANSPs to improve surveillance coverage.

SSR and ADS-B Coverage



2.5.8. PBCS

The implementation of Required Communication Performance (RCP-240) and Required Surveillance Performance (RSP-180) is at its starting phase. Although ARMA is tasked to conduct PBCS monitoring there is a need for an ordered and harmonized regional implementation Plan.

2.5.9. Spectrum

Aeronautical frequency spectrum protection is one of the concerns encountered in the AFI region where the Air Navigation Service are often subject to severe interferences on VHF operation. The emerging International Mobile Telecommunication (IMT) with the 5G remains the main threats to the aeronautical spectrum in particular the 4200-4400 MHz C Band, the operated by aeronautical Radio Altimeters.

The frequency bands adjacent mainly used for downlinks from geostationary satellites operated by the AFI satellite VSAT based Networks may be also affected by the 5G.

The region is also encountering the outstanding interference by FM broadcasting stations on Aeronautical VHF frequencies supporting air ground and radio navigation stations.

2.6. Aeronautical Information Management (AIM)

The object of the aeronautical information service (AIS) is to ensure the flow of aeronautical data and aeronautical information necessary for global air traffic management (ATM) system safety, regularity, economy, and efficiency in an environmentally sustainable manner.

The role and importance of aeronautical data and aeronautical information changed significantly with the implementation of area navigation (RNAV), performance-based navigation (PBN), airborne computer-based navigation systems, performance-based communication (PBC), performance-based surveillance (PBS), data link systems and satellite voice communications (SATVOICE). Corrupt, erroneous, late, or missing aeronautical data and aeronautical information can potentially affect the safety of air navigation.

To better ensure its important role, it has been necessary for the AIS to evolve globally to aeronautical information management (AIM).

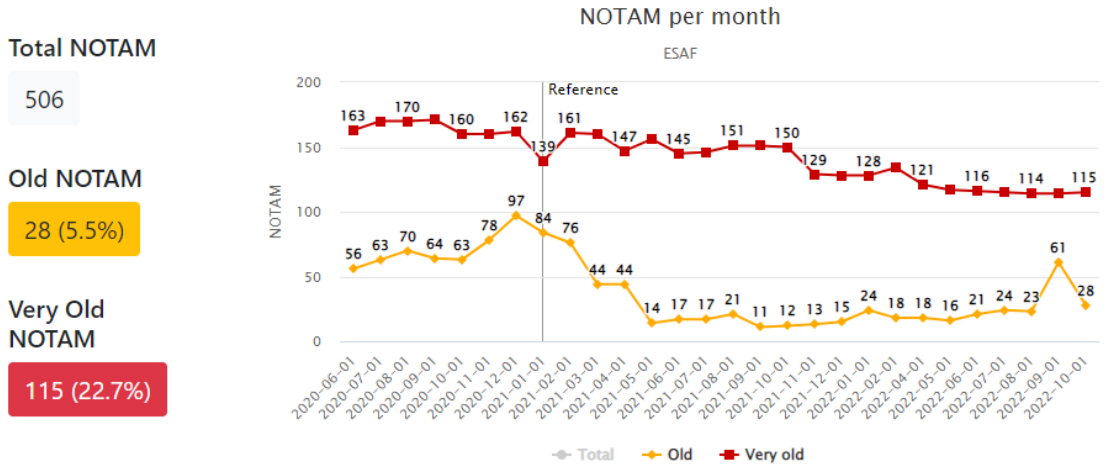
2.6.1. AIS Basic Building Blocs

As part of the Basic Building Blocks framework, the following services are fundamental for the provision of all aeronautical information necessary for the safety, regularity, and efficiency of air navigation:

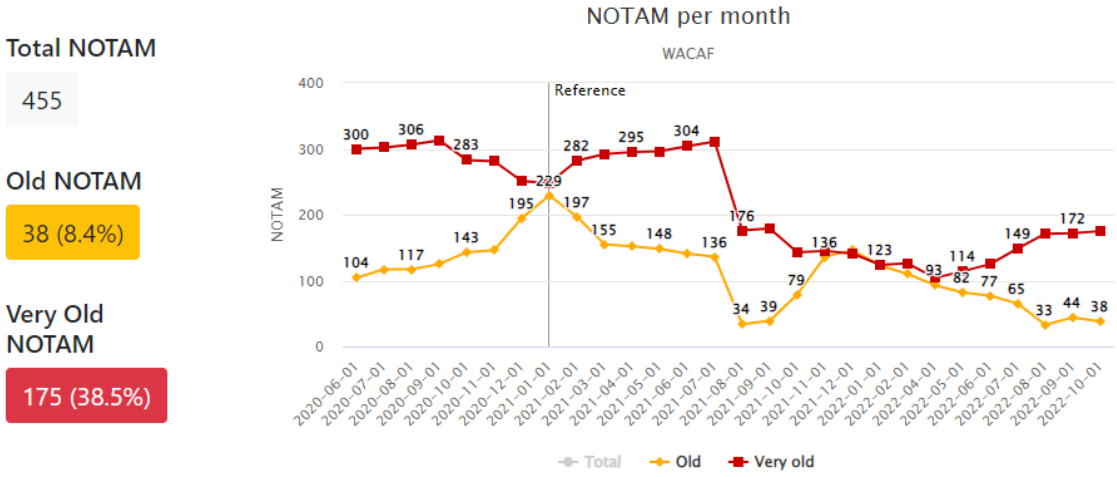
- Aeronautical Information Publication Service,
- Cartographic Service,
- NOTAM Service,
- Pre-Flight Briefing Service, and
- Post-Flight Briefing Service.

In the AFI Region, these services are ensured either by a Service Provider for individual States or by joint Agencies for groups of States. But the quality of the information provided through these services is still to be improved in the Region.

The following graphics illustrates the status of old and very old NOTAM yet to be solved respectively by ESAF and WACAF States, as of October 2022.



Graphic AIM.1 – Status of old and very old NOTAM for ESAF States

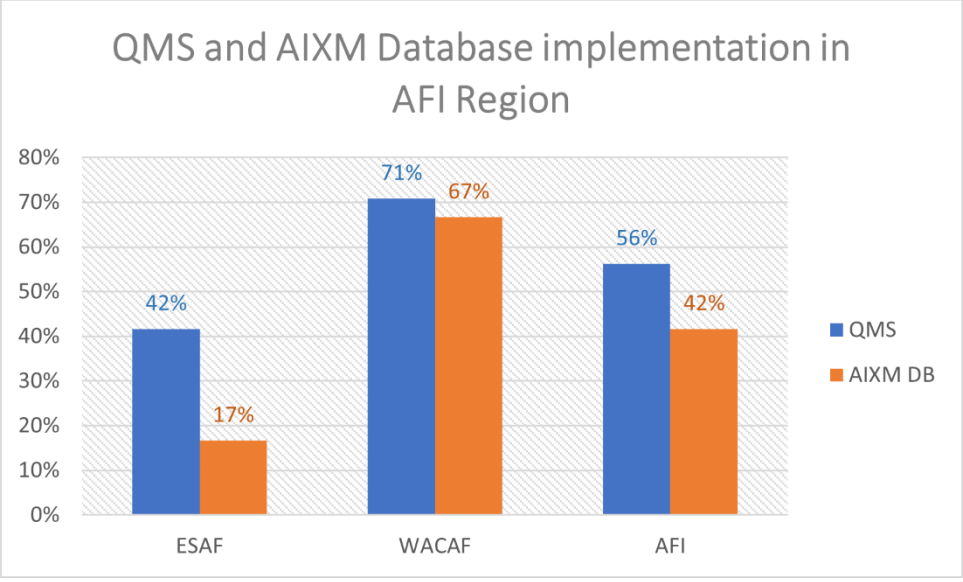


Graphic AIM.2 – Status of old and very old NOTAM for WACAF States

2.6.2. Transition from AIS to AIM

The transition from AIS to AIM introduces significant changes in the way aeronautical data and aeronautical information is processed and managed. Even though some of the principles remain the same, AIM is significantly different from traditional AIS. This transition introduces not only automation into the current paper-based environment, but also the required business transformation to make the change to a data-centric environment. The goal is to create and distribute quality assured aeronautical data and aeronautical information in digital form to satisfy the more stringent demands of an ever-increasing number of users.

AFI States are making efforts towards this transition. The graphic below shows the level of implementation of Quality management system and the Aeronautical Information Exchange Model (AIXM) database which constitute the pillars for the provision of quality assured data-centric products and services.



Graphic AIM.3 – Status of implementation of QMS and AIXM databases in AFI Region

2.6.3. Regional implementation initiatives

The AFI States and Services providers are making efforts to improve the aeronautical information services. However, the Region identified the need to leverage the various efforts through regional projects to foster the harmonized implementation of facilities and services. To this end, the AIM Result Based Implementation Support (AIM RBIS) project was established in the framework of the AFI Plan to assist States in implementing Quality Management System (QMS), Aeronautical Information Exchange Model (AIXM) and digital Terrain and Obstacle Data (TOD). This project covers the ASBU elements DAIM-B1/1, DAIM-B1/2, DAIM-B1/3 and DAIM-B1/4.

Furthermore, two other projects were recently established under the APIRG project approach, to cover the implementation of the ASBU elements DAIM-B1/5, DAIM-B1/6 and DAIM-B1/7.

2.7. Aeronautical Meteorology (MET)

The objective of meteorological service for international air navigation shall be to contribute towards the safety, regularity and efficiency of international air navigation. This objective shall be achieved by supplying the following users: operators, flight crew members, air traffic services units, search and rescue services units, airport managements and others concerned with the conduct or development of international air navigation, with the meteorological information necessary for the performance of their respective functions.

2.7.1. MET Basic Building Blocks

The Basic Building Blocks (BBBs) in MET, so called essential services (ES) in MET consist of a set of MET services recognized by ICAO Member States as necessary to contribute for international civil aviation to develop in a safe and orderly manner, and as such, shall be provided in accordance with ICAO Standards. Any departures from complying with ICAO SARPs in providing the essential services result in a deficiency to be reported.

The following MET ES are fundamental to implement required minimum capabilities and facilities by States to fulfill the objectives of meteorological services for Air navigation as indicated above.

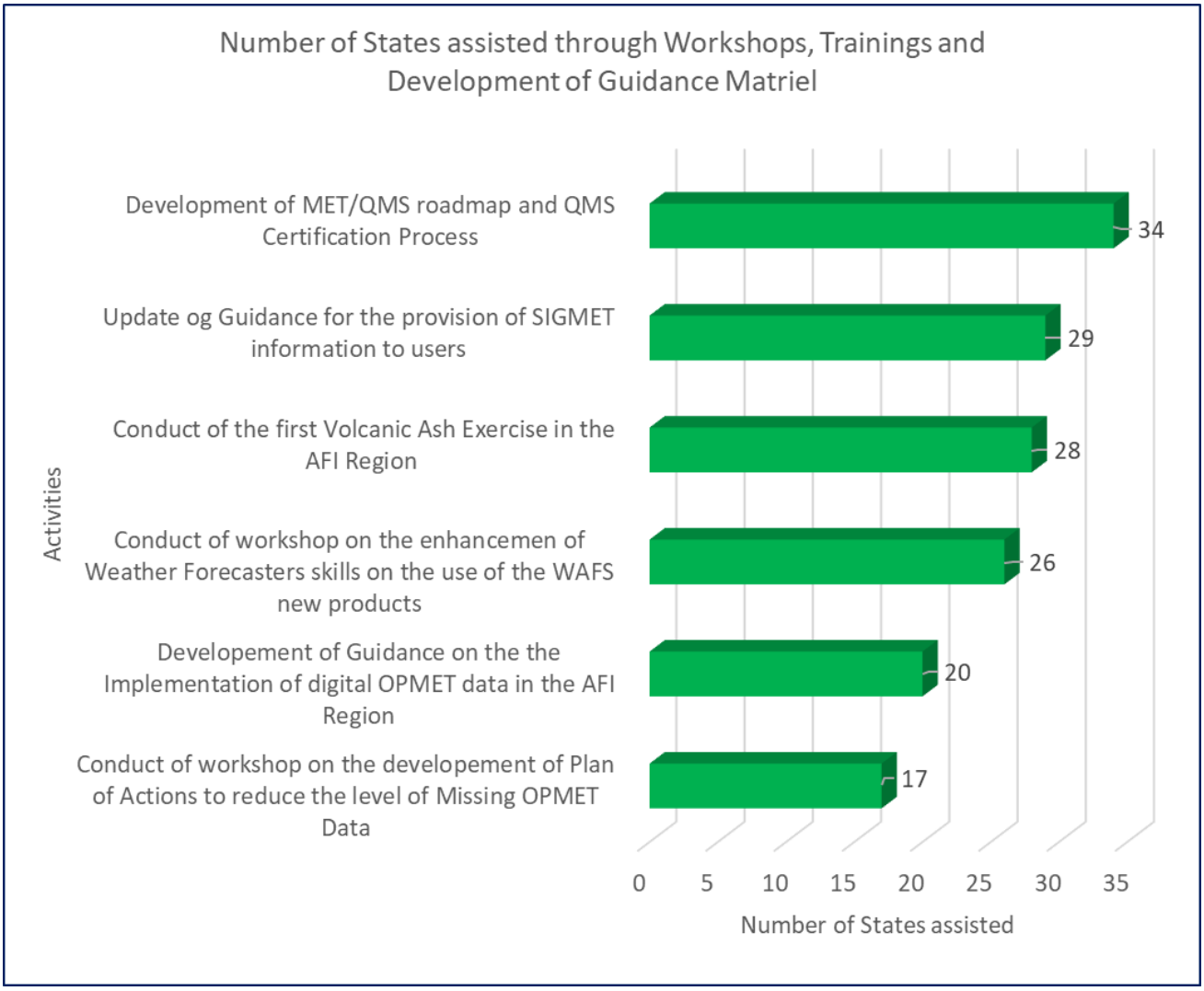
- Aerodrome weather services
- Services of the meteorological watch office
- World/Regional Center Meteorological Services

Not implementing the ES in compliance with MET related SARPs may result in air navigation deficiencies in MET field that may adverse safe operations of aircraft. To assist States in identifying and addressing potential safety risks related to MET deficiencies, a set of relevant Minimum Reporting Areas have been determined for MET and endorsed by APIRG/23 through the Conclusion 23/32.

2.7.2. Key achievements in MET

Key achievements include assistance to States through workshops, trainings, development of guidance materials and summarized in the following graphics.

Fig. MET 1 : Key achievements in MET



2.7.3. Regional implementation initiatives are captured in Appendix xxx to this report.

2.8. Search and Rescue (SAR)

Search and Rescue (SAR) in the region remain a major concern. Whereas some states have National SAR Regulations in place and have developed National SAR Plans in accordance to the requirement of Annex 12, the implementation of these plans continue to be a challenge. ICAO and AFCAC carried out a survey to determine the level of implementation in 2018 with poor level of implementation report. Out of the Targeted 53 states, report was received from only 30 States, representing only 57% reporting.

Based on data collected as part of AFI Plan project, twenty five (25) SAR agreements have been signed between States and 35 new draft agreements have been developed to either supersede old agreements or formalized cooperation where this has been lacking. Eight (8) States have developed National SAR Plans and two (2) States have draft National SAR Plans in place. *(Source: AFI Plan data - ICAO)*

Follow up workshops were carried out by ICAO to build capacity at State level in 2019, 2020 and 2021. Minimal improvement was realized, the results for 2021 are indicated in the Table below:

SUMMARY OF AFI STATUS OF STATE IMPLEMENTATION OF SAR

FI: Fully Implemented **PI**: Partially Implemented **NI**: Not Implemented N/A: Not Applicable

LEVEL OF IMPLEMENTATION	Regulatory framework	Organisation	Aeronautical / maritime SAR coordination	Publication of SAR information	Funding	SAR Conventions and Agreements	Operational procedures	Equipment / Communications	Personnel, training and exercises	SAR services oversight / Improving services
FI	21	18	10	9	7	8	11	3	3	1
	70 %	60 %	33.33 %	30 %	23.33 %	26.67 %	36.67 %	10 %	10 %	3.33 %
PI	6	10	13	19	13	17	13	22	23	18
	20 %	33.33 %	43.33 %	63.33 %	43.33 %	56.67 %	43.33 %	73.33 %	76.67 %	60 %
NI	3	2	2	2	10	5	6	5	4	11
	10 %	6.67 %	6.67 %	6.67 %	33.33 %	16.67 %	20 %	16.67 %	13.33 %	36.67 %
N/A	0	0	5	0	0	0	0	0	0	0
			16.67 %							

The results indicate the need for AFI States to put emphasis in the support of national SAR organisations through equipping the organisation with SAR equipment and communication facilities as well as funding personnel training. Also noted as a major challenges is the lack of effective oversight of SAR organisations. This could be contributed to the fact that these organisation are often under the Military. This makes it difficult for the established oversight bodies to access the SAR centers. To enable adequate oversight, there is need for facilitation through amendments to the regulations that govern the established SAR organisations, incorporating the requirement for the oversight by established civil aviation oversight agencies.

The results of the survey have been demonstrated in the pie-charts for comparison as indicated in Appendix XXX to this report.

2.9. ASBU Implementation Status

2.9.1. AOP

2.9.2. ATM

The implementation status of ASBU Block 0 and 1 Elements related to ATM in the AFI region as reported by AFI states has been slow. Although continuous follow-up has been done by ICAO on

State reporting, this remain a major challenge, thus indicating that the actual level of implementation in the region cannot be determined.

The data received from the States and other sources on the level of ASBU implementation is captured in **Appendix xx** to this report.

2.9.3. CNS

2.9.4. AIM

2.9.4.1. AIM Applicable ASBU elements

The following ASBU elements have been identified through the Volume III of the AFI Regional Air navigation plan as applicable to the Region, in the area of Aeronautical information management:

Element ID	Element Title
DAIM-B1/1	Provision of quality-assured aeronautical data and information
DAIM-B1/2	Provision of digital Aeronautical Information Publication (AIP) data sets
DAIM-B1/3	Provision of digital terrain data sets
DAIM-B1/4	Provision of digital obstacle data sets
DAIM-B1/5	Provision of digital aerodrome mapping data sets
DAIM-B1/6	Provision of digital instrument flight procedure data sets
DAIM-B1/7	NOTAM improvements

Table AIM.1 – ASBU elements applicable to the AFI Region in AIM

2.9.4.2. Status of implementation of ASBU elements

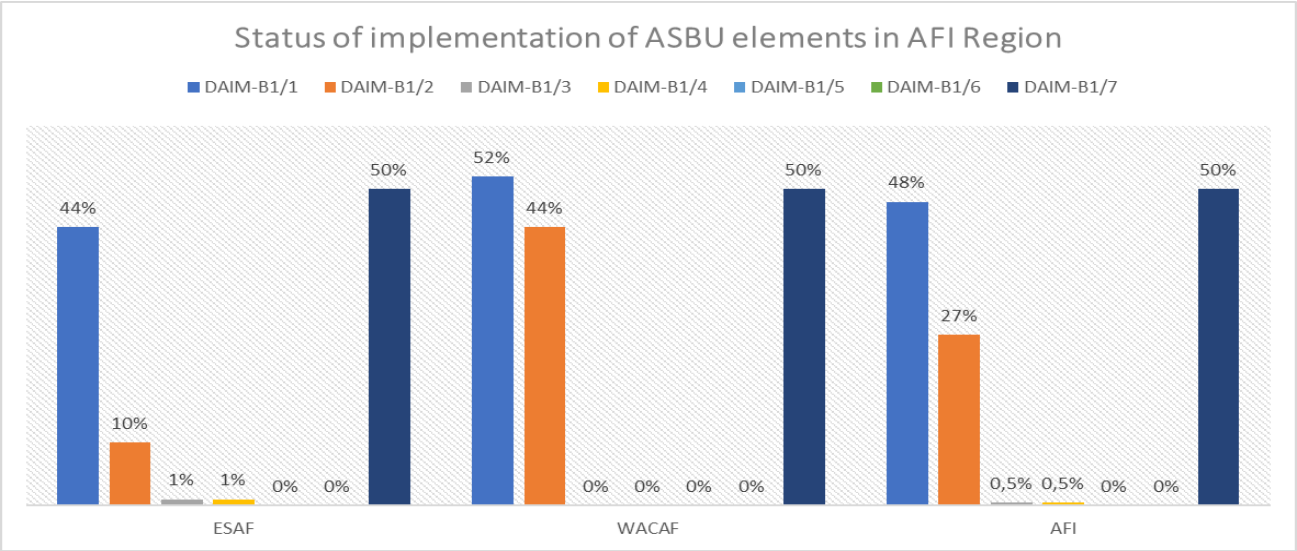
The table below shows details of status of implementation of ASBU elements DAIM-B1/1 – Provision of quality-assured aeronautical data and information, and DAIM-B1/2 – Provision of digital Aeronautical Information Publication (AIP) data sets. It provides an overview of the number of States having fully or partially implemented the various components of these ASBU elements and summarizes their average percentage of regional implementation.

Implementation Status: FI - Fully implemented (100%) PI - Partially implemented (50%)			***DAIM-B1/1*** *- Provision of quality-assured aeronautical data and information*				***DAIM-B1/2*** *- Provision of digital Aeronautical Information Publication (AIP) data sets*		
			QMS	**SLA**	**AIRAC**	**WGS-84**	**AIXM DB**	**eAIP**	**AIP Data sets**
# States having the given implementation status	**ESAF**	FI	**10**	**0**	**0**	**0**	**4**	**3**	**0**
		PI	**3**	**13**	**24**	**24**	**0**	**1**	**0**
	WACAF	FI	**17**	**0**	**0**	**0**	**16**	**16**	**0**
		PI	**0**	**17**	**24**	**24**	**0**	**0**	**0**

% Regional Implementation status	**ESAF**	%	48	27	50	50	17	15	0
	WACAF	%	71	35	50	50	67	67	0

Table AIM.2 – Detailed implementation status of elements DAIM-1/1 and DAIM-1/2

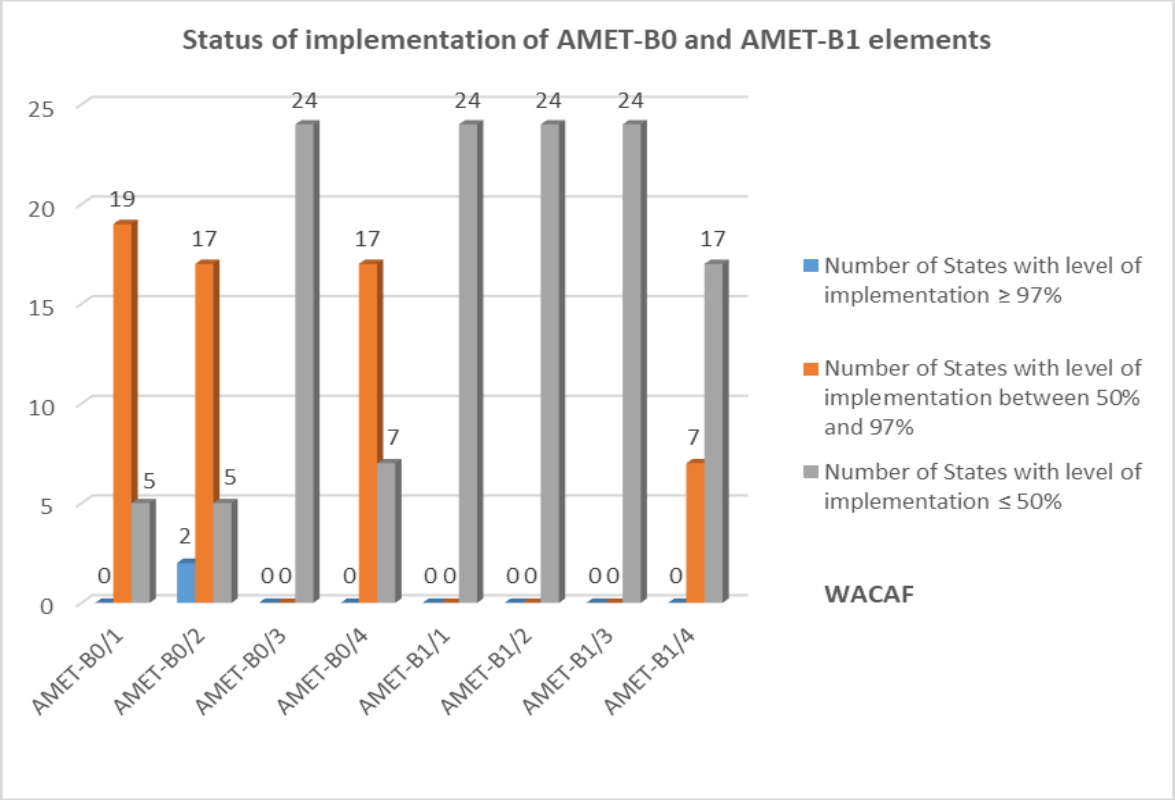
As done above for the elements DAIM-B1/1 and DAIM-B1/2, the implementation data has been consolidated also for the other applicable ASBU elements ranging from DAIM-1/3 to DAIM-B1/7. The following graphic provides an overview the status of implementation the said ASBU elements in the AFI Region.



Graphic AIM.4 – Status of implementation of AIM ASBU elements in AFI Region

2.9.5. MET

Fig. MET 2 : Status of implementation of AMET-B0 and AMET-B1 elements



3. Environmental Protection

3.7.Air Navigation developments related to Environmental Protection

Several activities related to environmental protection have been conducted in the AFI region to support States. The ICAO Regional Offices developed a capacity building strategy in 2019 that aims to provide direct support to States, through workshops and regular coordination with the States' Focal Points (FPs).

In relation to climate change, ICAO formulates policies, develops and updates Standards and Recommended Practices (SARPs) on aircraft emissions. The launch of the State Action Plan (SAP) initiative in 2010 is also a means to provide States with the capacity and tools to act. This initiative enables all ICAO Member States to establish a long-term strategy on climate change for the international aviation sector, involving all interested parties at national level. This involves the selection of appropriate emissions mitigation measures from ICAO's basket of measures which includes Operational Improvements. The term "operations" reflects changes to air traffic management (ATM) procedures and improvements to infrastructure and operations. It describes activities such as the flying of the airplane, the control and/or monitoring of the aircraft by the air traffic management system, and the conduct of various airport activities.

In the SAPs developed/updated by AFI States, 'Operational Improvements' is the most implemented among the basket of measures. The ICAO Global Air Navigation Plan (Doc 9750, Sixth Edition) facilitates the implementation of air traffic management improvements, through the implementation of the Aviation System Block Upgrade (ASBU) methodology. The ASBUs Modules related to ATM have environmental benefits that are realized by States and are reported through the

SAP initiative. The AFI Region is involved in various initiatives, including PBN; CCO, CDO, Free Route Operations (FRTO) and the expansion of Flexible Use. Some of the environmental benefits are:

- Fuel efficient descent profiles
- Fuel efficient climb profiles
- Reduced delays and associated fuel consumption

The ATM operational measures are based on different ways of operating aircraft that are already in service. They are popular in the AFI Region as a measure for SAPs because they do not necessarily require the introduction of new equipment or the deployment of expensive technologies.

4. Coordination and Cooperation

4.7.Interregional Coordination
4.8.Coordination between APIRG and RASG-AFI
4.9. Air Navigation Services Providers Peer Review Programme

5. Industry Initiatives

5.7.Air Navigation Services Providers

5.1.1. ***ASBU Implementation Plan by South Africa.***

Heeding the call for states to develop ASBU implementation Plans to enable harmonised and efficient implementation of the identified ASBU elements in line to the sixth edition of the Global Air Navigation Plan (the 6th Edition of GANP), ATNS South Africa has developed an elaborate plan, incorporating all the elements of ASBU that the State identified as essential for the improvement of the service delivery in South Africa.

5.7.1.1. The detailed plan is captured in Appendix xx to this report.

5.8.Airspace Users
5.9.Airport Operators
5.10. Aircraft Manufacturers

6. Challenges and Opportunities (*planning (human/financial etc.), implementation, operation and monitoring, reporting) measures for each challenge*

7. Recommendations

AFI Air Navigation Report (AANR)

Appendices

1. Executive Summary

1.1. Objective
1.2. Background
1.3. Scope
1.4. Organizational Structure of the APIRG
1.5. Traffic Overview
1.6. Structure of the Report

2. Regional Air Navigation Priorities, Targets and Achievements

2.1. Abuja Safety and Air Navigation Targets

2.1.1. ***Table XX: Revised Abuja Safety Targets incorporating AFI Air Navigation Services Performance Indicators (ANS PIs); and the status of their implementation for all the 48 RASG-AFI States***

Revised Abuja Safety Target	Assessments	Status of Implementation
1. Progressively reduce the African accident rate from 8.6 to 2.5 per million departures by the end of 2022, with focus on: ▪ Runway related accidents and serious incidents (Runway Excursion, RE). ▪ Controlled flight into terrain (CFIT) related accidents and serious incidents. ▪ Loss of Control In-flight (LOC-I) related accidents and serious incidents. ▪ Achieve and maintain zero fatalities in aircraft accidents.	The accident rate decreased from 10.34 in 2019 to 6.7 in 2021. ▪ Runway related accidents and serious incidents (Runway Excursion, RE) continue to record a higher rate than the other HRCs. ▪ CFIT related Accidents and serious Incidents rate remained at Zero from 2015 to 2021. ▪ LOC-I related accidents and serious incidents had Zero rate in 2021. ▪ Number of fatalities decreased from 20 in 2020 to Zero in 2021 *(Source:- ICAO iSTARS)*	Although there was an overall decrease in accident rate and fatalities in 2021 compared to the same period in 2020, this may be attributed to the drastic reduction in the volume of traffic due to the impact of COVID-19 pandemic. Notwithstanding, more efforts need to be put in place to continue to maintain a downward trend if the target for 2022 is to be achieved.
2. All States establish and strengthen autonomous Civil Aviation Authorities with independent regulatory oversight, sustainable sources of funding and resources to carry out effective safety oversight and regulation of the aviation industry by 2022.	At least the 28 States that have attained the 60 per cent EI Target, amongst the 46 audited RASG-AFI States, are effectively autonomous.	AFCAC to encourage more States, through high level State visits, to establish autonomous CAAs with independent regulatory oversight and sustainable sources of funding.

Revised Abuja Safety Target	Assessments	Status of Implementation
▪ States that need support in areas with safety margins below zero, to use a regional safety oversight organizations or another State's ICAO-recognized functions by 2020. ▪ States effectively exercise the safety oversight functions with a positive safety margin in all areas by 2022. ▪ States to delegate certain safety oversight functions to RSOOs or other States, by the end of 2022 in areas with safety margins below zero, and as appropriate.	*(Source: ICAO iSTARS)*	
3. States resolve: ▪ Existing SSCs by June 2018; ▪ Newly identified SSCs within 6 months from the date of its official publication by ICAO.	Statistics from 2012 to 2021: ▪ 22 SSCs found in 15 States; ▪ 21 resolved in 14 States. ▪ 1 SSC still exist in one State. SSC exceeded 12-month deadline.	**Target not met**
4. States abide by the timelines and provide resources for implementation of ICAO/State Plans of Action ▪ All States to have accepted ICAO Plans of Action by 2019 and ▪ abide by the timelines and provide resources for their implementation.	37 States have accepted ICAO Plans of Action and are at different stages of implementation (Source: AFI Plan)	Data collected was insufficient to determine level of implementation of the 37 ICAO/ State Plans of Action.
5. States progressively increase the Effective Implementation (EI) percentage under the ICAO USOAP such that States with: ▪ EI < 60% attain 60% by 2020; ▪ 60% ≤ EI ≤ 70% attain 80% by 2022; ▪ 70% < EI attain 95% by 2028.	By December 2021, only 59.62% of the AFI member States had reached the target of 60% EI and the group of States have an average EI of 57.82%. This is 1.18% increase compared to year 2020 performance.	**Target not met** (EI < 60% attain 60 per cent by 2020). Number of AFI States with EI of 60 per cent and greater has increased significantly from 15 in 2014 to 33 by December 2021. The efforts of ICAO and AFCAC should be intensified to accelerate the implementation of the CAPs.

Revised Abuja Safety Target	Assessments	Status of Implementation
6. For the purposes of SSP/SMS Implementation, all States: ▪ to have a Foundation SSP established, addressing all pre-requisites; ▪ to have an Effective SSP with appropriate maturity level established; ▪ to contribute information on safety risks, including SSP SPIs, to the RASG-AFI; ▪ with a positive safety margin, and an Effective SSP, to actively engage in RASG-AFI safety risk management activities (analysis of safety risks, design and implementation of risk mitigation actions). All Service Providers to use globally harmonized SPIs as part of their SMS.	▪ By December 2021, at least 24 RASG-AFI States initiated SSP implementation with One State (Rwanda) attaining Level 4. None of the States contributed information on safety risks to RASG-AFI. *(Source: ICAO iSTARS)*	**Target not met** Goal 3.1 of the 2020 – 2022 Edition of the GASP requires all States to implement the foundation of an SSP by 2022. Therefore, the ICAO Regional Offices (ESAF/WACAF) had incorporated SSP Implementation Assistance to States in their work programme, which includes review of the SSP Foundation Protocol Questions (PQs). The AFI Plan Project on SSP Implementation by States should be broadened to include all RASG-AFI States and not just States with 60% EI and greater.

Revised Abuja Safety Target	Assessments	Status of Implementation
7. All International Aerodromes to be certified by 2022, • At least one international aerodrome in every State to be certified by end of 2020; • All airport operators to participate in the ICAO-recognized industry assessment programme for airports (APEX) by end of 2022; • At least one international aerodrome in every State to establish a Runway Safety Team (RST) by end of 2020.	As at 31 December 2021, 41 International Aerodromes were certified out of 126 within RASG-AFI States (32.54 per cent). *(Source: ICAO ISTARS -2021)* • 24 out of 48 RASG-AFI States certified at least one international aerodrome. • 50 airports out of 126 received an APEX review • 38 aerodrome out of 126 established RSTs. *(Source: ICAO ISTARS -2021)*	**Target not met** (At least one international aerodrome in every State to be certified by end of 2020). From the responses to the questionnaire, aerodrome certification is still a serious challenge for AFI States. However, almost all AFI States indicated that the process of certification of international aerodromes is in progress.
8. Require all African airlines to obtain an IATA Operational Safety Audit (IOSA) certification: ▪ All States to establish an appropriate framework for recognition of IATA operational safety audit (IOSA) and IATA Standard Safety Assessment (ISSA) as effective safety mechanisms; All African airlines to obtain IOSA or ISSA certification, as appropriate, by the end of 2022.	From a total of 20 airlines on the IOSA Registry in 2012 there were 41 airlines on the Registry by end of December 2021. Percentage of States with IOSA certified airlines increased to 41.87% *(Source: IATA)*	Interventions through AfDB Project Implementation Agreement (PIA) for SAATM member States will assist some airlines to meet the target. There is a need for distinction between the establishment of an appropriate framework by States for recognition of IATA operational safety audit (IOSA) and IATA Standard Safety Assessment (ISSA) as effective safety mechanisms, and IOSA registration.
Air Navigation (ANS) Target	**Status of Implementation**	**Recommendations**

Revised Abuja Safety Target	Assessments	Status of Implementation
9. All States to establish an effective and operational SAR organization: • Development of a National SAR Plan by end of 2018; • Conclusion of SAR Agreements/ MoUs with all neighboring States by end of 2018; • Organisation of multi-agency, multi-State and combined Regional SAR exercises to test SAR systems in place involving as many SAR units as practicable by end of 2019.	• Based on data collected as part of AFI Plan project, 25 SAR agreements have been signed between States and 35 new Draft agreements have been developed to either supersede old agreements or formalised cooperation where this has been lacking. • Eight (8) States have developed National SAR Plans and two (2) States have draft National SAR Plans in place. *(Source: ICAO ISTARS -2021)*	**Target not met.** States are progressively developing SAR Plans, though at a slow pace.
10. All States to implement the transition from AIS to AIM: • Development of a National Action Plan By end of 2018; • Implementation of the National Action Plan in accordance with the ASBU Block 0 D-ATM by end of 2020.	• 36 per cent of States have fully completed Phase 1 Consolidation; • 44 per cent have partially accomplished Phase 2 Going Digital. *(Source: ICAO ISTARS -2021)*	**No comprehensive data available.** • There is need to establish and promote sufficient data collection tools; • Effective coordination among key stakeholders and appropriate regional master plans/ interventions are required to ensure effective implementation of this target. •
Air Navigation (ANS) Target	**Status of Implementation**	**Recommendations**
11. All States to implement PBN procedures for all instrument runways. • 75% of Instrument Runways to have PBN procedures by end of 2020; • 100% of Instrument Runways to have PBN Procedures by end of 2025.	**National PBN Implementation Plans (NPIPs) status** Reg. Office/Region # States # NPIPs ESAF 24 17 (71%) WACAF 24 22 (92%) AFI Region 48 38 (81%) Year WACAF ESAF AFI 2014 17% 42% 29% 2018 92% 63% 77% 2020 92% 71% 81% 2022 92% 71% 81% **Instrument Runways Status for AFI Region** # Instr. RWY 248	Although group average is high, a number of States have not initiated PBN procedures for their instrument runways. There is need for effective coordination among key stakeholders and appropriate regional interventions are required to ensure effective implementation of this target.

Revised Abuja Safety Target	Assessments	Status of Implementation
	# RNP APRCH 173 # BARO VNAV 131 # SID 85 # CCO 26 # STAR 117 # CDO 28 *(Source – ICAO ISTARS -2021)*	
12. All States to progressively reduce the rate of aircraft proximity (AIRPROX) occurrences in their managed airspaces by at least 50% annually from Dec. 2017 baseline, in order to attain and maintain a level of zero (0) AIRPROX by correspondingly reducing errors in the following contributing factors: • Co-ordination between ATS Units (50%); • Airspace Organization and ATC Procedures (50%); • Mobile Communications (50%) • Poor Crew Discipline on board aircraft (50%)	No comprehensive data to establish level of implementation.	**Target: 2023** So far, no comprehensive data available. There is need to establish and promote sufficient data collection tools.
Air Navigation (ANS) Target	**Status of Implementation**	**Recommendations**
13. Establishment of seamless Air Navigation Services in the AFI Region: a) All States to ensure provision of harmonized Air Navigation Services in terms of flight separation, interoperability of CNS/ATM systems to reduce airspace complexity and achieve seamless operations along major air traffic flows.	Activities towards integration of the AFI Region towards seamless ANSPs is anticipated through RECs. AFCAC established the ANSPs Platform which will discuss among other things establishment of a seamless air navigation services in the AFI Region including establishment of a continental ANS infrastructure gap analysis.	**Target: 2024** There is need for appropriate regional master plans/ interventions to ensure effective implementation of this target.

Revised Abuja Safety Target	Assessments	Status of Implementation
b) Various initiatives formulated by the Regional Economic Communities (RECs) and ANSPs within the AFI Region to be harmonized.		
14. All States to implement ASBU B0 Modules: • All States to develop National ASBU Plan by end of 2018.	IATA ASBU Tracker indicate that: ▪ Total percentage of RNAV GNSS APRCH was 63 per cent for ESAF and 79 per cent for WACAF; ▪ Total percentage of RNAV SID was 40 per cent for ESAF and 20 per cent for WACAF; ▪ Total percentage of RNAV STAR was 40 per cent ESAF and WACAF 46 per cent. *(Source - ICAO/ IATA)*	**Target not met** Comprehensive information on current Status of ASBU implementation in AFI Region was not available. • There is need to establish and promote sufficient data collection tools; • There is need for appropriate regional master plans/ interventions to ensure effective implementation of this target.
15. All States to develop and implement a National Plan for the reduction of CO_2 emissions due to international civil aviation: • develop a National Plan for CO_2 reduction by end of 2020; • full implementation of the National Plan by 2022.	25 States in AFI Region have developed and submitted to ICAO, National Plans for the reduction of CO_2 emissions. 10 States are receiving assistance under Phase II of the ICAO assistance project, funded by the European Union (EU), on Capacity Building for the Mitigation of CO_2 Emissions from International Aviation. *(Source – ICAO)*	States need to be encouraged to develop or update their Action Plans using the guidance in the ICAO Doc 9988.
16. All States ensure that their ANSPs effectively participate in the African ANSP Peer Review Programme by: • Joining the programme and having in place, an annual Peer Review plan of activities. • Develop and implement appropriate corrective action plans to satisfactorily address Peer Review recommendations.	Membership has continued to grow with current participation including: CANSO members (all 18 ASECNA member States, South Africa, 3 Robert FIR States, Uganda, Mozambique, Zambia, Algeria etc). *(Source – ICAO)*	More States need to be encouraged to join the ANSP Peer Review Programme in order to meet the 2022 target.

2.2. ASBU Modules Categorization and Prioritization
2.3. Airports Operations Planning (AOP)

2.4. Air Traffic Management (ATM)
2.4.1. Performance – Based Navigation (PBN)
2.4.2. CCO and CDO
2.4.3. RVSM Airspace

2.4.3.1. ***Scope of responsibility of the ARMA***

AFI States

	Angola	Benin	Botswana
Burkina Faso	Burundi	Cameroon	Congo
Central African Rep.	Chad	Comoros	Côte d'Ivoire
Eritrea	Djibouti	DR Congo	Equatorial Guinea
Guinea Bissau	Ethiopia	Gabon	Ghana
Liberia	Guinea	Kenya	Lesotho
Mali	Mauritania	Madagascar	Malawi
Namibia	Niger	Mauritius	Mozambique
Rwanda	Sao Tome & Principe	Nigeria	
Sierra Leone	Somalia	Senegal	Seychelles
Eswatini	United Republic of Tanzania	South Africa	Togo
		The Gambia	Uganda

Zambia	Zimbabwe	Guinea Bissau	

AFI FIRs

Accra	Addis Ababa		Antananarivo
Asmara	Beira	Brazzaville	Cape Town
Dakar	Dar es Salaam	Entebbe	Gaborone
Harare	Johannesburg	Johannesburg Oceanic	Kano
	Kinshasa	Lilongwe	Luanda
Lusaka	Mauritius	Mogadishu	Nairobi
N'Djamena	Niamey	Roberts	Seychelles
	Windhoek		

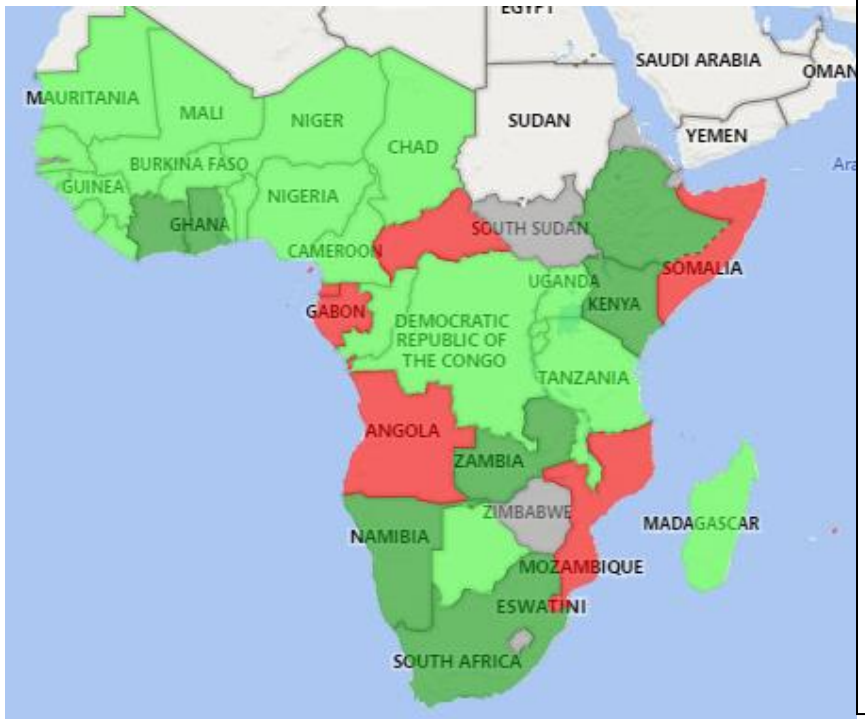
2.4.4.PBCS
2.4.5.FRA

2.4.5.1. AFI region presentation of results

The gap analysis revealed the level of preparedness of the AFI states in implementing FRA. The results of the gap analysis and the CONOPS were shared with states during the first AFI FRA workshop held on 6-7 July 2022. Whereas some States are considered to be fully ready for FRA implementation, some have already implemented FRA within their FIR while others are considered almost ready with a few considered not ready.

The maps below depict the level of preparedness for the AFI region based on each of the focus areas.

Surveillance



The implementation of various methods of surveillance were considered.

Based on the weights on table 1. States in ***Dark green*** *are considered fully ready,* ***Light green*** *considered almost ready,* ***Red*** *as not ready while* ***Grey*** *shows States that had not data (No response to the survey)*

Communication

The implementation of various methods of Communication were considered.

*Based on the weights on table 1. States in **Dark green** are considered fully ready, **Light green** considered almost ready while **Grey** shows States that had not data (No response to the survey)*

Coordination

The implementation of various methods of coordination were considered.

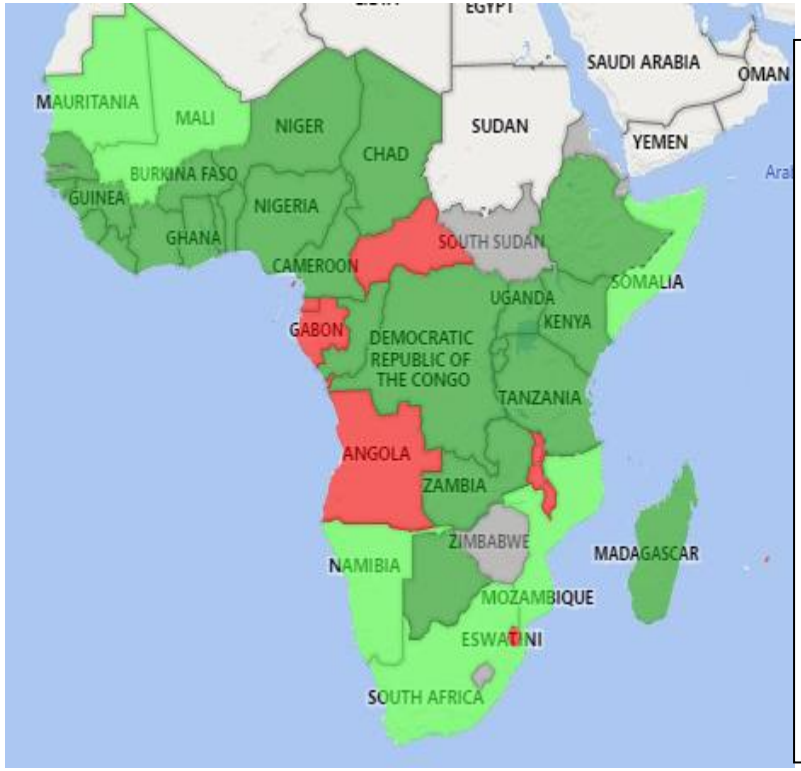
Based on the weights on table 1. States in ***Dark green*** *are considered fully ready,* ***Light green*** *considered almost ready, while* ***Grey*** *shows States that had not data (No response to the survey)*

Navigation

The implementation of various methods of navigation were considered.

Based on the weights on table 1. States in ***Dark green*** *are considered fully ready,* ***Light green*** *considered almost ready, while* ***Grey*** *shows States that had not data (No response to the survey)*

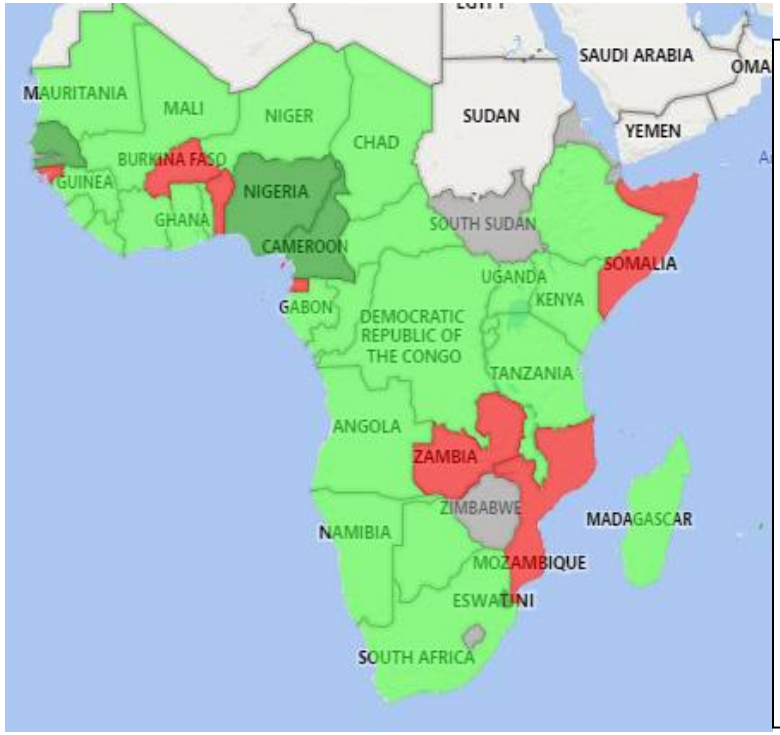
Safety Nets



The implementation of various methods of Safety nets were considered.

Based on the weights on table 1. States in ***Dark green*** *are considered fully ready,* ***Light green*** *considered almost ready, Red as not ready while* ***Grey*** *shows States that had not data (No response to the survey)*

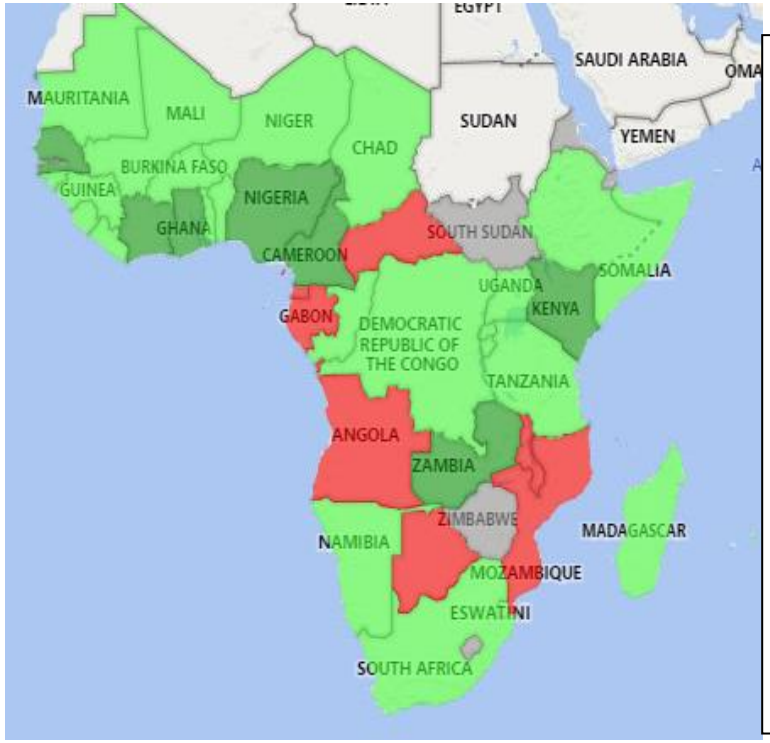
Airspace procedures



The implementation of various methods of Airspace procedures were considered.

Based on the weights on table 1. States in ***Dark green*** *are considered fully ready,* ***Light green*** *considered almost ready,* ***Red*** *as not ready while* ***Grey*** *shows States that had not data (No response to the survey)*

Combined areas depicting AFI readiness



The evaluation of a combination of all factors considered as a unit Based on the weights on Table 1.

*States in **Dark green** are considered fully ready, **Light green** considered almost ready, **Red** as not ready while **Grey** shows States that had not data (No response to the survey)*

2.5. Communications, Navigation and Surveillance (CNS)

2.5.1.Ground Communications -ATS/DS

In the area of Air traffic Service Direct Speech (ATS/DS), the pace of implementation of the AFI planned Circuits is satisfactory thanks to the support offered by the satellite based VSAT Networks (AFISNET, NAFISAT, SADC/2 and CAFSAT). However, the performance of the service is to be improved since the components of some networks are aging in an environment of lack of spare parts.

2.5.2.AFTN/AMHS/ AIDC

In the area of aeronautical messages exchanges the pace of implementation of the communication infrastructure for AFTN is completed with regards to the AFI Air Navigation Plan except one circuit that is disconnected due to non-technical reason. However, the region is still experiencing lack of operational messages such as Flights Plans, OPMETs and NOTAMs due amongst others to the technology obsolescence and operation procedures.

The implementation of Air traffic Message Handling Systems (AMHS) is ongoing although the pace has been slowed down in the COVID-19 environment. Lot of Air Traffic Service Units with AMHS capability continue to use AFTN gateways for the interconnection with neighboring centers.

The implementation of AIDC has been initiated and successfully conducted amongst some ANSPs in the AFI Region. Although ICAO Document 9694 provides clear guidelines for the implementation over AMHS of AIDC as a ground segment of the ATN the low pace of AMHS interconnection leads to AIDC implementation over the legacy AFTN.

The Status of implementation of AMHS and AIDC is presented in **Appendix xxxx** to this report

2.5.3.HF & VHF coverage

The AFI region has implemented the AFI Air Navigation Plan provision for HF in particular for continental remote and oceanic air spaces. The implementation of satellite-based Networks has significantly the VHF coverage in friendly remote continental areas. However, the evolving security concern in particular in part of western and central Africa, led to the loss of remote extended VHF Stations resulting in the reduction of VHF capability.

2.5.4.CPDLC

CPDLC is implemented to supplement HF deficiencies and VHF unavailability in continental remote and oceanic airspaces. The pace of implementation in concerned FIRs in the AFI Region is satisfactory.

100% of WACAF and X% of ESAF concerned FIRs are CPDLC capable and the datalink service is provided to equipped fleet.

2.5.5.Radionavigation

Aeronautical radionavigation service is provided in the AFI Region through the operation of conventional radionavigation aids (VORs, DMES and ILSs) and the Global Navigation Satellite System (GNSS) core and augmented.

The pace of completion of the implementation of Conventional Nav'Aids is satisfactory with regards to the requirements of Recommendation 10/4 of the AFI/RAN 7th meeting on Navaids.

Core GNSS operation is ongoing for en route operation and projects are being conducted for the implementation of SBAS. In this regard, AFCAC, with the assistance of ICAO conducted an independent Cost Benefit Analysis (CBA) for the implementation of SBAS in the Region

2.5.6.SSR Mode S

Surveillance Secondary Radar (SSR) Mode S compatible have been implemented in compliance with the provision of the Recommendations of the 7eme meeting of the AFI/RAN. In consideration of the overlapping of SSR Coverage, ICAO is promoting collaboration amongst Administration and Organization for surveillance data sharing.

2.5.7.ADS-C &ADS-B

Automatic Dependent Surveillance by Contract (ADS-C) is generally co implemented with CPDLC for operation in continental remote and oceanic airspaces. In WACAF 8 FIRs out of 9 are fully ADS-C capable, the Roberts FIR is not operating ADS-C. In ESAF xx FIRs out of yy are ADS-C Capable.

The implementation of ground based Automatic Dependent Surveillance Broadcast (ADS-B) to complement SSR Mode S is ongoing based on regional requirements. The opportunity given by Space based ADS-B for an extended coverage of all airspaces is taken into consideration by major ANSPs to improve surveillance coverage.

2.5.8.PBCS

The implementation of Required Communication Performance (RCP-240) and Required Surveillance Performance (RSP-180) is at its starting phase. Although ARMA is tasked to conduct PBCS monitoring there is a need for an ordered and harmonized regional implementation Plan.

2.5.9.Spectrum

Aeronautical frequency spectrum protection is one of he concerns encountered in the AFI region where the Air Navigation Service are often subject to severe interferences on VHF operation. The emerging International Mobile Telecommunication (IMT) remains the main threat to the aeronautical spectrum

2.6. Aeronautical Information Management (AIM)

2.6.1.Transition from AIS to AIM

2.6.2.SWIM

2.7. Aeronautical Meteorology (MET)

2.7.1. Regional implementation initiatives

APIRG approved Regional MET projects were established to support States in the implementation of SARPs and regional priorities. The achievements of these projects are summarized as follow:

a) Achievements by APIRG MET Project 1 for implementation of en-route weather phenomena information (SIGMET), (QMS/MET) service, in the AFI region

Fig. MET 3 : Implementation of SIGMET standards and procedures in the AFI region

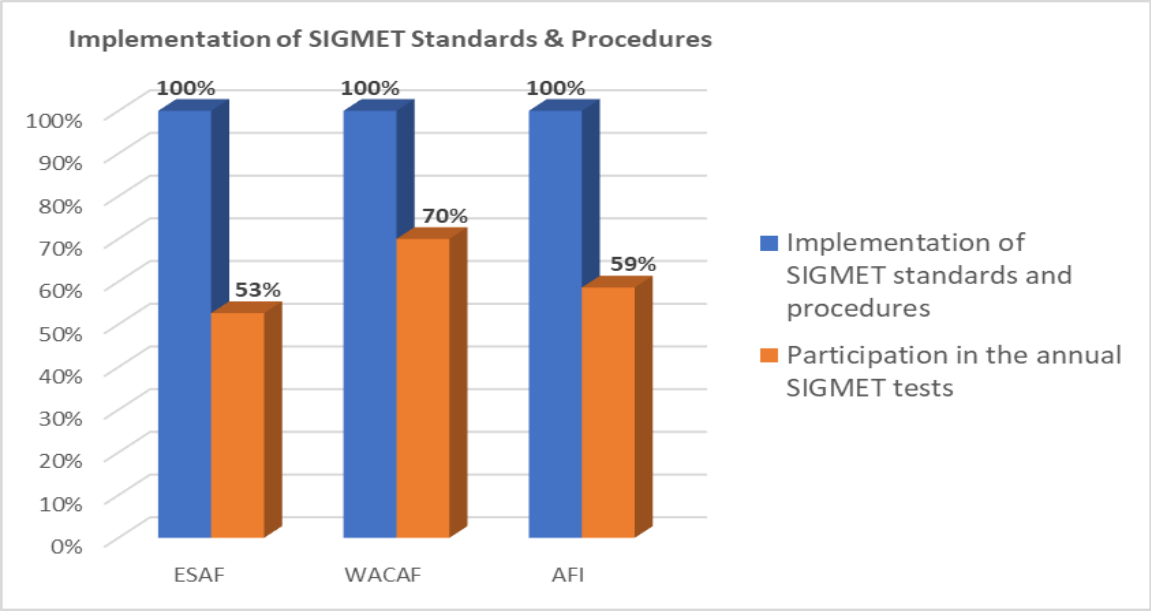
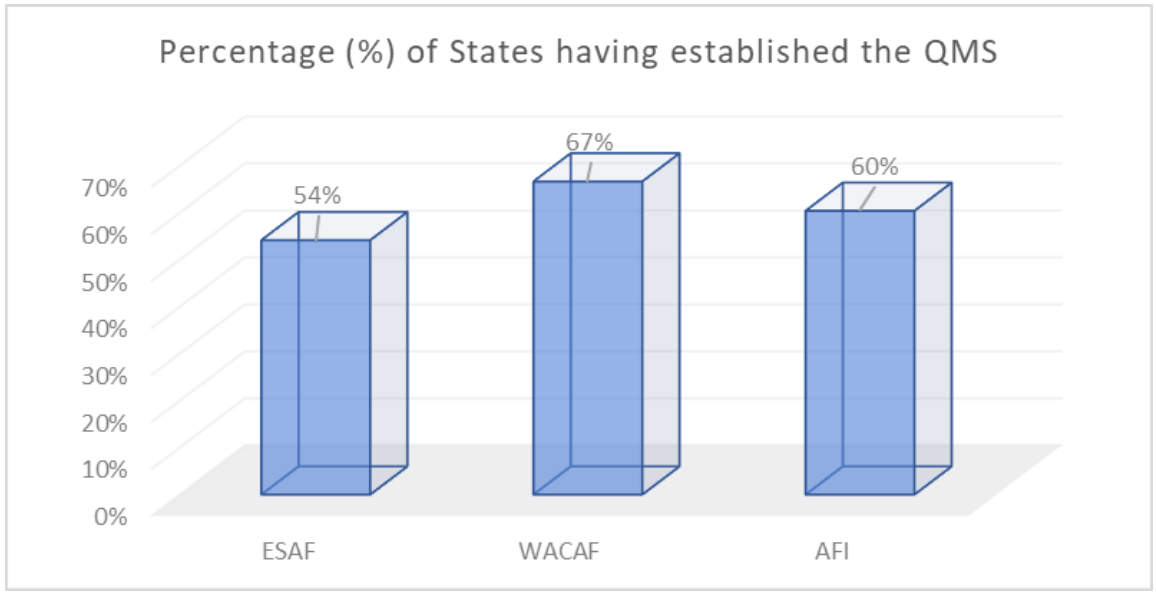
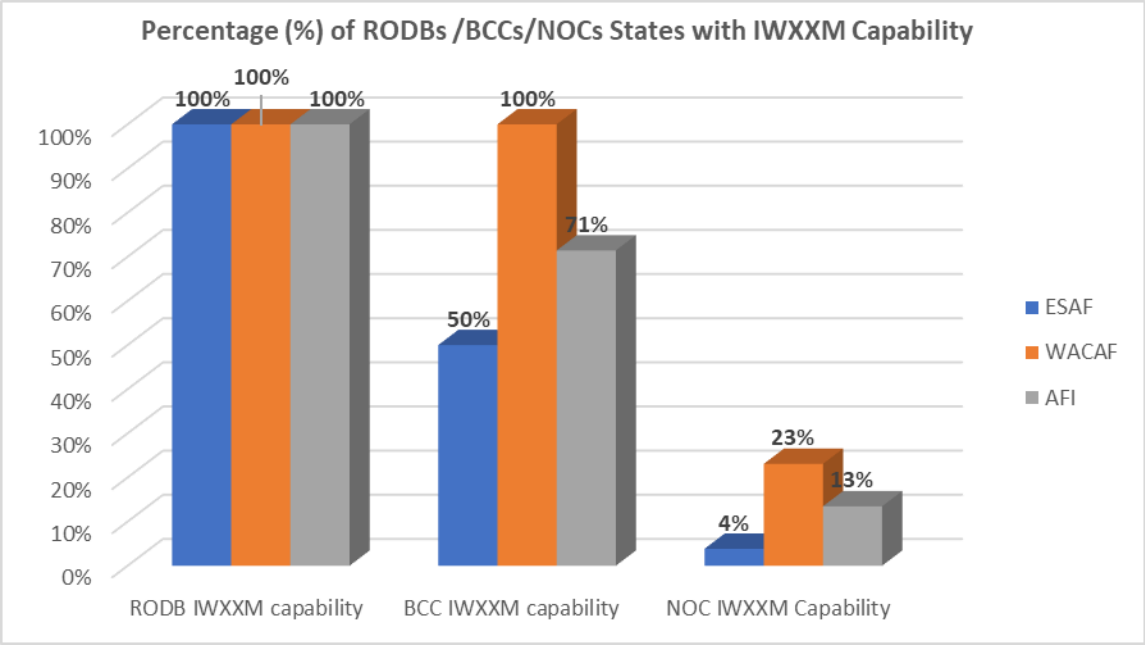


Fig. MET 4 : Status of the implementation of QMS in MET



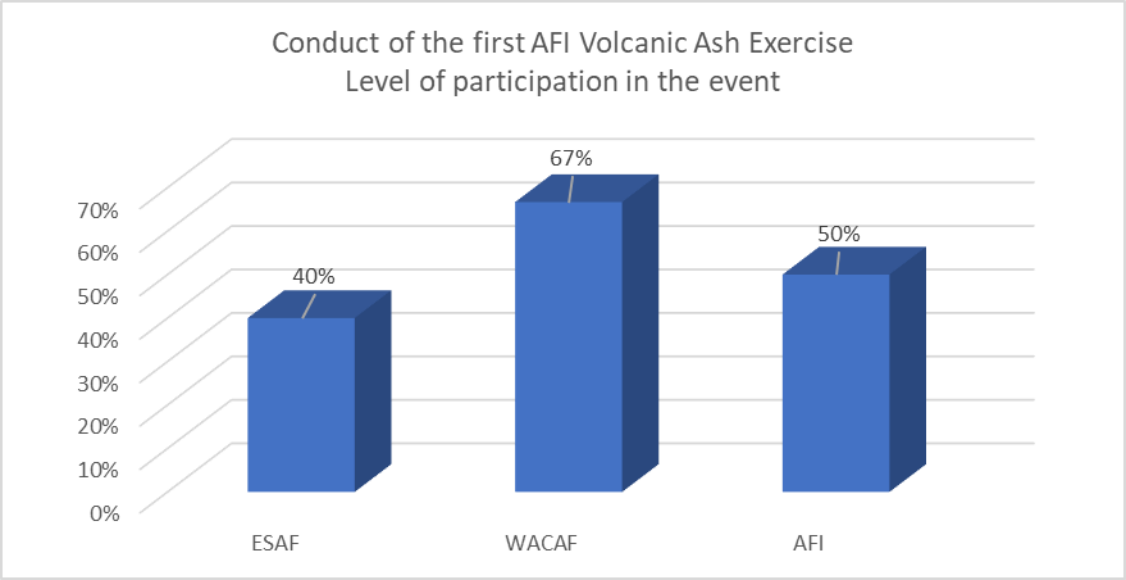
b) Achievements by APIRG MET Project 2 for implementation of Terminal Area Warnings and Forecasts, Provision of WAFS Forecasts and Optimization of

Fig. MET 5 : Status of IWXXM capabilities in the AFI region



Establishment of the AFI Volcanic Ash Exercise Steering Group and Conduct of the first volcanic ash exercise with the participation level illustrated hereto.

Fig. MET 6 : Participation in the AFI first volcanic ash exercise



c) MET Project 3 for the implementation of Annex 3 provisions relating to Space Weather requirements within the AFI Region

- Conduct of Survey on the status of implementation of SWX requirements in the region
- Introductory awareness workshops conducted
- Ongoing implementation activities.

d) The APIRG MET projects 1, 2 and 3 have been reviewed and revised to align their references with the groups, Threads and Elements of the GANP 6th edition. In addition, two new MET Projects were created to assist States in the implementation of aeronautical meteorological personnel competency standards and removal of deficiencies related to availability of OPMET data in the region.

2.7.2. Safety Oversight and QMS implementation in MET

- CODEVMET-AFI Project implementation Package developed to assist States in strengthening their Safety oversight system in MET and help State MET Services Providers to Comply with QMS requirements

2.7.3. ASBU applicable elements in MET

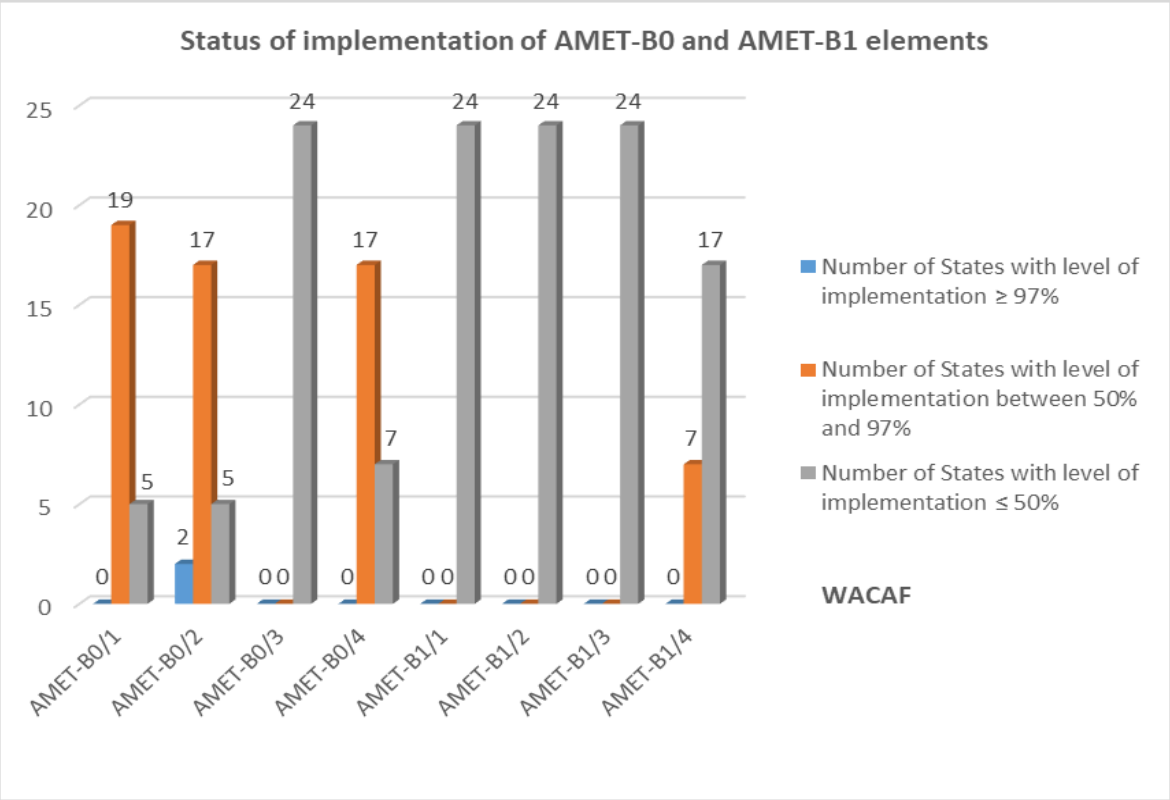
Table MET 1 : ASBU applicable elements in MET

AMET-B0 : Global, regional and local meteorological information to support flexible airspace management, improved situational awareness, collaborative decision-making and dynamically optimized flight trajectory planning.	
Element ID	**Element Title**
AMET-B0/1	Meteorological observations products
AMET-B0/2	Meteorological forecast and warning products
AMET-B0/3	Climatological and historical meteorological products
AMET-B0/4	Dissemination of meteorological products
AMET-B1 : Meteorological information supporting automated decision process or aids, involving meteorological information, meteorological information translation, ATM impact conversion and ATM decision support	
Element ID	**Element Title**
AMET-B1/1	Meteorological observations information
AMET-B1/2	Meteorological forecast and warning information
AMET-B1/3	Climatological and historical meteorological information
AMET-B1/4	Dissemination of meteorological information

2.7.4. Status of implementation of MET ASBU elements

The status of implementation of elements of AMET-B0 and AMET-B1 is provided in the Figure MET-x, showing the number of States with level of implementation ≥ 97%; number of States with level of implementation between 50% and 97% and number of States with level of implementation ≤ 50%.

Fig. MET 7 : Status of implementation of AMET-B0 and AMET-B1 elements



2.8. Search and Rescue (SAR)

2.8.1. Status of SAR implementation in the AFI Region

SUMMARY OF THE AFI STATUS OF STATE IMPLEMENTATION OF SAR

FI: Fully Implemented **PI**: Partially Implemented **NI**: Not Implemented **N/A**: Not Applicable

N°	STATES	Regulatory framework	Organisation	Aeronautical / maritime SAR coordination	Publication of SAR information	Funding	SAR Conventions and Agreements	Operational procedures	Equipment / Communications	Personnel, training and exercises	SAR services oversight / Improving services
1	ANGOLA	NI	NI	NI	PI	NI	PI	PI	PI	PI	NI
2	BENIN	FI	FI	PI	PI	PI	PI	PI	PI	PI	PI
3	BOTSWANA	FI	FI	N/A	PI	NI	PI	PI	PI	PI	PI
4	BURKINA FASO	FI	PI	N/A	FI	PI	FI	FI	PI	PI	FI
5	BURUNDI	FI	PI	PI	PI	PI	PI	PI	PI	PI	NI
6	CAMEROON	PI	PI	PI	FI	FI	NI	FI	PI	PI	PI
7	CAPE VERDE	FI	FI	FI	PI	FI	FI	FI	PI	PI	PI
8	CENTRAL AFRICAN REPUBLIC	PI	PI	N/A	PI	NI	NI	NI	NI	NI	NI
9	DEMOCRATIC REPUBLIC OF CONGO	PI	NI	NI	NI	NI	PI	NI	NI	NI	NI
10	EGYPT	FI	FI	FI	FI	FI	PI	FI	FI	FI	PI
11	ETHIOPIA	FI	FI	FI	PI	PI	FI	FI	PI	PI	PI

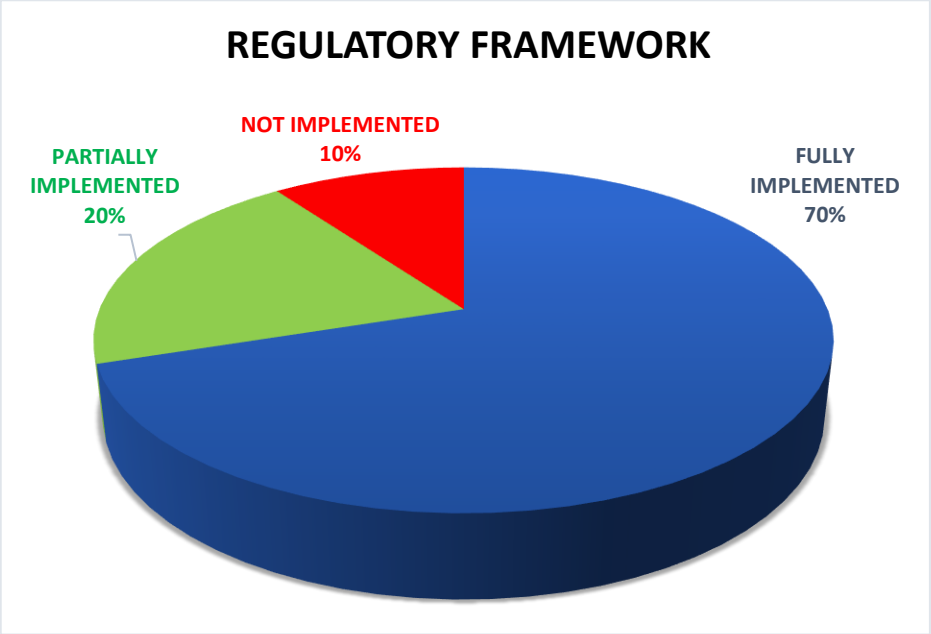
N°	STATES	Regulatory framework	Organisation	Aeronautical / maritime SAR coordination	Publication of SAR information	Funding	SAR Conventions and Agreements	Operational procedures	Equipment / Communications	Personnel, training and exercises	SAR services oversight / Improving services
12	GABON	NI	PI	PI	PI	NI	NI	NI	NI	NI	NI
13	GAMBIA	PI	PI	PI	FI	PI	NI	FI	NI	NI	NI
14	GHANA	PI	PI	PI	PI	PI	PI	PI	PI	PI	NI
15	IVORY COAST	FI	FI	PI	FI	PI	PI	PI	PI	PI	PI
16	KENYA	FI	FI	FI	PI	PI	PI	PI	PI	PI	PI
17	MALI	FI	FI	N/A	FI	PI	FI	PI	PI	PI	PI
18	MAURITIUS	FI	FI	PI	NI	PI	PI	PI	PI	PI	NI
19	MOROCCO	FI	FI	FI	PI	FI	PI	FI	FI	FI	PI
20	NAMIBIA	FI	FI	PI	PI	NI	FI	PI	PI	PI	PI
21	NIGER	PI	PI	N/A	PI	NI	PI	NI	NI	PI	PI
22	NIGERIA	FI	FI	FI	PI	PI	NI	FI	PI	PI	PI
23	RWANDA	FI	PI	PI	FI	NI	PI	PI	PI	PI	NI
24	SENEGAL	FI	FI	PI	PI	NI	PI	FI	PI	PI	PI

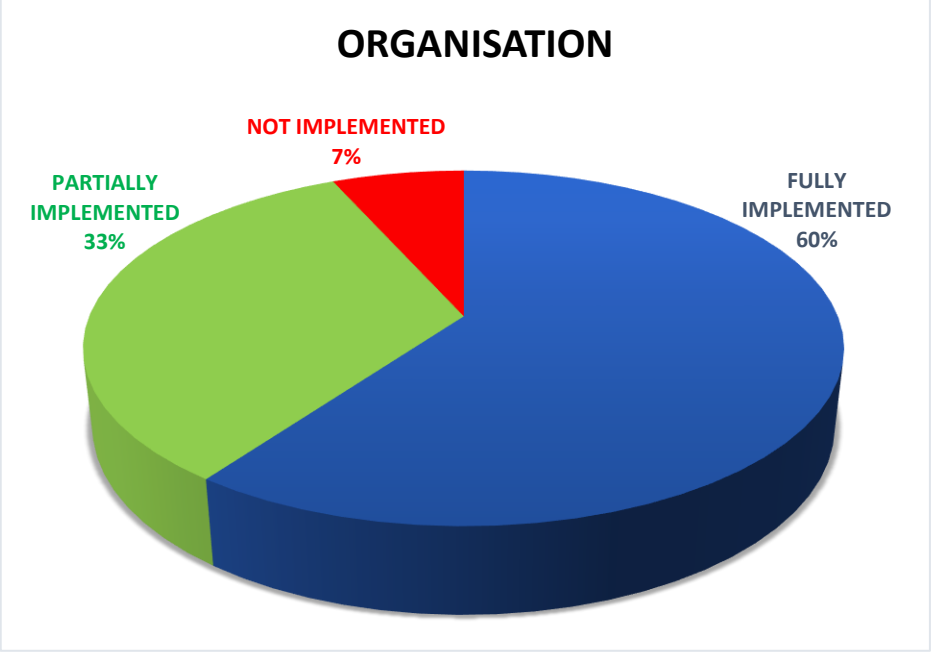
N°	STATES	Regulatory framework	Organisation	Aeronautical / maritime SAR coordination	Publication of SAR information	Funding	SAR Conventions and Agreements	Operational procedures	Equipment / Communications	Personnel, training and exercises	SAR services oversight / Improving services
25	SEYCHELLES	NI	PI	FI	PI	NI	PI	NI	PI	PI	PI
26	SOUTH AFRICA	FI	FI	PI	FI	FI	FI	PI	FI	FI	PI
27	SUDAN	FI	FI	FI	PI	FI	PI	PI	PI	PI	NI
28	TANZANIA	FI	FI	PI	PI	PI	FI	NI	PI	PI	PI
29	TOGO	FI	FI	FI	FI	PI	FI	FI	PI	PI	PI
30	UGANDA	FI	FI	FI	PI	FI	PI	FI	PI	PI	NI

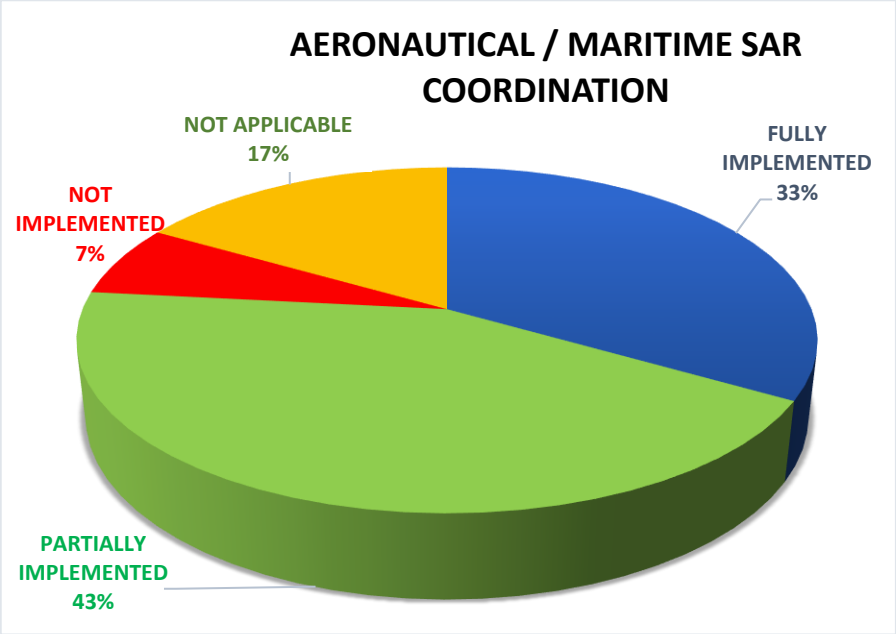
The results are highlighted in percentage of implementation in the following table.

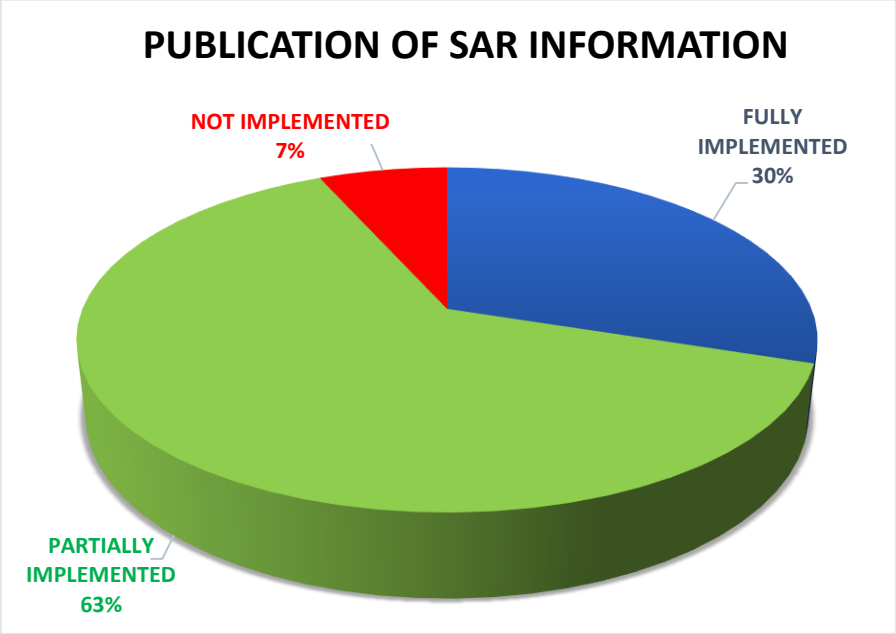
STATISTICS

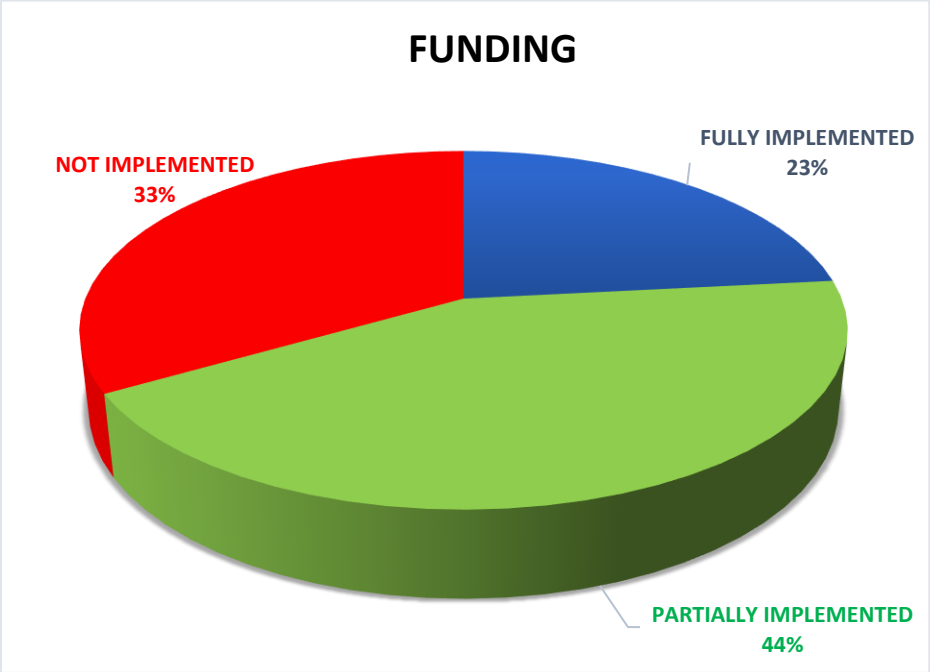
LEVEL OF IMPLEMENTATION	Regulatory framework	Organisation	Aeronautical / maritime SAR coordination	Publication of SAR information	Funding	SAR Conventions and Agreements	Operational procedures	Equipment / Communications	Personnel, training and exercises	SAR services oversight / Improving services
FI	21	18	10	9	7	8	11	3	3	1
	70 %	60 %	33.33 %	30 %	23.33 %	26.67 %	36.67 %	10 %	10 %	3.33 %
PI	6	10	13	19	13	17	13	22	23	18
	20 %	33.33 %	43.33 %	63.33 %	43.33 %	56.67 %	43.33 %	73.33 %	76.67 %	60 %
NI	3	2	2	2	10	5	6	5	4	11
	10 %	6.67 %	6.67 %	6.67 %	33.33 %	16.67 %	20 %	16.67 %	13.33 %	36.67 %
N/A	0	0	5	0	0	0	0	0	0	0
			16.67 %							

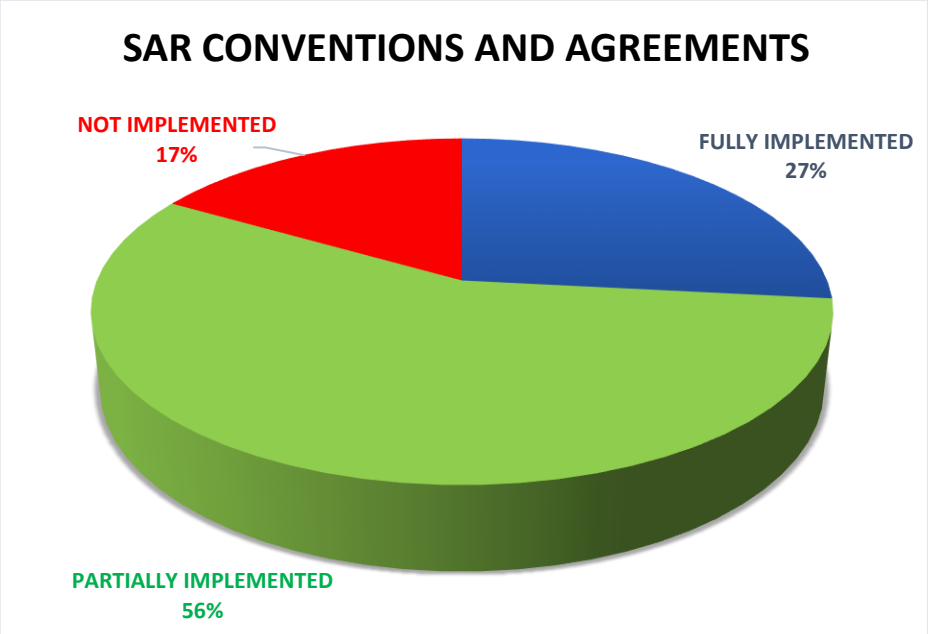

REGULATORY FRAMEWORK
NOT IMPLEMENTED
10%
PARTIALLY
IMPLEMENTED
20%
FULLY
IMPLEMENTED
70%

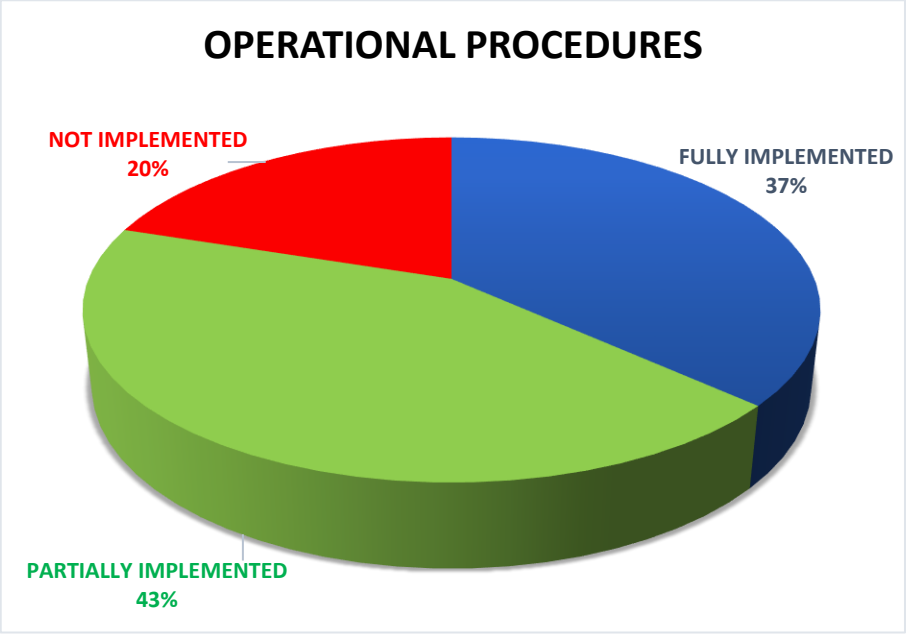

ORGANISATION
NOT IMPLEMENTED
7%
PARTIALLY
IMPLEMENTED
33%
FULLY
IMPLEMENTED
60%

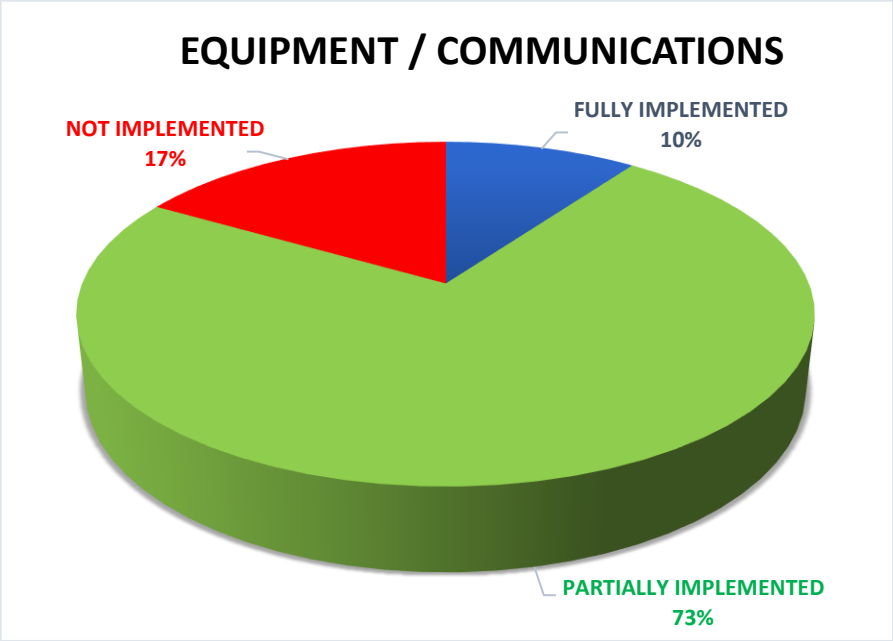

AERONAUTICAL / MARITIME SAR COORDINATION
NOT APPLICABLE 17%
FULLY IMPLEMENTED 33%
NOT IMPLEMENTED 7%
PARTIALLY IMPLEMENTED 43%


PUBLICATION OF SAR INFORMATION
NOT IMPLEMENTED 7%
FULLY IMPLEMENTED 30%
PARTIALLY IMPLEMENTED 63%

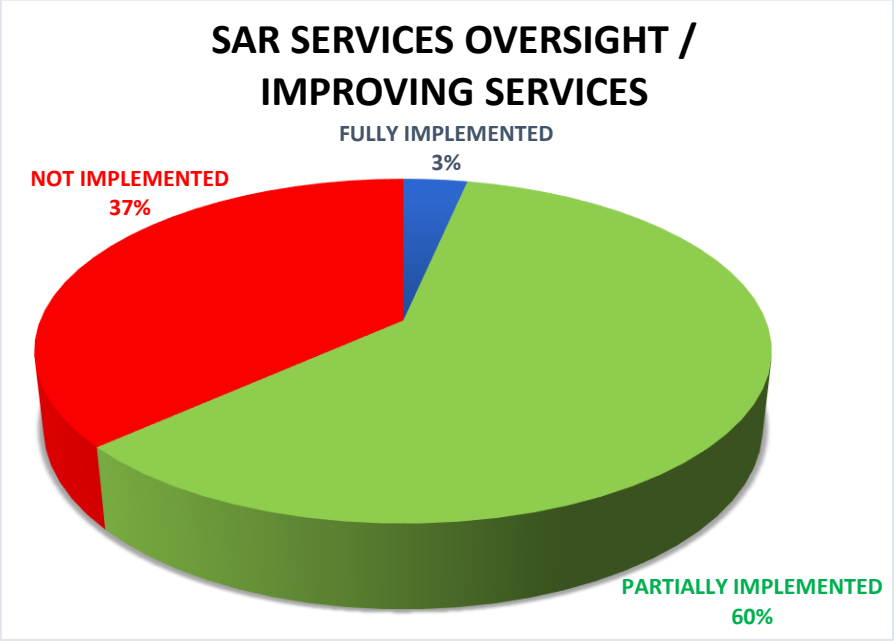

FUNDING
NOT IMPLEMENTED
33%
FULLY IMPLEMENTED
23%
PARTIALLY IMPLEMENTED
44%


SAR CONVENTIONS AND AGREEMENTS
NOT IMPLEMENTED
17%
FULLY IMPLEMENTED
27%
PARTIALLY IMPLEMENTED
56%


OPERATIONAL PROCEDURES
NOT IMPLEMENTED
20%
FULLY IMPLEMENTED
37%
PARTIALLY IMPLEMENTED
43%


EQUIPMENT / COMMUNICATIONS
NOT IMPLEMENTED
17%
FULLY IMPLEMENTED
10%
PARTIALLY IMPLEMENTED
73%


PERSONNEL, TRAINING AND EXERCISES
NOT IMPLEMENTED
13%
FULLY IMPLEMENTED
10%
PARTIALLY IMPLEMENTED
77%


SAR SERVICES OVERSIGHT /
IMPROVING SERVICES
FULLY IMPLEMENTED
3%
NOT IMPLEMENTED
37%
PARTIALLY IMPLEMENTED
60%

2.9. **ASBU Implementation Status**

2.9.1. ATM

3. I = Implemented NI = Not implemented IP = In progress N/A = Not applicable

Essentiels services (BBBs) to be implemented *(List the requiered essential serivices)*	RANP requirements (eANP Vol I & Vol II refer) *(Provide the corresponding regional requirements)*	Angola	Botswana	Burundi	Comoros	Djibouti	Eritrea	Eswatini	Ethiopia	Kenya	Lesotho	Madagascar	Malawi	Mauritius	Mozambique	Namibia	Rwanda	Seychelles	Somalia	South Africa	South Sudan	Uganda	United Rep. of Tanzania	Zambia	Zimbabwe
ACAS	B0-ACAS Improvement (ACAS II - TCAS version 7.1)	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I		I
FRTO	B0/1 Direct Routing (DCT)	I	I	NI	NI	NI	I	I	I	I	NI	I	I	I	I	I	I	I	NI	I	NI	I	I		I
	B0/2 Airspace planning and flexible Use of Airspace (FUA)	NI	NI	NI	NI	NI	NI	NI	I	I	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI		NI
	B0/3 Pre-validated and coordinated ATS routes to support flight and flow	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I		I
	B0/4 Basic conflict detection and conformance monitoring.	NI	NI	NI					I	I		I	NI	I	NI	NI	NI	NI	NI	NI	NI	I	NI		NI
	B1/1 Free Route Airspace (FRA)	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	I	NI	NI	NI	NI	NI	NI	NI	NI	NI		NI
	B1/2 Required Navigation Performance (RNP) routes	NI	NI	NI	NI	NI	NI	NI	I	I	NI	NI	NI	I	I	NI	NI	I	NI	I	NI	I	I		NI
APTA	B0/1 PBN Approaches (Basic)	I	I	I	I	I	I	NI	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I		I
	B0/2 PBN SIDS and STAR procedures (Basic)	I	I		I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I		I
	B0/3 SBAS/GBAS CAT I precision approach procedures	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I		I
	B0/4 CDO (Basic)	NI	NI	NI				NI	I	I	NI	NI	NI	I	NI	NI	NI	NI	NI	I	NI	I	NI		NI
	B0/5 CCO (Basic)	NI	NI	NI				NI	I	I	NI	NI	NI	I	NI	NI	NI	NI	NI	I	NI	I	NI		NI
	B0 - TBO (Datalink - CPDLC/ADS-C)	I	NI	N/A	N/A	N/A	NI	N/A	NI	I	N/A	I	N/A	I	NI	N/A	N/A	I	I	I	NI	N/A	NI		N/A

SNET	B0/1 STCA	≧	–	≧				≧	–	–		–	–	–	–	–	–		–	–	≧	–	–		–
	B0/2 MSAW	– ≧	–	≧				≧	–	–		–	–	–	–	–	–		–	–	≧	–	–		–
	B0/3 APW	– ≧	–	≧				≧	–	–		–	≧	–	–	≧	≧		–	–	≧	–	–		–
	B0/4 APM	– ≧	–	≧				≧	–	–		–	≧	–	–	≧	≧		–	–	≧	–	–		–

4. Environmental Protection

4.1. Air Navigation developments related to Environmental Protection

5. Coordination and Cooperation

5.1. Interregional Coordination
5.2. Coordination between APIRG and RASG-AFI
5.3. ***Air Navigation Services Providers Peer Review Programme***

5.3.1. The AFI Air Navigation Services Providers Safety and Quality Assurance (ASQA) initiative was created pursuant to the Coordination meeting between African Air Navigation Services Providers organized by ICAO in Montreal, on 4 February 2015 in the framework of the President of the Council No Country Left Behind statement. In this regards the AFI ANSPs Peer Review Programme adopted its terms of Reference in Durban, South Africa on 12 June 2015.

5.3.2. The activities conducted so far on Peer Reviewer Training, pioneer peer reviews were drastically impacted by the CIVID-19 Pandemic.

5.3.3. The ANSPs meeting in Lomé (5.1 Refers) relaunched the Peer Review activity through the development of a programme including the update of basic documentation, the conduct of refresher training and the effective conduct of peer reviews that will take place on 2023.

6. Industry Initiatives

6.1. ***Air Navigation Services Providers***

5.1.1. The AFI Air Navigation Service Providers (ANSPs) enhanced their cooperation by holding their Fifth Meeting in Lomé, Togo from 28 March - 1st April 2022.

5.1.2. During this meeting the impact of the COVID-19 pandemic on air navigation services and related challenges encountered were underlined. It appeared that international commercial Air Navigation Provision dropped to 0% resulting in loss of revenue. Agreement was made to implement innovative and efficient working solutions (AIDC, ATFM…) to address human factors issues, identify and give priority to the implementation of projects that contribute to the resilience of the air navigation system, develop, and harmonize a regional ANSPs post Covid-19 cooperative restart and recovery mechanism.

5.1.3. The meeting discussed the status of implementation of the Global and Regional Air Navigation Plans (GANP & AFI ANP) and identified ANSPs Priority Areas of Cooperation. ANSPs were invited to enhance collaboration for the establishment of the Air Navigation Systems Architecture and Roadmap towards a Seamless Sky in Africa in support to SAATM implementation

6.2. **Airspace Users**
6.3. **Airport Operators**
6.4. **Aircraft Manufacturers**

7. **Challenges and Opportunities** (*planning (human/financial etc.), implementation, operation and monitoring, reporting) measures for each challenge*

8. Recommendations

9. Appendices