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AFI Air Navigation Report (AANR)

Second Edition, December 2024

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

ASBU IMPLEMENTATION AND REGIONAL INITIATIVES IN THE AFI REGION

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FOREWORD

Mrs. Paule Assoumou Koki,
Director General, Cameroon Civil Aviation Authority
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Distinguished African Aviation Stakeholders, the Africa-Indian Planning and Implementation Regional Group (APIRG) in discharging its mandate committed to regular reporting on air navigation activities in the Region. The fulfillment of this commitment started in 2023 with the publication of the first annual air navigation report which, from the feedback received, was welcomed and appreciated by the readers.

To ensure continuity and with regards to ongoing projects and initiatives the Region has successfully issued this second edition of the Annual Air Navigation Report. This second Edition is focused on the implementation of the Aviation System Block Upgrades (ASBU) in the AFI Region as part of the implementation of the Global Air Navigation Plan (GANP). ASBU methodology and the associated technology roadmaps are designed to assist States in modernizing their essential air navigation services and facilities. The Assembly Resolution 38-02, among others, call upon States, planning and implementation regional groups (PIRGs), and the aviation industry to provide timely information to ICAO (and to each other) regarding the implementation status of the GANP. Furthermore, APIRG/20 through conclusion 20/05 called for the reporting by States of the status of implementation of ASBU in the AFI Region.

This second Edition of the annual Air Navigation Report aims to shed light on progress in the implementation of ASBU both at regional and national levels through sharing of information on projects and initiatives undertaken in the AFI region. The report, therefore, appears as a powerful reference tool that complements ASBU related information contained in Volume III of the AFI Air Navigation Plan by providing more insight into efforts and investments carried out by States in the modernization of their air navigation and airport services and facilities.

Production of this second Edition became possible, due to the commitment and collaboration of all involved parties including States and Organizations as well as the editorial team. The collection and processing of information, though at a slow pace, were crucial for the completion of the report. I would like to express my gratitude to all contributors who committed to the effective publication of this report.

Readers will find some key information and data related to ASBU implementation in various domains of air navigation including airport and airspace operations as well as supporting technologies and services. Suggestions for improvement of the content of the report and future editions are highly welcomed through available channels.

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As Secretaries of the AFI Planning and Regional Implementation Group (APIRG) and the Regional Aviation Safety Group for the AFI Region (RASG-AFI), we are pleased to introduce our able Reporting Team that worked very hard to coordinate with the States, organizations and industry, and compile the information and data contained in this Second Edition of the Annual Air Navigation Report.

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1. EXECUTIVE SUMMARY

1.1. Global air navigation plan & ASBU Framework

1.1.1. Aviation connects people globally, driving economic growth and improving living standards through reliable daily operations. The Global Air Navigation Plan (GANP) supports sustainable aviation growth by guiding the development of a safe, high-performing, and seamless global air navigation system that integrates aerodrome operations, air traffic management, meteorology, and more. The GANP, structured into four levels for targeted access, helps stakeholders in prioritizing advancements, supporting ICAO's objectives and the United Nations Sustainable Development Goals (SDGs).

1.1.2. The GASP supports the implementation of the GANP by promoting the effective implementation of safety oversight and a safety management approach, including safety risk management.

1.1.3. The GANP's content is organized into four levels. At its strategic level, the GANP outlines stable performance and technical frameworks, while the global technical level includes two technical frameworks, the basic building blocks (BBBs) and Aviation System Block Upgrades (ASBUs), with its associated performance framework, which includes performance objectives and key performance indicators (KPIs). With the implementation of the BBBs, an air navigation system will be able to deliver the essential services to be provided for international civil aviation. The subsequent performance of these air navigation systems can then be improved through the application of the ASBU framework.

1.1.4. The ASBU framework drives the evolution of the global air navigation system towards the achievement of the identified performance ambitions by defining operational improvements and associated performance benefits, derived from specific concepts of operations defined in the evolutionary steps of the conceptual roadmap. Once validated and made available for deployment, these operational improvements support the adoption of a holistic, performance-based approach towards modernizing the air navigation system in a cost-effective manner. The adoption of a globally harmonized performance management process for the modernization of the air navigation system is necessary to align global, regional and national plans.

1.2. Regional air navigation plan & applicable ASBU Elements

1.2.1. Guided by the GANP, the regional planning process started by identifying the homogeneous ATM areas, major traffic flows and international aerodromes. An analysis of this data leads to the identification of opportunities for performance improvement. Elements from the Aviation System Block Upgrades (ASBUs) are evaluated to identify which of those Elements best provides the operational improvements needed. Depending on the complexity of the element, additional planning steps may be undertaken including financial and training needs. Finally, regional plans would be developed for the deployment of elements by drawing on supporting technology requirements. This is an iterative planning process which may require repeating several steps until a final plan with specific targets is in place. This planning methodology requires full involvement of States, service providers, airspace users and other stakeholders, thus ensuring commitment by all for implementation.

1.2.2. On 18 June 2014, the ICAO Council decided that the regional air navigation plans (ANPs) should be published in three volumes.

1.2.3. The ANP Volume I contains stable plan elements whose amendment necessitates approval by the Council such as the assignment of responsibilities to States for the provision of aerodrome and air

navigation facilities and services in accordance with Article 28 of the Convention on International Civil Aviation (Doc 7300); and the current to medium term mandatory regional requirements related to aerodrome and air navigation facilities and services to be implemented by States in accordance with regional air navigation agreements and requirements specific to the region which are not covered in the ICAO Standards and Recommended Practices (SARPs) and Procedures for Air Navigation Services (PANS). The material to be included in Volume I should minimize the requirement for frequent amendment.

1.2.4. ANP Volume II contains dynamic plan elements related to the assignment of responsibilities to States for the provision of aerodrome and air navigation facilities and services; and the mandatory requirements related to aerodrome and air navigation facilities and services to be implemented by States in accordance with regional air navigation agreements.

1.2.5. ANP Volume III contains dynamic/flexible plan elements related to the implementation of the air navigation system and its modernization in line with the ICAO Aviation System Block Upgrades (ASBUs) and associated technology roadmaps described in the Global Air Navigation Plan (GANP).

1.2.6. The information contained in Volume III is related mainly to Planning (objectives set, priorities and targets planned at regional or sub-regional levels), Implementation monitoring and reporting (monitoring of the progress of implementation towards targets planned. This information should be used as the basis for reporting purposes and/or Guidance (providing regional guidance material for the implementation of specific system/procedures in a harmonized manner).

1.2.7. The planning and implementation of the ICAO Aviation System Block Upgrades (ASBUs) should be undertaken within the framework of the APIRG with the participation and support of all stakeholders, including regulatory personnel. The ASBU Threads/Elements adopted by States in the AFI Region should be followed in accordance with the specific ASBU requirements to ensure global interoperability and harmonization of air traffic management. APIRG determines the ASBU Threads/Elements, which best provide the operational improvements needed in the AFI Region.

1.2.8. The ASBU framework has been updated in the 6th edition of the GANP with better clarification of its concepts. Thus, the ASBU Elements have become the core concept. It is a specific change in operations designed to improve the performance of the air navigation system under specified operational conditions.

1.2.9. While the first version of the AFI Regional air navigation system implementation plan was Module-oriented, the focus is now made on the applicability of the ASBU elements in the AFI region. The assessment of this applicability was conducted, considering the performance-based approach. Moreover, some ASBU Elements are made mandatory pursuant to the ICAO Standards and Recommended Practices (SARPs).

1.2.10. The identification of applicable ASBU Elements was conducted in the areas of AOP, ATM, SAR, AIM, CNS and MET based on the maturity level and the rationale of applicability of the elements. The 2023 Edition of Volume III of the AFI eANP provides details on the applicable ASBU elements as approved by APIRG at its Twenty-fifth meeting and is available at https://www.icao.int/WACAF/Documents/edocs/eANPs/AFI%20ANP%20Volume%20III%20Edition%20July%202023.pdf

1.3. ASBU implementation monitoring & reporting

1.3.1. The process of data collection is one of the most critical processes at national and regional levels to support the monitoring and reporting of the status of implementation of the applicable ASBU Threads/Elements. APIRG urged States to provide their respective Regional Offices with necessary data on implementation progress at least once a year (by 1st December every year) for the development of the AFI Region Air Navigation Reports.

1.3.2. Volume III of eANP contains tables aiming for data collection on planning and implementation of ASBU elements in AOP, ATM, SAR, CNS, AIM and MET, as well as for the monitoring of implementation status. An Excel tool was developed by the Secretariat to assist States in reporting on their status of implementation.

1.3.3. Under the Secretariat initiative, a framework for data collection and monitoring of ASBU implementation was developed. This ASBU online tool was completed as a second module of the AANDD platform, which leverages the existing database, providing access to both Air navigation deficiencies management and ASBU monitoring through a single user account. A demonstration of this tool, through its main functionalities including the configuration of the ASBU concepts in the system, the reporting on planning and implementation of the applicable ASBU elements, as well as the generation of dashboards and regional reports was presented at the APIRG/27 Meeting that agreed on the use of the said ASBU tool of the AANDD platform by States for reporting on their planning and implementation of ASBU elements in the AFI region. The ASBU tool is accessible at https://aandd.icao.int/

1.4. Overview of ASBU implementation in the AFI Region

1.4.1. The implementation of ASBU is critical in the Africa Indian-Ocean region, where the aviation infrastructure and safety oversight systems are evolving to meet global standards.

1.4.2. The 2023 edition of Volume III of the AFI eANP provides details on the ASBU elements applicable in the AFI Region. These elements are identified within blocks 0 and 1 pertaining to Technology, Operations and Information for AOP, ATM, SAR, CNS, MET and AIM areas.

1.4.3. The AFI region has made considerable progress in adopting ASBU principles, through the implementation of ASBU B0 elements up to 67%. Significant efforts are needed to foster implementation of ASBU B1 elements. Key aspects include:

- **Regulatory Framework**: Many countries have aligned their national regulations with ICAO's Global Air Navigation Plan (GANP) and ASBU requirements, promoting harmonized regional airspace management.
- **Capacity Building**: ICAO has undertaken numerous initiatives to enhance the technical capabilities of States, such as the APIRG approved regional Projects, the Result-Based Implementation Support, the Cooperative Development of Aeronautical Meteorology Services in the AFI Region.
- **Implementation Challenges**: The AFI region faces significant challenges in infrastructure, human and financial resources. A lack of robust air navigation systems and inconsistent safety oversight remains a challenge. Moreover, the varied levels of economic

and technical development in different countries require tailored approaches to ASBU implementation.

1.4.4. Strategic Focus Areas for ASBU Implementation to foster progress in the AFI region, include:

- **Capacity Building**: Addressing skills gaps in key areas such as implementation in AOP, ATM, SAR, CNS, AIM, MET as well as safety oversight is crucial. Regional cooperation for training and capacity building is a priority.
- **Infrastructure**: Significant investments are needed in upgrading and modernizing aviation infrastructure, including air navigation services and ground-based systems, to meet ASBU requirements.
- **Regional Cooperation**: Enhanced cooperation among African States through the African Union (AU), AFCAC, and regional economic communities (RECs) is essential for standardizing ASBU implementation and addressing common challenges.
- **Collaboration with Industry Stakeholders**: Partnerships with airlines, air navigation service providers (ANSPs), and international organizations are essential for the successful rollout of ASBU in the region. Collaboration ensures that the AFI region benefits from shared knowledge and resources, aligning local developments with global advancements.
- **Harmonization of Regulations and Procedures**: States should prioritize the alignment of national aviation regulations with ICAO's global standards, ensuring smooth integration into the international aviation network.
- **Monitoring and Evaluation**: A continuous monitoring and evaluation mechanism is necessary to track the progress of ASBU implementation and to adjust based on the region's evolving needs and challenges.

1.4.5. The implementation of ASBU in the AFI region is a vital step toward modernizing aviation systems, enhancing safety, and improving efficiency. Despite challenges, the region is making steady progress, supported by strong partnerships and strategic initiatives as demonstrated in subsequent sections of this report. As infrastructure and capacity continue to improve, the region will be better positioned to meet the GANP goals, contributing to a safer, more efficient, and sustainable global aviation system.

2. INTRODUCTION

2.1 Objective

2.1.1 The AFI Annual Air Navigation Report presents an overview of the current achievements, as well as an outlook of the implementation of the ICAO ASBU Block 0 and Block 1 Elements identified in the 7th Edition of the GANP, within the AFI Region during the Reference period of January to December 2023.

2.1.2 GANP states that the regional and national planning process should be aligned and used to identify those elements which best provide solutions to the operational needs identified. Depending on implementation parameters such as the complexity of the operating environment, the constraints and the resources available, regional and national implementation plans will be developed in alignment with the GANP. Such planning requires interaction between stakeholders including regulators, users of the aviation system, the air navigation service providers (ANSPs), aerodrome operators and supply industry for implementation. The second edition of the annual air navigation report provides an in-depth to the process developed at regional and national levels as well as strategies developed to progress the implementation of ASBU elements in the AFI region.

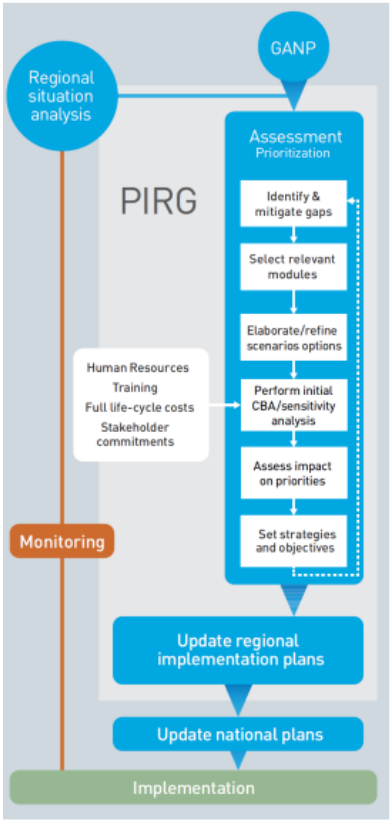


CHART 1-ASBU Prioritization process

2.2 Background

2.2.1 Following the recommendations from the Twelfth Air Navigation Conference (AN-Conf/12), the Fourth Edition of the Global Air Navigation Plan (GANP) based on the Aviation Systems Block Upgrades (ASBU) approach was endorsed by the 38th Assembly of ICAO in October 2013. The Assembly Resolution 38-02 which agreed, amongst others, to call upon States, planning and implementation regional groups (PIRGs), and the aviation industry to provide timely information to ICAO (and to each other) regarding the implementation status of the GANP, including the lessons learned from the implementation of its provisions and to invite PIRGs to use ICAO standardized tools or adequate regional tools to monitor (in collaboration with ICAO) and analyze the implementation status of air navigation systems.

2.2.2 In the framework of the GANP 4th Edition, APIRG/19 adopted the AFI Air Navigation System Implementation Action aligned with the ICAO Aviation System Block Upgrades (ASBUs).

2.2.3 APIRG/20 called for States to provide information on the status of implementation of ASBU modules using the Air Navigation Reporting Forms (ANRFs) or other reporting tools as may be provided, at least twice a year. APIRG/20 further recommended the development of annual air navigation reports reflecting the status of implementation of ASBU modules.

2.2.4 The 40th ICAO Assembly adopted the sixth edition of the GANP which was restructured in a four-layer structure including global strategic framework, global technical framework (BBBs and ASBU), and the regional and national plans. The sixth edition presented a major shift from the module-based to the

element-based approach in ASBU scalable implementation framework and the introduction of new threads and elements.

2.2.5 APIRG amended and adopted volume III of the eANP to align with the changes brought in by the 6th Edition of the GANP. A list of applicable ASBU elements was identified and adopted for the AFI Region, to ensure a harmonized yet scalable implementation of ASBU in States. States were called on to provide annual report to ICAO on the status of planning and implementation of ASBU elements through reporting forms, tools and the annual air navigation report.

2.3 Scope

2.3.1 The Second Edition of the AFI Annual Air Navigation Report addresses the implementation status of the AFI applicable ASBU Elements as adopted by the APIRG/25 and covers the period from January to December 2023.

2.3.2 The implementation status covers forty-eight (48) Africa Indian-Ocean States including

- ✓ twenty-four (24) in the ICAO Eastern and Southern Africa (ESAF) area of accreditation: Angola, Botswana, Burundi, Comoros, Djibouti, Eritrea, Eswatini, Ethiopia, Kenya, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Rwanda, Seychelles, Somalia, South Africa, South Sudan, Uganda, United Republic of Tanzania, Zambia and Zimbabwe; and
- ✓ twenty-four (24) in the ICAO Western and Central Africa area of accreditation (WACAF): Benin, Burkina Faso, Cameroon, Cabo Verde, Central African Republic, Chad, Congo, Cote d'Ivoire, Democratic Republic of Congo, Equatorial Guinea, Gabon, Gambia, Ghana, Guinea Bissau, Guinea, Liberia, Mali, Mauritania, Niger, Nigeria, Sao Tome & Principe, Senegal, Sierra Leone and Togo.

CHART 2- States of the AFI region

2.4 Organizational Structure of the APIRG

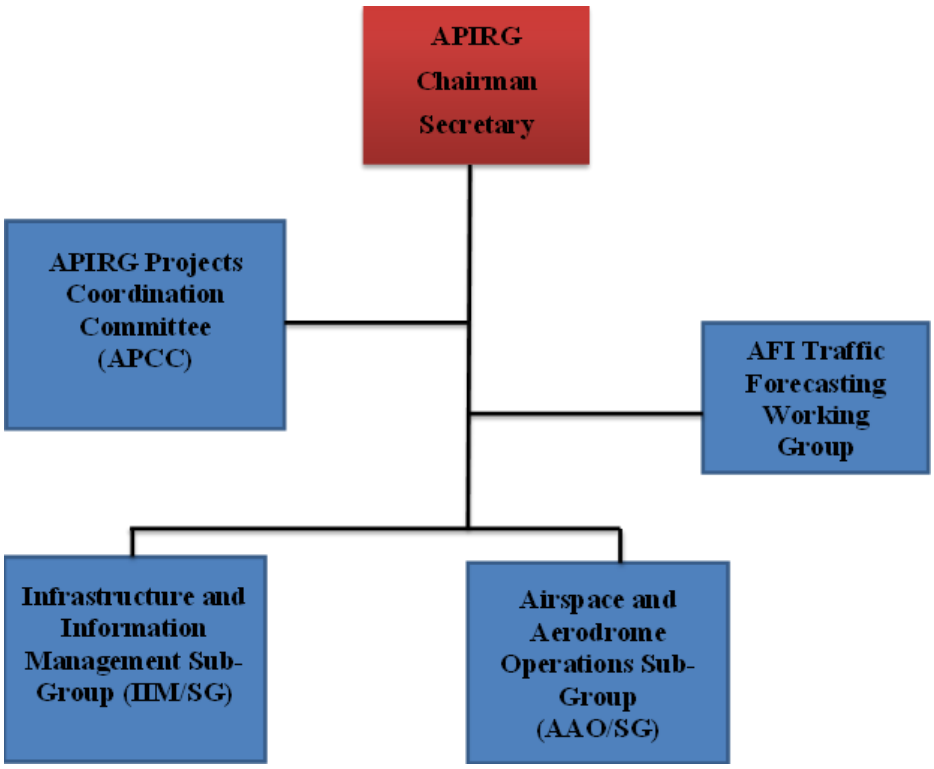


CHART 3-APIRG STRUCTURE

2.5 Collection of data

2.5.1 Information provided in this report contains generic data collected from sources such as the GANP portal and the AFI Regional air navigation plan.

2.5.2 Information provided on States' ASBU implementation status were collected through States' responses to the States letter 2024 - O1.4- 0327 dated 17 May 2024 which incorporated a data collection form. The data collection form included sections to report on the implementation initiatives that are correlated to specific ASBU elements.

2.5.3 Although the report could be published based mainly on information available at the ICAO ESAF and WACAF Offices, it was observed that many States did not provide any information on their implementation status despite several reminders. The analysis of the level of feedback on initiatives indicates that only three (03) States (DRC, Kenya and Senegal) out of forty-eight the data, which represents **6.2%**. Only one (01) Regional Organization (AFRAA) provided input.

2.5.4 It is anticipated with optimism that the operationalization of the AFI ASBU online reporting tool under the AANDD will incentivize more reporting from the States and therefore enable for a more consistent annual air navigation report in the future.

3 REGIONAL APPLICABLE ELEMENTS

The ASBU threads and the corresponding elements listed in the table below are those selected and endorsed by the Africa-Indian Ocean Planning and Implementation Regional Group as applicable to the AFI region. They are presented with their corresponding maturity level and monitoring status in the region. Threads that are listed as "Not monitored" are those with missing implementation information or whose maturity level is set as "Validation".

3.1 Information Threads Elements.

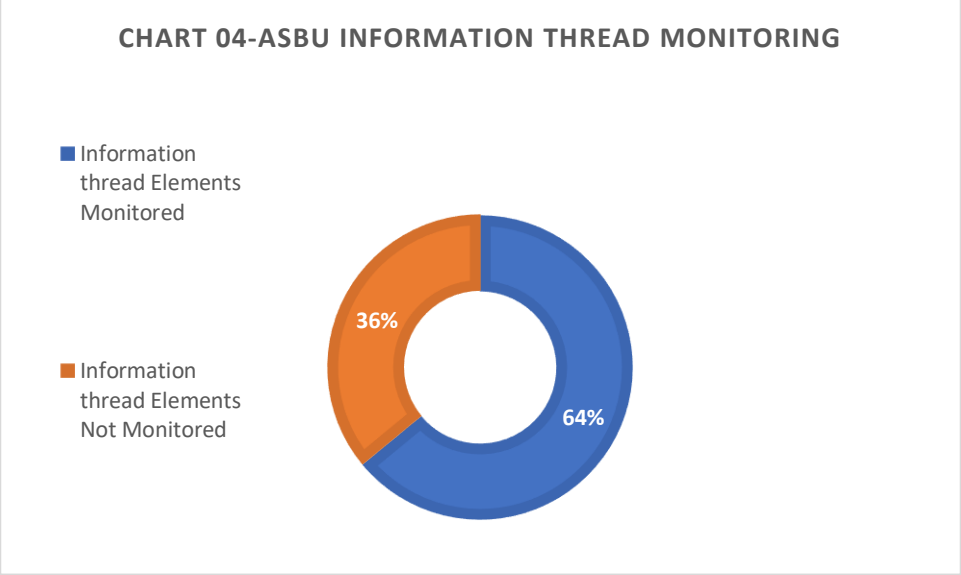


TABLE 1-ASBU ELEMENTS IN INFORMATION THREAD

Thread	Thread Title	Element	Element Title	Maturity level	Monitoring status
AMET	**Meteorological Information**	AMET-B0/1	Meteorological observations products	Ready for implementation	Monitored
		AMET-B0/2	Meteorological forecast and warning products	Ready for implementation	Monitored
		AMET-B0/3	Climatological and historical meteorological products	Ready for implementation	Monitored
		AMET-B0/4	Dissemination of meteorological products	Ready for implementation	Monitored
		AMET-B1/1	Meteorological observations information	Standardization	Monitored
		AMET-B1/2	Meteorological forecast and warning information	Standardization	Monitored
		AMET-B1/3	Climatological and historical meteorological information	Standardization	Monitored

		AMET-B1/4	Dissemination of meteorological information	Standardization	Monitored
DAIM	**Digital Aeronautical Information Management**	DAIM-B1/1	Provision of quality-assured aeronautical data and information	Standardization	Monitored
		DAIM-B1/2	Provision of digital Aeronautical Information Publication (AIP) data sets	Ready for implementation	Monitored
		DAIM-B1/3	Provision of digital terrain data sets	Ready for implementation	Monitored
		DAIM-B1/4	Provision of digital obstacle data sets	Ready for implementation	Monitored
		DAIM-B1/5	Provision of digital aerodrome mapping data sets	Ready for implementation	Monitored
		DAIM-B1/6	Provision of digital instrument flight procedure data sets	Ready for implementation	Monitored
		DAIM-B1/7	NOTAM improvements	Ready for implementation	Monitored
FICE	**Flight and Flow Information for a Collaborative Environment (FF-ICE)**	FICE-B0/1	Automated basic facility data exchange (AIDC)	Ready for implementation	Monitored
		FICE-B2/1*	Planning Service	Validation	Not Monitored
		FICE-B2/2*	Filing Service	Validation	Not Monitored
		FICE-B2/3*	Trial Service	Validation	Not Monitored
		FICE-B2/4*	Flight Data Request Service	Validation	Not Monitored
		FICE-B2/5*	Notification Service	Validation	Not Monitored
		FICE-B2/6*	Publication Service	Validation	Not Monitored
		FICE-B2/7*	Flight Information Management service for higher airspace operations	Validation	Not Monitored
		FICE-B2/8*	Flight information management service for low-altitude operations	Validation	Not Monitored
		FICE-B2/9*	Flight information management support for inflight re-planning	Validation	Not Monitored

3.2 Operational Threads Elements

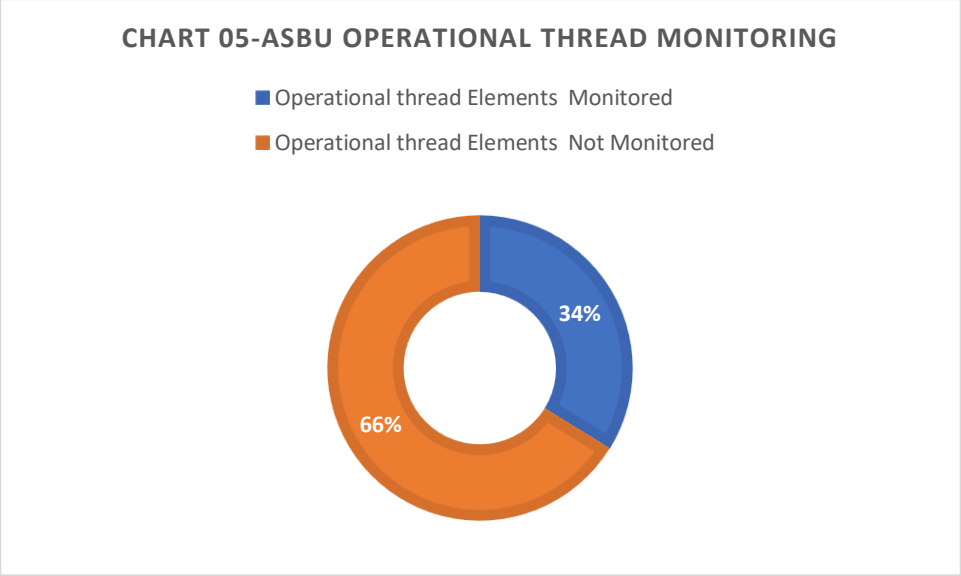


TABLE 2-ASBU ELEMENTS IN OPERATIONAL THREAD

Thread	Thread Title	Element	Element Title	Maturity level	Monitoring status
ACAS	**Airborne Collision Avoidance System (ACAS)**	ACAS – B1/1	ACAS Improvement	Ready for implementation	Monitored
		ACAS – B2/1	New collision avoidance system	Standardization	Monitored
		ACAS – B2/2	New Collision avoidance capability as part of an overall detect and avoid system for RPAS	Validation	Not Monitored
ACDM	**Airport Collaborative Decision Making**	ACDM–B0/1	Airport CDM Information Sharing (ACIS)	Ready for implementation	Monitored
		ACDM–B0/2	Integration with ATM Network function	Ready for implementation	Monitored
APTA	**Improve arrival and departure operations**	APTA –B0/1	PBN Approaches (with basic capabilities)	Ready for implementation	Monitored
		APTA –B0/2	PBN SID and STAR procedures (with basic capabilities)	Ready for implementation	Monitored
		APTA –B0/3	SBAS/GBAS CAT I precision approach procedures	Ready for implementation	Monitored
		APTA –B0/4	CDO (Basic)	Ready for implementation	Monitored
		APTA –B0/5	CCO (Basic)	Ready for implementation	Monitored

		APTA –B0/6	PBN Helicopter Point in Space (PinS) Operations	Ready for implementation	Monitored
		APTA –B0/7	Performance based aerodrome operating minima – Advanced aircraft	Ready for implementation	Monitored
		APTA –B0/8	Performance based aerodrome operating minima – Basic aircraft	Ready for implementation	Monitored
		APTA –B1/1	PBN Approaches (with advanced capabilities	Standardization	Monitored
		APTA –B1/2	PBN SID and STAR procedures (with advanced capabilities)	Standardization	Monitored
		APTA –B1/4	CDO (Advanced)	Standardization	Monitored
		APTA –B1/5	CCO (Advanced)	Standardization	Monitored
CSEP	**Cooperative Separation**	CSEP – B1/1	Basic airborne situational awareness during flight operations (AIRB)	Ready for implementation	Not Monitored
		CSEP – B1/2	Visual Separation on Approach (VSA)	Ready for implementation	Not Monitored
		CSEP – B1/3	Performance Based Longitudinal Separation Minima	Standardization	Not Monitored
		CSEP – B1/4	Performance Based Lateral Separation Minima	Standardization	Not Monitored
DATS	**Digital Aerodrome Air Traffic Services**	DATS – B1/1	Remotely Operated Aerodrome Air Traffic Services	Standardization	Not Monitored
FRTO	**Improved operations through enhanced en-route trajectories**	FRTO – B0/1	Direct routing (DCT)	Ready for implementation	Monitored
		FRTO – B0/2	Airspace planning and Flexible Use of Airspace (FUA)	Ready for implementation	Monitored
		FRTO – B0/3	Pre-validated and coordinated ATS routes to support flight and flow	Ready for implementation	Not Monitored
		FRTO – B0/4	Basic conflict detection and conformance monitoring	Ready for implementation	Monitored
		FRTO – B1/1	Free Route Airspace (FRA)	Standardization	Monitored
		FRTO – B1/2	Required Navigation Performance (RNP) routes	Standardization	Monitored
		FRTO – B1/3	Advanced Flexible Use of Airspace (FUA) and management of real time airspace data	Standardization	Not Monitored
		FRTO – B1/4	Dynamic sectorization	Standardization	Not Monitored

		FRTO – B1/5	Enhanced Conflict Detection Tools and Conformance Monitoring	Standardization	Not Monitored
		FRTO – B1/6	Multi-Sector Planning	Standardization	Not Monitored
		FRTO – B1/7	Trajectory Options Set (TOS)	Standardization	Not Monitored
GADS	**Global Aeronautical Distress and Safety System (GADSS)**	GADS –B1/1	Aircraft Tracking	Ready for implementation	Not Monitored
		GADS – B1/2	Contact directory service	Ready for implementation	Not Monitored
NOPS	**Network Operations**	NOPS – B0/1	Initial integration of collaborative airspace management with air traffic flow management	Ready for implementation	Not Monitored
		NOPS – B0/2	Collaborative Network Flight Updates	Ready for implementation	Not Monitored
		NOPS – B0/3	Network Operation Planning basic features	Ready for implementation	Not Monitored
		NOPS – B0/4	Initial Airport/ATFM slots and A-CDM Network Interface	Ready for implementation	Not Monitored
		NOPS – B0/5	Dynamic ATFM slot allocation	Ready for implementation	Not Monitored
		NOPS – B1/1	Short Term ATFM measures	Standardization	Not Monitored
		NOPS – B1/2	Enhanced Network Operations Planning	Standardization	Not Monitored
		NOPS – B1/3	Enhanced integration of Airport operations planning with network operations planning	Standardization	Not Monitored
		NOPS – B1/4	Dynamic Traffic Complexity Management	Standardization	Not Monitored
		NOPS – B1/5	Full integration of airspace management with air traffic flow management	Standardization	Not Monitored
		NOPS – B1/6	Initial Dynamic Airspace configurations	Standardization	Not Monitored
		NOPS – B1/7	Enhanced ATFM slot swapping	Standardization	Not Monitored
		NOPS – B1/8	Extended Arrival Management supported by the ATM Network function	Standardization	Not Monitored
		NOPS – B1/9	Target Times for ATFM purposes	Standardization	Not Monitored
		NOPS – B1/10	Collaborative Trajectory Options Program (CTOP)	Standardization	Not Monitored

OFPL	**Improved access to optimum flight levels in oceanic and remote airspace**	OPFL – B0/1	In Trail Procedure (ITP)	Standardization	Not Monitored
		OPFL – B1/1	Climb and Descend Procedure (CDP)	Standardization	Not Monitored
RSEQ	**Improved traffic flow through runway sequencing**	RSEQ – B0/1	Arrival Management	Ready for implementation	Not Monitored
		RSEQ – B0/2	Departure Management	Ready for implementation	Not Monitored
		RSEQ – B0/3	Point merge	Ready for implementation	Not Monitored
		RSEQ – B1/1	Extended arrival metering	Standardization	Not Monitored
SNET	**Ground-based Safety Nets**	SNET – B0/1	Short Term Conflict Alert (STCA)	Ready for implementation	Monitored
		SNET – B0/2	Minimum Safe Altitude Warning (MSAW)	Ready for implementation	Monitored
		SNET – B0/3	Area Proximity Warning (APW)	Ready for implementation	Monitored
		SNET – B0/4	Approach Path Monitoring (APM)	Ready for implementation	Monitored
		SNET – B1/1	Enhanced STCA with aircraft parameters	Ready for implementation	Not Monitored
		SNET – B1/2	Enhanced STCA in complex TMAs	Ready for implementation	Not Monitored
SURF	**Surface operations**	SURF – B0/1	Basic ATCO tools to manage traffic during ground operations	Ready for implementation	Not Monitored
		SURF – B0/2	Comprehensive situational awareness of surface operations	Ready for implementation	Not Monitored
		SURF – B0/3	Initial ATCO alerting service for surface operations	Ready for implementation	Not Monitored
		SURF – B1/1	Advanced features using visual aids to support traffic management during ground operations	Standardization	Not Monitored
		SURF – B1/2	Comprehensive pilot situational awareness on the airport surface	Ready for implementation	Not Monitored
		SURF – B1/3	Enhanced ATCO alerting service for surface operations	Standardization	Not Monitored
		SURF – B1/4	Routing service to support ATCO surface operations management	Standardization	Not Monitored
		SURF – B1/5	Enhanced vision systems for taxi operations	Standardization	Not Monitored
TBO	**Trajectory-based Operations**	TBO – B0/1	Introduction of time-based management within a flow centric approach	Ready for implementation	Not Monitored

		TBO – B1/1	Initial Integration of time-based decision-making processes	Standardization	Not Monitored

3.3 Technology Threads Elements

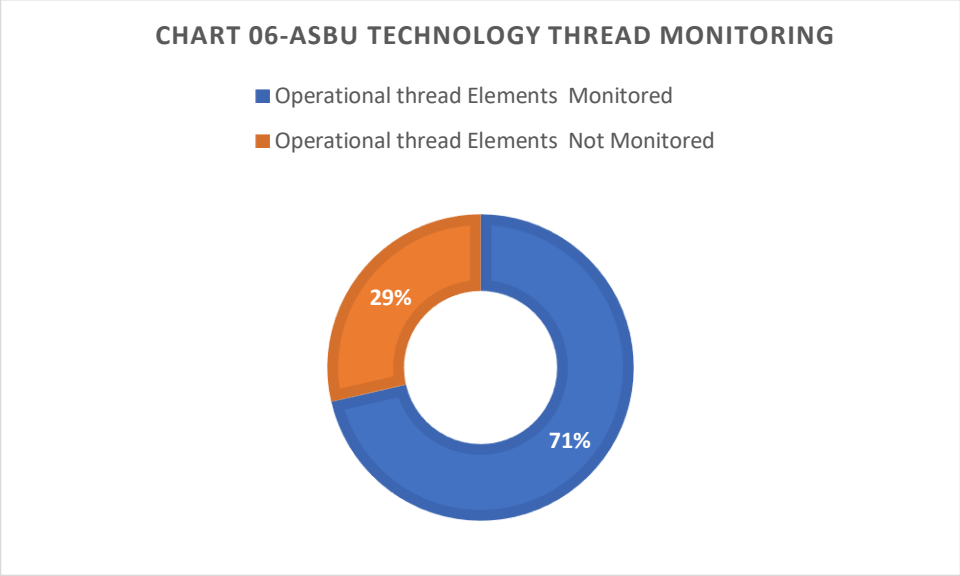


TABLE 3-ASBU ELEMENTS IN TECHNOLOGY THREAD

Thread	Thread Title	Element	Element Title	Maturity level	Monitoring status
ASUR	**Surveillance systems**	ASUR-B0/1	Automatic Dependent Surveillance - Broadcast (ADS-B)	Ready for implementation	Monitored
		ASUR-B0/2	Multi-lateration cooperative surveillance systems (MLAT)	Ready for implementation	Monitored
		ASUR-B0/3	Cooperative Surveillance Radar Downlink of aircraft Parameters (SSR-DAPS)	Ready for implementation	Monitored
		ASUR-B1/1	Reception of aircraft ADS-B signals from space (SB ADS-B)	Ready for implementation	Monitored
		ASUR-B2/1	Evolution of ADS-B and Mode S	Validation	Not Monitored
		COMI-B0/1	Aircraft Communication Addressing Reporting System (ACARS)	Ready for implementation	Monitored
		COMI-B0/2	Aeronautical Telecommunication Network/Open System	Ready for implementation	Monitored

COMI	**Communication infrastructure**		Interconnection (ATN/OSI)		
		COMI-B0/3	VHF Data Link (VDL) Mode O/A	Ready for implementation	Monitored
		COMI-B0/4	VHF Data Link (VDL) Mode 2 Basic	Ready for implementation	Monitored
		COMI-B0/5	Satellite Communication (SATCOM) Class C Data	Ready for implementation	Monitored
		COMI-B0/6	High Frequency Data Link (HFDL)	Ready for implementation	Monitored
		COMI-B0/7	ATS Message Handling System (AMHS)	Ready for implementation	Monitored
		COMI-B1/1	Ground-Ground Aeronautical Telecommunication Network/Internet Protocol suite (ATN/IPS)	Standardization	Monitored
		COMI-B1/2	VHF Data Link (VDL) Mode 2 Multi-Frequency	Ready for implementation	Monitored
		COMI-B1/3	SATCOM Class B Voice and Data	Ready for implementation	Monitored
		COMI-B1/4	Aeronautical Mobile Airport Communication System (AeroMACS)	Ready for implementation	Monitored
		COMI-B2/1	Air-Ground ATN/IPS	Validation	Not Monitored
		COMI-B2/2	Aeronautical Mobile Aircraft Communication System (AeroMACS) aircraft mobile connection	Validation	Not Monitored
		COMI-B2/3	Link meeting requirements for non-safety critical communication	Validation	Not Monitored
COMS	**ATS Communication service**	COMS-B0/1	CPDLC (FANS 1/A & ATN B1) for domestic and procedural airspace	Ready for implementation	Monitored
		COMS-B0/2	ADS-C (FANS 1/A) for procedural airspace	Ready for implementation	Monitored
		COMS-B1/1	PBCS approved CPDLC (FANS 1/A +) for domestic and procedural airspace	Ready for implementation	Monitored
		COMS-B1/2	PBCS approved ADS-C (FANS 1/A +) for procedural airspace	Ready for implementation	Monitored
		COMS-B1/3	SATVOICE (incl. routine	Ready for implementation	Monitored

			communication) for procedural airspace		
		COMS-B2/1	PBCS approved CPDLC (B2) for domestic and procedural airspace	Validation	Not Monitored
		COMS-B2/2	PBCS approved ADS-C (B2) for domestic and procedural airspace	Validation	Not Monitored
		COMS-B2/3	PBCS approved SATVOICE (incl.routine communications) for procedural airspace	Validation	Not Monitored
NAVS	**Navigation systems**	NAVS-B0/1	Ground Based Augmentation System (GBAS)	Ready for implementation	Monitored
		NAVS-B0/2	Satellite Based Augmentation System (SBAS)	Ready for implementation	Monitored
		NAVS-B0/3	Aircraft Based Augmentation system (ABAS)	Ready for implementation	Monitored
		NAVS-B0/4	Navigation Minimal Operating Networks (Nav. MON)	Ready for implementation	Monitored
		NAVS-B1/1	Extended GBAS	Standardization	Monitored
		NAVS-B2/1	Dual frequency Multi Constellation (DFMC) GBAS	Validation	Not Monitored
		NAVS-B2/2	Dual frequency Multi Constellation (DFMC) SBAS	Validation	Not Monitored
		NAVS-B2/3	Dual frequency Multi Constellation (DFMC) ABAS	Validation	Not Monitored

4 REGIONAL IMPLEMENTATION STRATEGIES

4.1 Aerodrome Operations (AOP) Projects

4.1.1 In AOP, there are four projects namely Aerodrome Certification, Runway Safety, A-CDM and Training and Qualification. The Aerodrome Certification Project document and the Runway Safety projects have been approved. Some funding was provided for the Aerodrome Certification Project under the AFI Plan to assist States certify international aerodromes through peer support under a National Regulatory framework. Although the Status of Aerodrome Certification is still at an average of 42% for ESAF and WACAF. The ESAF Status is at 51 % while WACAF is at 38%. This project has among other initiatives contributed to the Certification of more aerodromes.

4.1.2 The Runway Safety Project document was approved and implementation initiated through Runway Safety Go Teams, for which States are requesting missions to assist in establishing Runway Safety Teams. This project is currently under reconsideration following the review of the Global Runway Safety Action Plan in 2022. The project further needs funding to actualize the milestones proposed in the Project Document.

4.1.3 The other two other projects, namely A-CDM and Training and qualification, are still under development and it is anticipated that they will be submitted to the AAO/SG7.

4.2 Air Traffic Management (ATM) Projects

4.2.1 APIRG has established six projects in air traffic management to support the implementation of related basic building blocks and ASBU elements. Projects with direct impact on ASBU implementation include

AFI ATM Master Plan (AAMP) Project

4.2.2 The project focuses on developing a comprehensive and consistent plan to drive a harmonious and seamless implementation of air traffic services, airspace management as well as air traffic flow management in the AFI region. The project is conducted in the framework of regional safety and air navigation priorities as envisioned in the Global Aviation Safety Plan (GASP) and Global Air Navigation Plan (GANP). The project is designed to ensure effective and coherent implementation of applicable ASBU elements pertaining to ATM. The project deliverables include the AFI Seamless ATM Master plan, the AFI ATM vision 2045 future concept of operations and the enabling technology and infrastructure strategy.

The Free Route Airspace (FRA) project

4.2.3 The project was established to ensure a seamless and effective implementation of Direct route (DCT), Direct Routing Operations (DRO) and Free Route Airspace in the AFI region. The project aims to safely improve airspace operations through increased capacity, improved efficiency and reduction of environmental impact of aviation activities. Through its achievements the project ensures the effective implementation of ASBU applicable elements, especially FRTO B0/1-DCT, FRTO B1/1 Free Route Airspace.

The Civil-Military cooperation in ATM/Flexible Use of Airspace (CMC/FUA) Project

4.2.4 The project was established in early 2024 to support and promote the establishment of an effective civil/military collaboration, cooperation and coordination at State's and Regional levels to favor the implementation of local and cross border flexible use of airspace. In discharging its mandate, the project team contributes to the implementation of ASBU elements FRTO B0/2- Airspace planning and Flexible Use of Airspace (FUA), FRTO B1/3-

Advanced Flexible Use of Airspace (FUA) and management of real time airspace data, FRTO B1/4-Dynamic sectorization.

The Performance-based Navigation /AFI Optimized Route Trajectory and Airspace (PBN/AORTA) Project

4.2.5 The project was established in 2014 to support the implementation of all aspects pertaining to ATS Routes and airspace optimization in the AFI region. The project emphasizes on PBN routes and procedures implementation at international airports in the region. The role of the project team is key as it acts as a driver alongside the African Flight Procedure Program (AFPP) for the implementation of all ASBU APTA B0 and B1 elements.

The Flight and Flow -Information for a collaborative Environment (FF-ICE) Project

4.2.6 project was launched in Q2 2024 to prepare the region for the move from FPL 2012, whose sunset is set for 2032, to FF-ICE which offers more flexible and modernized services. It is expected that the project team will support all applicable ASBU FICE B0 and B2 elements through awareness activities and technical assistance.

Air Traffic Flow Management (ATFM) and Performance-Based Communication and Surveillance (PBCS) Projects

4.2.7 The projects are set to be established soon, being given the pressing need for the region. Several implementation initiatives are ongoing at States' and industries' levels that need to be consolidated and harmonized to ensure seamless and harmonized implementation. When established these projects will support the effective implementation of ASBU NOPS B0 and B1 elements.

4.3 Communication, Navigation, Surveillance (CNS) Projects

4.3.1 Regarding CNS Projects, COM Project 1 – Implementation of Ground/Ground Communication (ATS/DS, AIDC, VoIP); COM Project 3 – Implementation of Air/Ground communication (HF/VHF voice data, CPDLC); COM Project 4 – Integrated Aeronautical Telecommunication Infrastructure; COM Project 5 – Assessment of AFI navigation services Cyber resilience; Navigation Project; Surveillance project; and Spectrum Project made significant progress.

4.3.2 Six (6) of the eight (8) CNS projects completed the project documentation, the project action plans, the draft of projects costing and guidance material. The two other projects are yet to develop their action plan and the projects costing.

4.4 Aeronautical Meteorology (MET) Projects

4.4.1 Five (5) Projects were approved by APIRG to assist States in the implementation of the MET related SARPs as well as the implementation ASBU elements applicable in MET area. These Projects and their achievements in 2024 are:

MET Project 1 on the Provision of global, regional, and local meteorological products/information

4.4.2 The MET Project 1 on the Provision of global, regional, and local meteorological products/information reported on making steady progress with various ASBU MET elements, such as observations and forecasts, indicating successful development and deployment of MET services and the completion of Project costing. The Project emphasized that different implementation levels across ASBU elements indicate that progress is uneven, suggesting areas may need more focused support. The Project highlighted ongoing efforts to review materials, coordinate activities, and

address gaps, which implies challenges in achieving uniform implementation and possibly in coordinating across multiple states.

MET Project 2 on Provision of meteorological information in the ICAO Meteorological Information Exchange Model (IWXXM) format

4.4.3 The MET Project 2 on the Provision of meteorological information in the ICAO Meteorological Information Exchange Model (IWXXM) format, reported on its achievements, including the collection and review of data collected on implementation by States, the holding of a Seminar on the Development of Meteorological Information Exchange Capabilities (ICAO IWXXM model) and the development of the cost of the project. The Project team developed and implemented a questionnaire to assess the implementation of ASBU elements, particularly AMET-B1, in the AFI region. The Project recommended intensifying efforts to update national plans and adopt the digital format for OPMET data.

MET Project 3 on Implementation of ICAO Annex 3 provisions relating to Space Weather requirements within the AFI

4.4.4 The MET Project 3 on the Implementation of ICAO Annex 3 provisions relating to Space Weather requirements within the AFI region reported on the coordination of the project and development of guidance material, the conduct of gap analysis, and development of action plans, the conduct of three workshops since 2021, including virtual and in-person sessions. The Project highlighted that many States have not included Amendment 78 of Annex 3 in their national regulations impacting space weather inclusion in flight planning, as well as the low attendance from nominated experts at project meetings affecting progress. The Project also indicated that financial support may foster the progress of the project and reiterated States and organizations to ensure their nominated experts actively participation in project activities.

MET Project 4 on the Implementation of Aeronautical Meteorological Personnel Competency Standards in the AFI region

4.4.5 The MET Project 4 on the Implementation of Aeronautical Meteorological Personnel Competency Standards in the AFI region conducted a gaps analysis using a questionnaire sent to States, to assess the implementation of competency standards for Aeronautical Meteorological Forecasters (AMF) and Observers (AMO). Feedback from several States has been collected, including Angola, Djibouti, Eswatini, Ethiopia, Kenya, Mauritius, Seychelles, Uganda, Zambia, and Zimbabwe. The project also conducted a successful virtual workshop on competency standards in November 2023 with the participation from 19 States and ASECNA. Presentations on the project's activities were made at the ESAF in-person Regional Aeronautical Meteorological Seminar in June 2024. The Project expressed concerns on the limited participation of experts in project meetings and regional sensitization workshops, which affects the effectiveness of awareness-raising efforts.

MET Project 5 on the Mitigation of the deficiencies related to the availability of the OPMET data in the AFI region

4.4.6 The MET Project 5 on the Mitigation of the deficiencies related to the availability of the OPMET data in the AFI region developed the project document, including the project cost estimate. A workshop was organized in October 2023 to refresh the knowledge of States' experts on the AMBEX system, its organs and procedures. As a challenge, the meeting noted that the project suffers from a lack of effective coordination and latency in the conduct of activities. The meeting insisted on the review of the Project team.

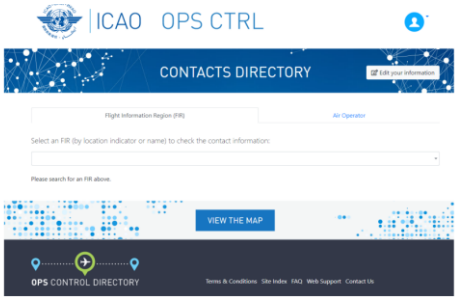
Projects Costing

4.4.7 The APIRG/20 and APIRG/21 meetings established and reiterated APIRG's mandate to explore assistance and funding mechanisms in cooperation with regional and sub-regional organizations such as the African Union, AFCAC, Regional Economic Communities (RECs) and financial

institutions, in accordance with the Conclusion 20/49. In line with this conclusion, the Secretariat created a consolidated project catalogue and provided guidance for project development and costing. The meeting reviewed the draft project documents and costing submitted by the IIM Project Teams as per Appendix 9 to this report and tasked the Secretariat to review the submissions and ensure projects documents are completed by September 2024, for APCC/9 meeting consideration.

4.5 Search And Rescue (SAR) Projects

4.5.1 The AFI SAR Project Team was reactivated in April 2024 following the halt observed since 2020 due to COVID-19. The project team was tasked to develop the necessary activities and technical tools to assist States with a low SAR profile. The Team will also promote and support the implementation of the Global Aeronautical Distress and Safety System (GADSS) through its relevant ASBU module and primarily the GADS-B1/1 (Aircraft Tracking), GADS-B1/2 (Operational Control Repository) which will enhance the tracking of aircraft in area without ATS surveillance system as well as an easy and rapid access to information sources such as ATS units.



PICTURE1-GADSS OPS CONTROL PORTAL

4.6 Aeronautical Information Management (AIM) Projects

4.6.1 Initially, the regional projects AIM Project 1, AIM Project 2 and AIM Project 3 were set up to assist States of the AFI region respectively in implementing Quality management system (QMS) in AIM, Aeronautical Information Exchange Model (AIXM) and Terrain and obstacle data (TOD). The AFI Plan Steering Committee approved the project "AIM Results-Based Implementation Support (RBIS) for the AFI Region" at its 22nd meeting held on 15 May 2019, to further enhance the effective implementation of the ICAO AIM provisions, covering the scope of the three former APIRG projects. Noting that the RBIS project was showing tangible results compared to the APIRG AIM 1, AIM 2 and AIM 3 projects, and to avoid duplication of efforts, these projects were closed by the APIRG/25 meeting held from 7 to 11 November in Kigali, Rwanda. The same meeting also adopted two new projects, namely AIM Project 4 and AIM Project 5 to assist States in the improvement of the quality of Aeronautical information, and the implementation of aerodrome mapping and instrument flight procedure data sets, respectively.

AIM Results-Based Implementation Support (RBIS)

4.6.2 The Project developed generic documentation for supporting the regulation, implementation and oversight of QMS, AIXM, eAIP and TOD by States. The project conducted assistance to States through dedicated workshops for building capacity of the technical personnel of the CAAs on the regulation and oversight activities, as well as of ANSPs and Aerodrome Operators on the implementation of systems and services. In this regards the Roberts FIR member States, namely Guinea, Liberia and Sierra Leone were assisted in 2023, in QMS, AIXM, eAIP and TOD implementation. The follow-up is ongoing with Roberts FIR on the plan of action for an effective implementation of the AIXM database and the eAIP. In 2024, the Democratic Republic of the Congo received two assistance activities, one in QMS implementation and the second in AIXM,

eAIP and TOD implementation. Mauritania, Côte d'Ivoire and Togo were assisted in TOD implementation, while Benin received assistance in AIXM, eAIP and TOD implementation. In 2024, assisted States almost submitted their plans of action on the regulatory and oversight aspect. The project team is expecting to receive the remaining plans of action related to implementation by Air navigation service providers and Aerodrome operators.

AIM Project 4 – Monitoring of the Aeronautical information quality and Improvement of NOTAM

4.6.3 The AIM Project 4 aims at delivering performance report on the improvement of aeronautical information quality by States, developing documents and tools and assisting States in the provision of enhanced NOTAM. The scope of the project contemplates the collection and assessment of users' feedback related to the quality of aeronautical information published by States' Aeronautical information services, as well as the monitoring of the Old NOTAMs. The scope also covers the identification and development of documents and tools needed to support States in the provision of enhanced NOTAM, as well as the conduct of assistance to beneficiary States.

AIM Project 5 – Implementation of Aerodrome mapping data sets and Instrument flight procedure data sets

4.6.4 The AIM Project 5 aims at developing necessary assistance documents and tools and support States in the implementation of Aerodrome (AD) mapping data sets and Instrument flight procedure (IFP) data sets. Both AIM Project 4 and AIM Project 5 were delayed due to challenges in the availability of adequate expertise. Some criteria were adopted by the latest meeting of the APIRG Infrastructure and Information Management Subgroup, for selecting experts to the two project teams.

5 PROGRESS IN ASBU IMPLEMENTATION IN THE AFI REGION

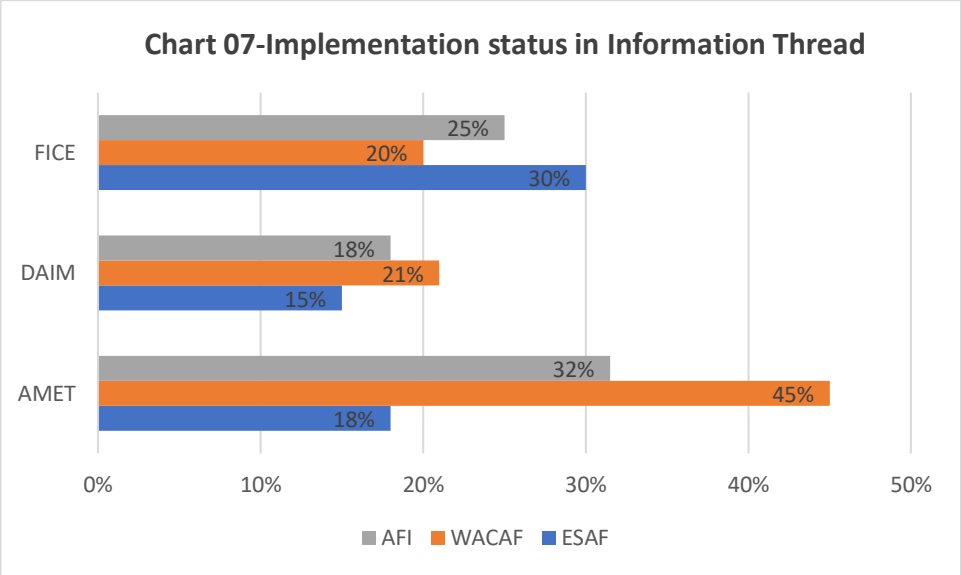
5.1 Implementation summary per ASBU Threads

5.1.1 This section summarizes the implementation progress achieved for the different elements belonging to a particular ASBU Thread. Detailed assessments per ASBU Element are given in section 5.3.

INFORMATION THREADS

TABLE 4-Implementation progress in Information Thread

Thread	2022	2023	Progress
AMET	18%	45%	+27%
DAIM	01%	18%	+17%
FICE	15%	25%	+10%

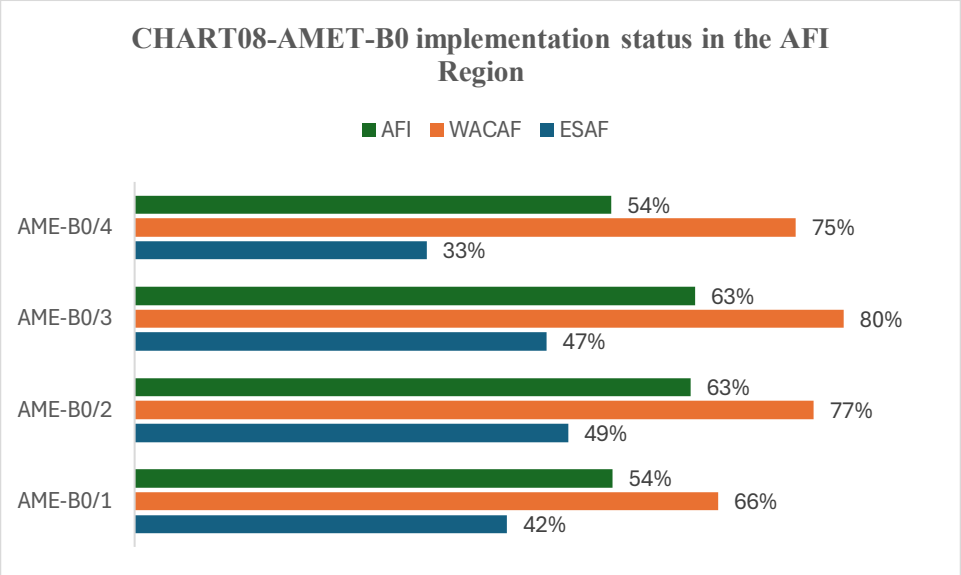


AMET – Meteorological Information

5.1.2 The ASBU applicable elements applicable under this thread were identified in 2022 and reported in the AFI Air Navigation Report Volume III following endorsement by APIRG.

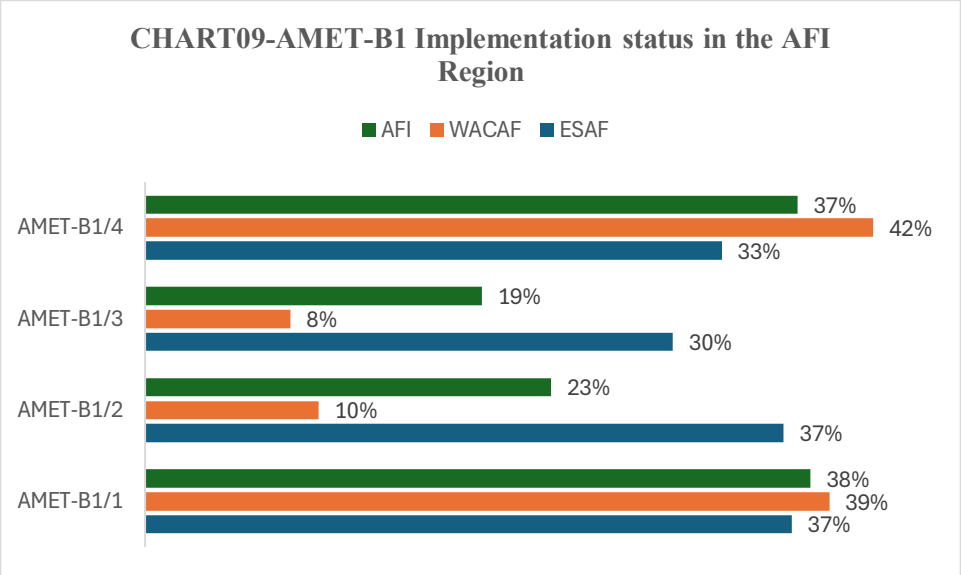
AMET-B0

5.1.3 The 2022 average performance baseline for AMET-B0 for AFI was 30%. As of December 2023, the AMET-B0 elements implementation status stands at 58% for the AFI region. This includes 43% in ESAF and 74% in WACAF.



AMET-B1

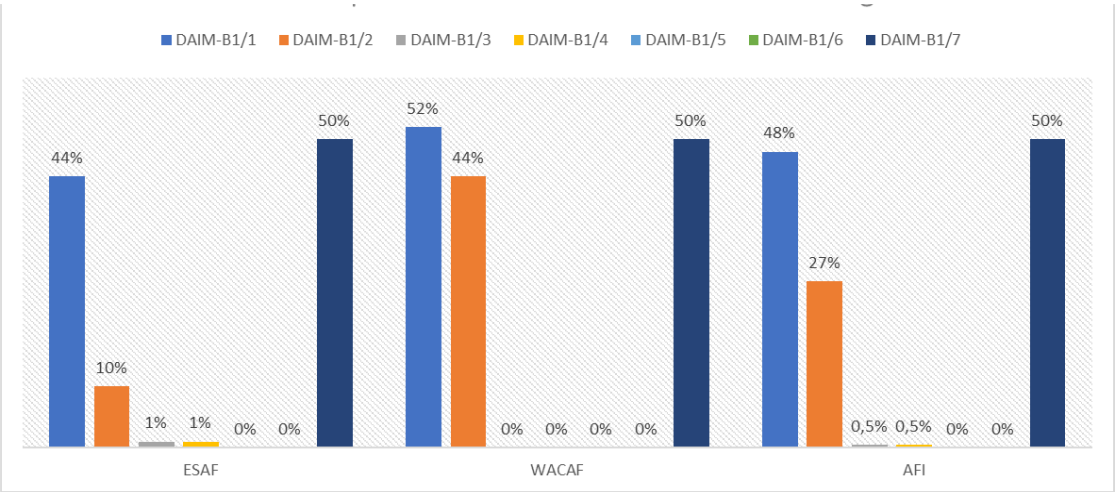
5.1.4 The 2022 average performance baseline for the AMET-B1 in AFI was 5%. As of December 2023, the average implementation of the AMET-B1 elements is at 29% in the AFI Region, which shows 24% progress as compared to 2022. The 2023 figure for AFI includes 34% in ESAF and 25% in WACAF. However, it was observed that not all the States provided their information on the implementation status of AMET elements. We may note that efforts may be necessary for the effective implementation of AMET-B1 elements.



DAIM – Digital Aeronautical Information Management

5.1.5 Based on data available from State, the implementation status of DAIM ASBU elements has not evolved from 2023 to 2024. The status is provided in the figure below, showing elements DAIM B1/1, B1/2 and B1/7 at implementation level of 48%, 27% and 50% respectively in the AFI Region. This is due to the timeframe it takes for implementation projects to complete.

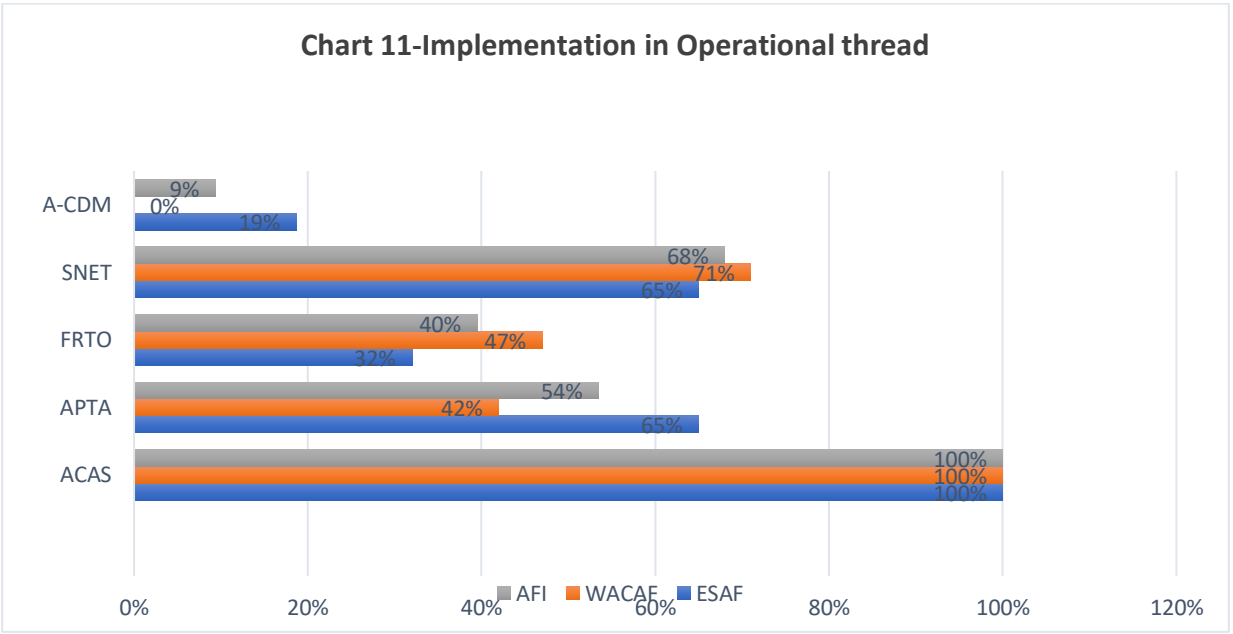
CHART 10-Status of implementation of AIM ASBU elements in the AFI Region



OPERATIONAL THREADS

TABLE 5-Implementation progress in Operational Thread

Thread	2022	2023	Progress
ACAS	100%	100%	0%
ACDM	16%	18.75%	2.75%
APTA	54%	67%	+13%
CSEP	Not monitored	Not monitored	
DATS	Not monitored	Not monitored	
FRTO		40%	
GADS	Not monitored	Not monitored	
NOPS	Not monitored	Not monitored	
OFPL	Not monitored	Not monitored	
RSEQ	Not monitored	Not monitored	
SNET		68%	
SURF	Not monitored	Not monitored	
TBO	Not monitored	Not monitored	



ACAS - Airborne Collision Avoidance System

5.1.6 **ACAS-** The Airborne Collision Avoidance System (ACAS) is subject to global mandatory carriage for airplanes with a maximum certificated take-off mass greater than 5.7 tons. **Table 5** indicates that all States of the AFI region have implemented ACAS -B1/1 which relates to mandatory carriage of TCAS 7.1 for aircraft with MCTOW of more than 5.7 tons. This achievement has a very positive impact on the safety of air operations and air traffic management.

ACDM - Airport Collaborative Decision Making

5.1.7 **A-CDM-** The Airport Collaborative Decision Making (A-CDM) is a key concept for stakeholders involved in aerodrome operations as it provides a framework for effective collaboration and coordination in decision making for aerodrome operations and air traffic management. The current level of implementation of A-CDM in the AFI region has increased from 16% in 2022 to 18.75% in 2023. However, this progress is mostly related to A-CDM B0/1-Airport CDM information sharing (ACIS).

APTA - Improve arrival and departure operations

5.1.8 **APTA-** The Improve arrival and departure operations (APTA) relates to terminal arrival and departures procedures (STAR/SID) as well as approach procedures. STARs provide a defined lateral path and vertical profile for arriving aircraft to connect to the approach while SIDs provide a lateral path and vertical profile for aircraft to depart the terminal area after take-off. These terminal procedures enable more efficient terminal airspace management. **Tables 5** shows that the current level of implementation of APTA in AFI is at 67%. The leading APTA elements in the region are currently B0/1-PBN Approaches (Basic) and B0/2-PBN SID and STAR procedures (Basic). Although there was an overall increase of 13% as compared to 2022, the area for improvement remains the CCO/CDO implementation which is still at 16%.

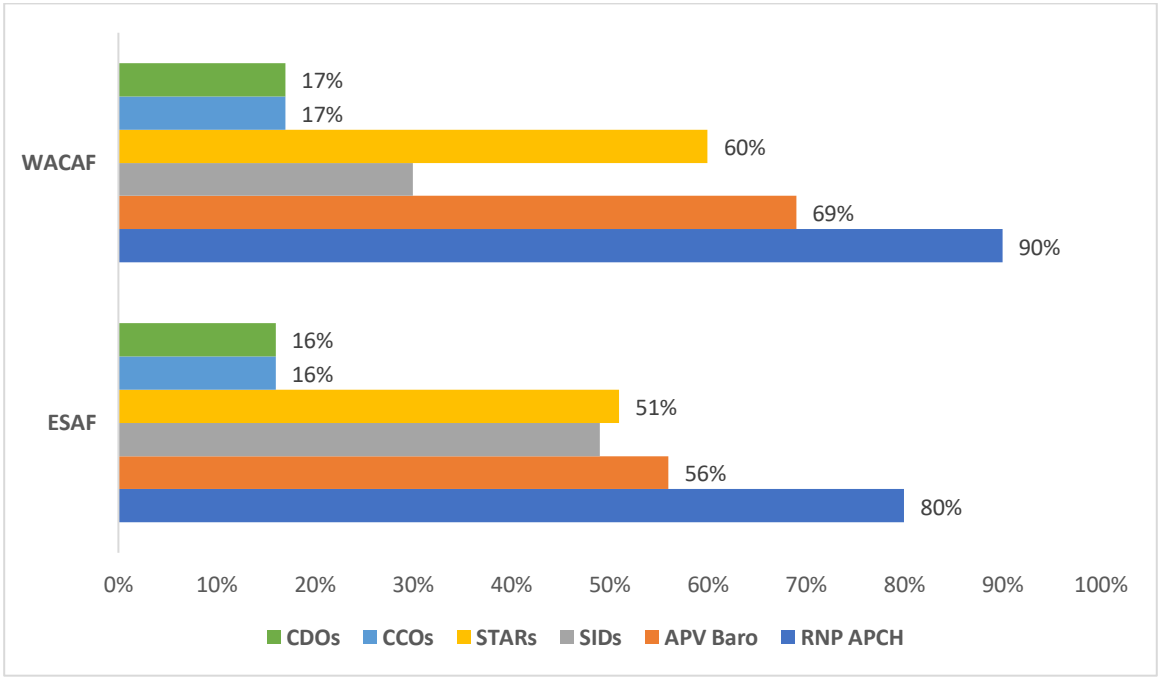


CHART 12-Implementation status of APTA elements

5.1.9 ASBU elements under this thread are currently not monitored in the region due to unavailability of information as well as low level of established relevant regulation in support of their implementation.

FRTO - Improved operations through enhanced en-route trajectories

5.1.10 The FRTO thread elements are at 40% for the whole AFI region with 32% in ESAF and 47% in WACAF. B0/1-Direct Routing (DCT), B0/4-Basic conflict detection and conformance monitoring and B1/2-Required Navigation Performance (RNP) routes are the most implemented elements in the region.

NOPS - Network Operations

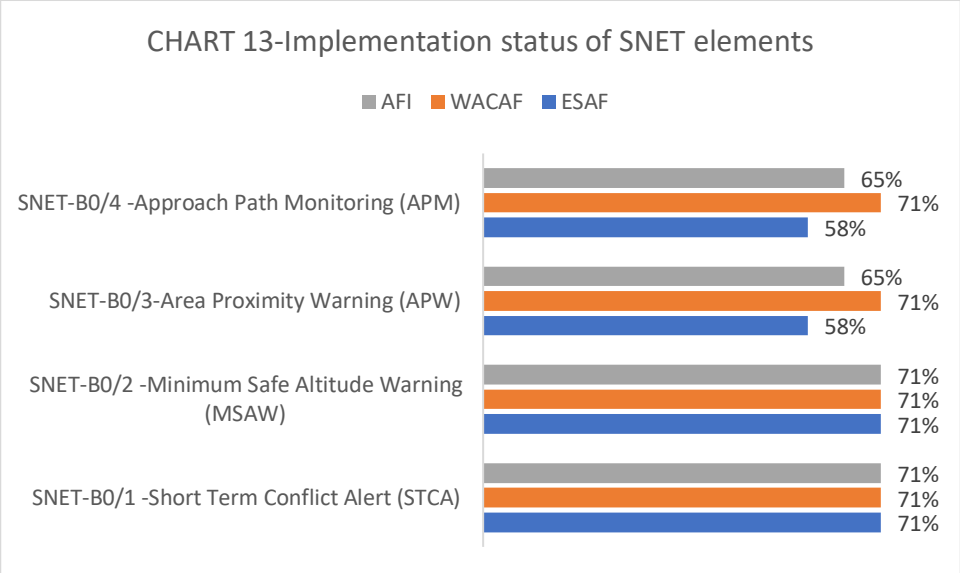
5.1.11 ASBU elements under this thread are currently not monitored in the region due to unavailability of information as well as low level of established relevant regulation in support of their implementation. Their monitoring will commence as soon as the initial stage of Air Traffic Flow Management is started in major FIRs in the AFI region.

RSEQ - Improved traffic flow through runway sequencing

5.1.12 ASBU elements under this thread are currently not monitored in the region due to unavailability of information as well as low level of established relevant regulation in support of their implementation.

SNET - Ground-based Safety Nets

5.1.13 Implementation of SNET has shown significant progress in the region with a rate of 68%. This encouraging figure is attributed to investment by ANSPs and States in ATM surveillance system integrating all applications such as STCA, MSAW, APW and APM.



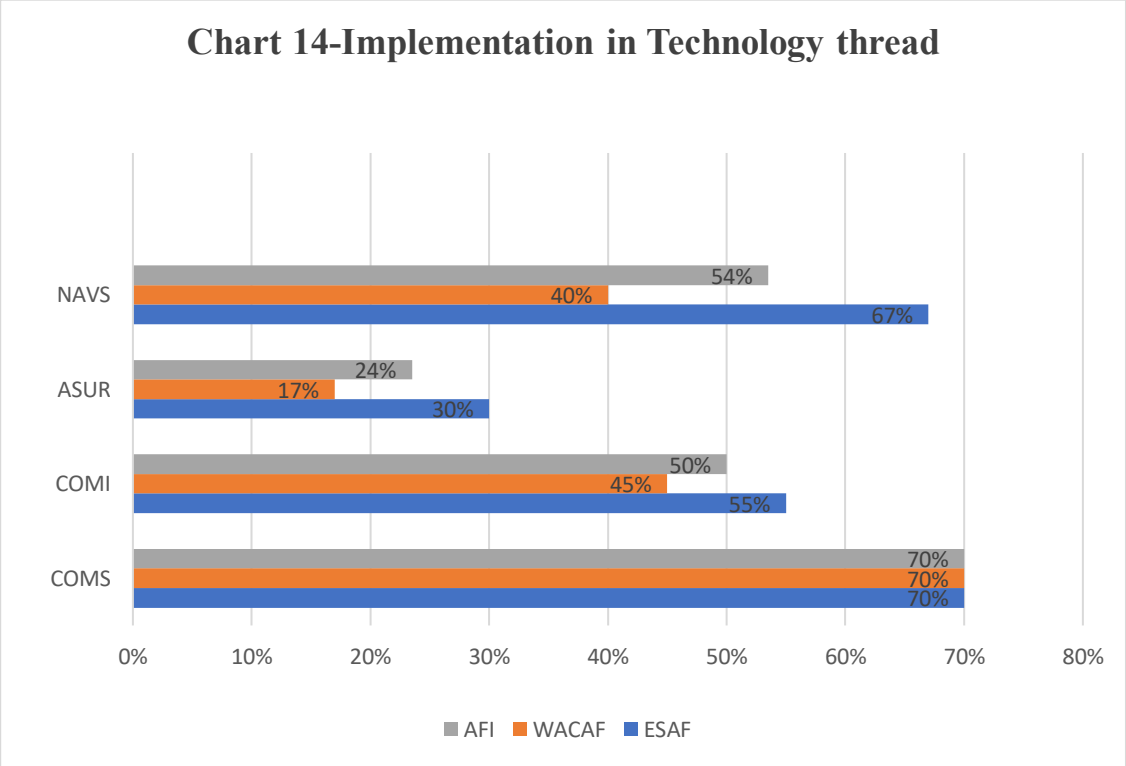
SURF - Surface operations

5.1.14 ASBU elements under this thread are currently not monitored in the region due to unavailability of information as well as low level of established relevant regulation in support of their implementation.

TECHNOLOGY THREADS

TABLE 6-Implementation progress in Technology Thread

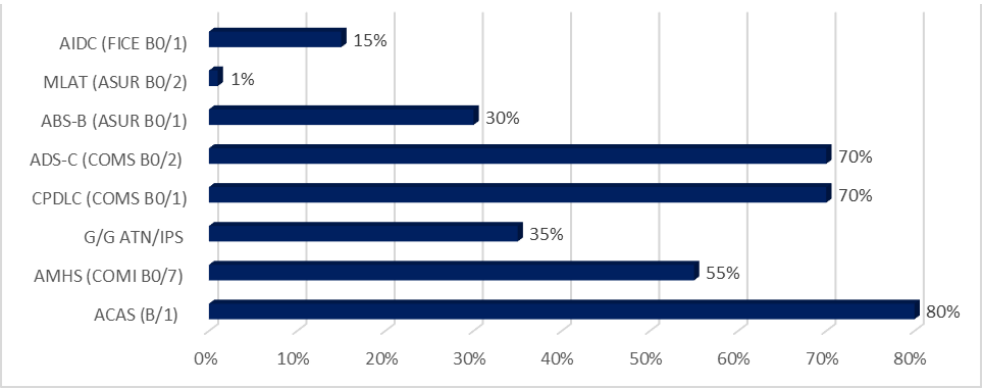
Thread	2022	2023	Progress
ASUR	20%	30%	10%
COMI	40%	55%	15%
COMS	70%	70%	00%
NAVS	40%	54%	+14%



AFI CNS - ASBU implementation STATUS

5.1.15 The status of ASBU implementation in CNS field, noting minimal feedback from States is shown in the graphic below. The implementation of certain ASBU elements like FICE B0/1 (AIDC), ASUR_B0/2 (MILAT), ASUR-B0/1 (ADS-B) is particularly challenging due to several factors, including a lack of reporting and data inconsistencies in the eANP Volume III,

CHART 15-Implementation status of CNS related ASBU elements in the AFI Region



ASUR - Surveillance systems

5.1.16 Based on the available information reported through the AFI ANP, as well as the lack of update from States, it has been determined that the capability to receive ADS-B data (en route or at airport) currently exists in sixteen States (8 ESAF and 8 in WACAF). The introduction of space-based ADS-B gives the opportunity to increase surveillance coverage in support to RVSM operations. The current status indicates that nineteen States have implemented Space-Based ADS-B (4 in ESAF and 15 in WACAF). In many cases it is deployed as part of the Wide Area Multilateration (WAM) systems with ADS-B capability. Multilateration (MLAT) is implemented by five States (4 in ESAF and 1 in WACAF) where the interest in using MLAT technique is to provide surveillance at airports or over wide areas and mainly to complement (and in some cases even replace) secondary surveillance radars (SSR).

COMI - Communication infrastructure

5.1.17 The implementation of Aeronautical Message Handling System (AMHS) is still ongoing, most of the AFI VSAT networks are upgraded and capable of IP technology implementation. It should be noted that as far as the basic AMHS feature is concerned, already providing most of the AMHS benefits, the level of implementation is much better, with 27 States already using it in operation.

COMS – ATS Communication Service

5.1.18 Automatic Dependent Surveillance – Contract (ADS-C) is generally co implemented with Controller Pilot Data Link Communication (CPDLC) for operation in continental remote and oceanic airspaces. Based on AFI Air Navigation Plan and CNS requirements, the pace of ADS-C/CPDLC implementation in concerned FIRs in the AFI Region is very satisfactory with 70% of AFI FIRs.

NAVS - Navigation systems

5.1.19 Aeronautical navigation service (Global Navigation Satellite System (GNSS) core and augmented systems) is provided in the AFI Region.

Core GNSS operation is ongoing for enroute operation and projects are being conducted for the implementation of SBAS. The Cost Benefit Analysis (CBA) conducted by AFCAC with the assistance of ICAO for the implementation of SBAS in the AFI Region was completed and validated and AUC and AFCAC will initiate and undertake its second phase focusing on governance and institutional framework. For navigation, some ANSPs are embarked in GNSS augmentation projects to support PBN operations.

5.2 Progress Per State

5.2.1 Progress In ESAF States

Progress in operational threads in ESAF

TABLE 7-Implementation status of Operational Thread in ESAF

ESAF REGION – A-CDM/ACAS/APTA/FRTO/SNET

IMPLEMENTED | PARTIALLY IMPLEMENTED | NOT IMPLEMENTED | UNKNOWN

THREAD ELEMENTS	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	ESAF SCORE
A-CDM-Airport Collaborative Decision Making																									
A-CDM B0/1-Airport CDM information sharing (ACIS)	50%							50%	50%						50%	50%			50%		50%	50%	50%		18.75%
A-CDM SCORE PER STATE	50%							50%	50%						50%	50%			50%		50%	50%	50%		18.75%
ACAS - Airborne Collision Avoidance System (ACAS)																									
ACAS-B1/1- (ACAS Improvement)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
ACAS SCORE PER STATE	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	**100%**

FRTO - Improved operations through enhanced en-route trajectories																									
FRTO-B0/1- DCT	100%	100%	0%	0%	0%	100%	100%	100%	100%	0%	100%	100%	100%	100%	100%	100%	100%	0%	100%	0%	100%	100%	0%	100%	71%
FRTO-B0/2 (Airspace planning and Flexible Use of Airspace (FUA))	0%	0%	0%	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	0%	17%
FRTO-B0/3 (Pre-validated and coordinated ATS routes to support flight and flow)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
FRTO-B0/4 (Basic conflict detection and conformance monitoring.)	0%	0%	0%	100%	0%	100%	0%	100%	100%	0%	100%	0%	100%	0%	0%	0%	0%	0%	100%	0%	100%	100%	100%	0%	42%
FRTO-B1/1 (Free Route Airspace (FRA))	0%	0%	0%	0%	0%	0%	0%	100%	100%	0%	100%	0%	100%	0%	0%	100%	0%	100%	0%	0%	0%	0%	0%	0%	25%
FRTO-B1/2 (Required Navigation Performance (RNP) routes)	0%	0%	0%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	100%	0%	0%	100%	0%	100%	0%	100%	100%	100%	0%	38%
FRTO SCORE PER STATE	17%	17%	0%	17%	0%	33%	17%	83%	83%	0%	50%	17%	67%	33%	17%	33%	33%	33%	67%	0%	50%	50%	33%	17%	**32%**
APTA - Improve arrival and departure operations																									
APTA-B0/1 (PBN Approaches (Basic))	50%	100%	0%	100%	100%	100%	0%	100%	100%	100%	50%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	50%	0%	81%

APTA-B0/2 (PBN SIDS and STAR procedures (Basic))	50%	100%	0%	100%	100%	100%	0%	100%	100%	100%	50%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	50%	0%	81%
APTA-B0/3 (SBAS/GBAS CAT I precision approach procedures)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
APTA-B0/4 CDO (Basic)	0%	0%	0%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	0%	0%	0%	0%	100%	0%	100%	0%	0%	0%	21%
APTA-B0/5 CCO (Basic)	0%	0%	0%	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	0%	0%	0%	0%	100%	0%	100%	0%	0%	0%	21%
APTA SCORE PER STATE	20%	40%	0%	60%	60%	60%	0%	80%	80%	40%	20%	40%	80%	40%	40%	40%	40%	40%	80%	40%	80%	40%	20%	0%	**44%**
SNET - Ground-based Safety Nets																									
SNET-B0/1 STCA	0%	100%	0%	100%	0%	0%	0%	100%	100%	0%	100%		100%	100%	100%	100%	100%	100%	100%	0%	100%	100%	100%	100%	**71%**
SNET-B0/2 MSAW	0%	100%	0%	100%	0%	0%	0%	100%	100%	0%	100%		100%	100%	100%	100%	100%	100%	100%	0%	100%	100%	100%	100%	**71%**
SNET-B0/3 APW	0%	100%	0%	100%	0%	0%	0%	100%	100%	0%	100%	0%	100%	100%	0%	0%	100%	100%	100%	0%	100%	100%	100%	100%	**58%**
SNET-B0/4 APM	0%	100%	0%	100%	0%	0%	0%	100%	100%	0%	100%	0%	100%	100%	0%	0%	100%	100%	100%	0%	100%	100%	100%	100%	**58%**

SNET SCORE PER STATE	0%	100%	0%	100%	0%	0%	0%	100%	100%	0%	100%	50%	100%	100%	50%	50%	100%	100%	100%	0%	100%	100%	100%	100%	**65%**

Progress in information threads in ESAF

TABLE 8-Implementation status of Information Thread in ESAF

ESAF REGION – AMET/DAIM

IMPLEMENTED | PARTIALLY IMPLEMENTED | NOT IMPLEMENTED | UNKNOWN

THREAD ELEMENTS	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	ESAF SCORE
AMET-Meteorological information																									
AMET-B0/1-Meteorological observations products	90%	70%		80%				60%	60%		90%				20%	90%	95%	40%	100%		70%	80%		65%	42%
AMET-B0/2-Meteorological forecast and warning products	85%	100%		100%				90%	90%		100%				40%	100%	100%	30%	100%		90%	100%		50%	49%
AMET-B0/3-Climatological and historical meteorological products	50%	100%		100%				50%	100%		100%				67%	100%	100%	25%	100%		75%	100%		50%	47%
AMET-B0/4-Dissemination of meteorological products	80%	40%		100%				60%	80%		90%				13%	30%		30%	100%		80%	69%		20%	33%
AMET-B1/1-Meteorological observations information	0%	84%		100%				56%	84%		94%				0%	80%	88%	0%	90%		82%	82%		48%	37%

AMET-B1/2-Meteorological forecast and warning information	9%	73%		100%				0%	91%		100%				0%	36%	100%	45%	100%		68%	82%		73%	37%
AMET-B1/3-Climatological and historical meteorological information	0%	100%		0%				0%	100%		0%				0%	100%	100%	0%	100%		75%	100%		50%	30%
AMET-B1/4-Dissemination of meteorological information	0%	67%		100%				0%	85%		67%				0%	67%	33%	67%	100%		83%	40%		83%	33%
AMET SCORE PER STATE	39%	79%	UNK	85%	UNK	UNK	UNK	40%	86%	UNK	80%	UNK	UNK	UNK	18%	75%	89%	30%	99%	UNK	78%	82%	UNK	55%	**39%**
DAIM – Digital Aeronautical Information Management																									
DAIM-B1/1-Provision of quality-assured aeronautical data and information	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
DAIM-B1/2-Provision of digital Aeronautical Information Publication (AIP) data sets	0%	0%	0%	50%	0%	0%	0%	0%	50%	0%	50%	0%	0%	0%	0%	0%	0%	0%	50%	0%	0%	0%	0%	0%	8%
DAIM-B1/3-Provision of digital terrain data sets	0%	0%	0%	0%	0%	0%	0%	0%	50%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
DAIM-B1/4-Provision of digital obstacle data sets	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
DAIM-B1/5-Provision of digital aerodrome mapping data sets	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
DAIM-B1/6-Provision of digital instrument flight procedure data sets	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

DAIM-B1/7-NOTAM improvements	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
DAIM SCORE PER STATE	14%	14%	14%	21%	14%	14%	14%	14%	29%	14%	21%	14%	14%	14%	14%	14%	14%	14%	14%	21%	14%	14%	14%	14%	14%	16%
FICE – Flight and Flow Information for a Collaborative Environment (FF-ICE)																										
FICE B0/1-Automated basic inter facility data exchange (AIDC)	0%	0%	0%	100%	0%	0%	0%	0%	0%	100%	0%	100%	0%	100%	100%	0%	0%	0%	100%	0%	0%	100%	0%	0%	0%	29%
FICE SCORE PER STATE	0%	0%	0%	100%	0%	0%	0%	0%	0%	100%	0%	100%	0%	100%	100%	0%	0%	0%	100%	0%	0%	100%	0%	0%	0%	**29%**

Progress in Technology Threads in ESAF

TABLE 9-Implementation status of ASUR Modules in ESAF					
Element	**Title**	**Applicability**	**Performance Indicators/**	**Performance Indicators/**	**Reference**
ASUR B0/1	Automatic Dependance Surveillance- Broadcast (ADS-B)	All States	Indicator: % of States that have implemented ADS-B to improve surveillance coverage/capabilities. Supporting metric: Number of States that have implemented ADS-B to improve surveillance coverage/capabilities.	33%	Dec 2023
ASURB0/2	Multi-lateration cooperative surveillance systems (M-LAT)	All States	Indicator: % of States that have implemented Multi-lateration (M-LAT) Supporting metric: Number of States that implemented Multi-lateration (M-LAT).	16%	Dec 2023
ASUR B1/1	Reception of aircraft ADS-B signals from space (SB ADS-B)	All States	Indicator: % of States that have implemented S ADS-B to provide surveillance coverage in locations where ground stations siting is not possible or not currently provided. Supporting metric: Number of States that implemented S ADS-B to provide surveillance coverage in locations where ground stations siting is not possible or not currently provided.	17%	Dec 2023

ASUR	Angola	Botswana	Burundi	Comoros	Djibouti	Eritrea	Eswatini	Ethiopia	Kenya	Lesotho	Mada gasca	Mala wi	Mauritius	Mozambique	Namibia	Rwanda	Seychelles	Somalia	South Africa	South Sudan	Uganda	U.R Tanzania	Zambia	Zimbabwe	Average
B0/1	0%	0%	0%	0%	100%	0%	0%	100%	100%	0%	0%	0%	0%	0%	100%	0%	0%	0%	100%	0%	0%	100%	0%	100%	**30%**
B0/2	0%	0%	0%	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	0%	100%	0%	0%	0%	100%	0%	0%	0%	0%	0%	**17%**
B1/1	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	100%	0%	100%	0%	0%	0%	0%	0%	**17%**
Score	**0%**	**0%**	**0%**	**33%**	**33%**	**0%**	**0%**	**67%**	**67%**	**0%**	**33%**	**0%**	**0%**	**0%**	**67%**	**0%**	**33%**	**0%**	**100%**	**0%**	**0%**	**33%**	**0%**	**33%**	
Average ASUR in ESAF																									**21%**

TABLE 10-Implementation status of COMI Modules in ESAF

Element	Title	Applicability	Performance Indicators/	Performance Indicators/	Reference
COMI B0/7	ATS Message Handling System (AMHS)	All States	Indicator: % of States that have implemented AMHS to support improved communication over AFTN Supporting metric: Number of States that have implemented AMHS to	63%	Dec 2023

COMI B1/1	Ground-Ground Aeronautical Telecommunication Network/Internet Protocol Suite (ATN/IPS)	All States	Indicator: % of States that have established National IP Network for voice and data communication. Supporting metric: Number of States that have established National IP Network for voice and data communication	17%	Dec 2023

COMI	Angola	Botswana	Burundi	Comoros	Djibouti	Eritrea	Eswatini	Ethiopia	Kenya	Lesotho	Madagasca	Malawi	Mauritius	Mozambique	Namibia	Rwanda	Seychelles	Somalia	South Africa	South Sudan	Uganda	U.R Tanzania	Zambia	Zimbabwe	Average
B0/7	100%	100%	0%	100%	0%	0%	100%	100%	100%	0%	100%	0%	100%	100%	0%	100%	0%	0%	100%	0%	100%	100%	100%	100%	63%
B1/1	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	100%	0%	0%	0%	100%	100%	0%	0%	0%	0%	17%
Score	**50%**	**50%**	**0%**	**50%**	**0%**	**0%**	**50%**	**50%**	**100%**	**0%**	**50%**	**0%**	**50%**	**50%**	**50%**	**50%**	**0%**	**0%**	**100%**	**50%**	**50%**	**50%**	**50%**	**50%**	
Average COMI IN ESAF																									**40%**

TABLE 11-Implementation status of ASUR Module in ESAF					
Element	**Title**	**Applicability**	**Performance Indicators/**	**Performance Indicators/**	**Reference**
COMS B0/1	CPDLC (FANS 1/A & ATN B1) for domestic and procedural airspace	Angola, Kenya, Madagascar, Mauritius, Namibia, Seychelles, Somalia, South Africa Tanzania	Indicator: % of States that have implemented CPDLC to support reduction of voice channel congestion, increase capacity in domestic airspace, improve communication and surveillance in airspace where procedural separation is being applied. Supporting metric: Number of States that have implemented CPDLC to support reduction of voice channel congestion, increase capacity in domestic airspace, improve communication and surveillance in airspace where procedural separation is being applied.	100%	Dec 2023
COMS B0/2	ADS-C (FANS 1/A) for procedural airspace	Angola Kenya, Madagascar, Mauritius, Namibia, Seychelles, Somalia, South Africa Tanzania	Indicator: % of States that have implemented ADS-C to improve surveillance in airspace where procedural separation is being applied. Supporting metric: Number of States that implemented ADS-C to improve surveillance in airspace where procedural separation is being applied.	90%	Dec 2023

COMS	**Angola**	**Kenya**	**Madagascar**	**Mauritius**	**Namibia**	**Seychelles**	**Somalia**	**South Africa**	**U.R Tanzania**	**Average**
B0/1	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
B0/2	100%	100%	100%	100%	0%	100%	100%	100%	100%	90%
SCORE	**100%**	**100%**	**100%**	**100%**	**50%**	**100%**	**100%**	**100%**	**100%**	

Average COMS	**95%**

TABLE 12-Implementation status of NAVS Modules in ESAF

Element	Title	Applicability	Performance Indicators/	Performance Indicators/	Reference
NAVS B0/3	Aircraft Based Augmentation system (ABAS)	All States	Indicator: % of States requiring Aircraft Based Augmentation System (ABAS) equipage for aircraft with max certificated take-off mass greater than 5,700 Kg to enable PBN Operation Supporting metric: Number of States requiring Aircraft Based Augmentation System (ABAS) equipage for aircraft with max certificated take-off mass greater than 5,700 Kg to enable PBN Operation	100%	Dec 2023

NAVS	Angola	Botswana	Burundi	Comoros	Djibouti	Eritrea	Eswatini	Ethiopia	Kenya	Lesotho	Madagascar	Malawi	Mauritius	Mozambique	Namibia	Rwanda	Seychelles	Somalia	South Africa	South Sudan	Uganda	U.R Tanzania	Zambia	Zimbabwe	Average
B0/3	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
SCORE	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Average NAVS																									**100%**

5.2.2 Progress in WACAF States

Progress in Operational Threads in WACAF

TABLE 13-Implementation status of Operational Thread in WACAF

WACAF REGION – A-CDM/ACAS/APTA/FRTO/SNET

IMPLEMENTED | PARTIALLY IMPLEMENTED | NOT IMPLEMENTED | UNKNOWN

THREAD ELEMENTS	Benin	Burkina Faso	Cameroon	Cabo Verde	Central African Republic	Chad	Congo	Cote d' Ivoire	DRC	Equatorial Guinea	Gabon	Gambia	Ghana	Guinea	Guinea Bissau	Liberia	Mali	Mauritania	Niger	Nigeria	Sao Tome & Principe	Senegal	Sierra Leone	Togo	WACAF SCORE
A-CDM-Airport Collaborative Decision Making																									
A-CDM B0/1-Airport CDM information sharing (ACIS)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
A-CDM SCORE PER STATE	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
ACAS - Airborne Collision Avoidance System (ACAS)																									
ACAS-B1/1- (ACAS Improvement)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
ACAS SCORE PER STATE	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
FRTO - Improved operations through enhanced en-route trajectories																									

FRTO-B0/1- DCT	100%	50%	100%	100%	0%	100%	100%	100%	100%	0%	50%	100%	100%	0%	100%	0%	100%	100%	100%	100%	0%	100%	100%	100%	75%
FRTO-B0/2 (Airspace planning and Flexible Use of Airspace (FUA))	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
FRTO-B0/3 (Pre-validated and coordinated ATS routes to support flight and flow)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
FRTO-B0/4 (Basic conflict detection and conformance monitoring.)	100%	100%	100%	100%	0%	100%	100%	100%	100%	0%	100%	0%	100%	0%	100%	0%	100%	100%	100%	100%	0%	100%	100%	100%	75%
FRTO-B1/1 (Free Route Airspace (FRA))	100%	100%	100%	0%	0%	100%	100%	100%	0%	0%	100%	0%	100%	0%	0%	0%	100%	100%	100%	100%	0%	100%	0%	100%	58%
FRTO-B1/2 (Required Navigation Performance (RNP) routes)	100%	100%	100%	100%	100%	100%	100%	100%	100%	0%	100%	0%	100%	0%	100%	0%	100%	100%	100%	100%	0%	100%	0%	100%	79%
FRTO SCORE PER STATE	60%	58%	60%	17%	50%	53%	60%	60%	60%	0%	58%	16%	60%	0%	50%	0%	60%	60%	60%	60%	00%	60%	30%	60%	**44%**
APTA - Improve arrival and departure operations																									
APTA-B0/1 (PBN Approaches (Basic))	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	0%	100%	100%	100%	96%
APTA-B0/2 (PBN SIDS and STAR procedures (Basic))	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	0%	100%	100%	100%	96%

APTA-B0/3 (SBAS/GBAS CAT I precision approach procedures)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
APTA-B0/4 CDO (Basic)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%
APTA-B0/5 CCO (Basic)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%
APTA SCORE PER STATE	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	0%	80%	40%	40%
SNET - Ground-based Safety Nets																									
SNET-B0/1 STCA	100%	100%	100%	100%	0%	100%	100%	100%	100%	0%	100%	0%	100%	0%	100%	0%	100%	100%	100%	100%	0%	100%	0%	100%	
SNET-B0/2 MSAW	100%	100%	100%	100%	0%	100%	100%	100%	100%	0%	100%	0%	100%	0%	100%	0%	100%	100%	100%	100%	0%	100%	0%	100%	
SNET-B0/3 APW	100%	100%	100%	100%	0%	100%	100%	100%	100%	0%	100%	0%	100%	0%	100%	0%	100%	100%	100%	100%	0%	100%	0%	100%	
SNET-B0/4 APM	100%	100%	100%	100%	0%	100%	100%	100%	100%	0%	100%	0%	100%	0%	100%	0%	100%	100%	100%	100%	0%	100%	0%	100%	
SNET SCORE PER STATE	100%	100%	100%	100%	0%	100%	100%	100%	100%	0%	100%	0%	100%	0%	100%	0%	100%	100%	100%	100%	0%	100%	0%	100%	

Progress in Information Threads in WACAF

TABLE 14-Implementation status of Information Thread in WACAF

WACAF REGION – AMET/DAIM

IMPLEMENTED | PARTIALLY IMPLEMENTED | NOT IMPLEMENTED | UNKNOWN

THREAD ELEMENTS	Benin	Burkina Faso	Cameroon	Cabo Verde	Central African Republic	Chad	Congo	Cote d' Ivoire	DRC	Equatorial Guinea	Gabon	Gambia	Ghana	Guinea	Guinea Bissau	Liberia	Mali	Mauritania	Niger	Nigeria	Sao Tome & Principe	Senegal	Sierra Leone	Togo	WACAF SCORE
AMET-Meteorological information																									
AMET-B0/1-Meteorological observations products	100%	100%	88%	90%	100%	100%	100%	100%	78%	86%	100%	0%	88%	100%	0%	13%	100%	100%	100%	100%	0%	100%	0%	100%	66%
AMET-B0/2-Meteorological forecast and warning products	100%	100%	100%	100%	100%	100%	100%	100%	0%	100%	100%	0%	100%	100%	100%	0%	100%	100%	100%	100%	0%	100%	22%	100%	77%
AMET-B0/3-Climatological and historical meteorological products	88%	88%	88%	63%	88%	88%	88%	88%	50%	88%	88%	43%	88%	125%	88%	28%	75%	63%	88%	75%	25%	88%	20%	88%	80%
AMET-B0/4-Dissemination of meteorological products	100%	100%	88%	90%	100%	100%	100%	100%	78%	86%	100%	0%	88%	100%	0%	13%	100%	100%	100%	100%	0%	100%	0%	100%	75%

AMET-B1/1-Meteorological observations information	84%	79%	78%	60%	76%	0%	81%	18%	0%	0%	82%	0%	0%	0%	0%	94%	52%	0%	77%	0%	0%	84%	79%	78%	39%
AMET-B1/2-Meteorological forecast and warning information	10%	4%	4%	30%	0%	13%	0%	0%	0%	0%	13%	0%	0%	30%	0%	30%	5%	0%	38%	0%	0%	10%	4%	4%	10%
AMET-B1/3-Climatological and historical meteorological information	0%	0%	0%	0%	67%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	8%
AMET-B1/4-Dissemination of meteorological information	40%	40%	40%	60%	60%	0%	60%	60%	0%	40%	60%	20%	20%	60%	60%	60%	60%	0%	60%	20%	60%	40%	40%	40%	42%
AMET SCORE PER STATE	63%	59%	59%	61%	61%	66%	72%	21%	60%	57%	12%	46%	63%	33%	9%	55%	51%	69%	73%	3%	70%	8%	53%	63%	**50%**
DAIM – Digital Aeronautical Information Management																									
DAIM-B1/1-Provision of quality-assured aeronautical data and information	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	100%	52%
DAIM-B1/2-Provision of digital Aeronautical Information Publication (AIP) data sets	50%	50%	50%	50%	50%	50%	50%	50%	0%	50%	50%	0%	0%	0%	50%	0%	50%	50%	50%	0%	0%	50%	0%	50%	30%

DAIM-B1/3-Provision of digital terrain data sets	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	50%	2%
DAIM-B1/4-Provision of digital obstacle data sets	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	50%	2%
DAIM-B1/5-Provision of digital aerodrome mapping data sets	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	50%	2%
DAIM-B1/6-Provision of digital instrument flight procedure data sets	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	50%	2%
DAIM-B1/7-NOTAM improvements	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
DAIM SCORE PER STATE	21%	21%	21%	21%	21%	21%	21%	21%	14%	21%	21%	14%	14%	14%	21%	14%	21%	21%	21%	21%	14%	14%	21%	14%	58%	**20%**
FICE – Flight and Flow Information for a Collaborative Environment (FF-ICE)																										
FICE B0/1-Automated basic inter facility data exchange (AIDC)	0%	100%	0%	100%	0%	0%	0%	100%	0%	0%	0%	0%	100%	0%	0%	0%	0%	100%	100%	0%	0%	100%	0%	0%		30%
FICE SCORE PER STATE	0%	100%	0%	100%	0%	0%	0%	100%	0%	0%	0%	0%	100%	0%	0%	0%	0%	100%	100%	0%	0%	100%	0%	0%		**30%**

Progress in Technology Threads in WACAF

TABLE 15-Implementation status of ASUR Modules in WACAF					
Element	**Title**	**Applicability**	**Performance Indicators/**	**Performance Indicators/**	**Reference**
ASUR B0/1	Automatic Dependance Surveillance- Broadcast (ADS-B)	All States	Indicator: % of States that have implemented ADS-B to improve surveillance coverage/capabilities. Supporting metric: Number of States that have implemented ADS-B to improve surveillance coverage/capabilities.	33%	Dec 2023
ASURB0/2	Multi-lateration cooperative surveillance systems (M-LAT)	All States	Indicator: % of States that have implemented Multi-lateration (M-LAT) Supporting metric: Number of States that implemented Multi-lateration (M-LAT).	4%	Dec 2023
ASUR B1/1	Reception of aircraft ADS-B signals from space (SB ADS-B)	All States	Indicator: % of States that have implemented S ADS-B to provide surveillance coverage in locations where ground stations siting is not possible or not currently provided. Supporting metric: Number of States that implemented S ADS-B to provide surveillance coverage in locations where ground stations siting is not possible or not currently	63%	Dec 2023

ASUR	Benin	Burkina Faso	Cameroon	Cabo Verde	CAR	Chad	Congo	Cote d' Ivoire	DRC	Equatorial Guine	Gabon	Gambia	Ghana	Guinea	Guinea Bissau	Liberia	Mali	Mauritania	Niger	Nigeria	Sao Tome & Principe	Senegal	Sierra Leone	Togo	Average
B0/1	0%	0%	0%	100%	0%	0%	0%	0%	100%	0%	0%		100%	100%	0%	100%	0%	0%	0%	100%	0%	0%	100%	0%	33%
B0/2	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	4%
B1/1	100%	100%	100%	0%	100%	100%	100%	100%	0%	100%	100%	0%	0%	0%	100%	0%	100%	100%	100%	0%	0%	100%	0%	100%	63%
Score	**33%**	**33%**	**33%**	**33%**	**33%**	**33%**	**33%**	**33%**	**33%**	**33%**	**33%**	**0%**	**33%**	**33%**	**33%**	**33%**	**33%**	**33%**	**33%**	**33%**	**33%**	**33%**	**67%**	**33%**	
Average ASUR in WACAF																									**33%**

TABLE 16-Implementation status of COMI Modules in WACAF

Element	Title	Applicability	Performance Indicators/	Performance Indicators/	Reference
COMI B0/7	ATS Message Handling System (AMHS)	All States	Indicator: % of States that have implemented AMHS to support improved communication over AFTN Supporting metric: Number of States that have implemented AMHS to	50%	Dec 2023

COMI B1/1	Ground-Ground Aeronautical Telecommunication Network/Internet Protocol Suite (ATN/IPS)	All States	Indicator: % of States that have established National IP Network for voice and data communication. Supporting metric: Number of States that have established National IP Network for voice and data communication	35%	Dec 2023

COMI	Benin	Burkina Faso	Cameroon	Cabo Verde	CAR	Chad	Congo	Cote d' Ivoire	DRC	Equatorial Guine	Gabon	Gambia	Ghana	Guinea	Guinea Bissau	Liberia	Mali	Mauritania	Niger	Nigeria	Sao Tome & Principe	Senegal	Sierra Leone	Togo	Average
B0/7	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
B1/1	0%	100%	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	100%	100%	0%	100%	0%	100%	35%
Score	50%	75%	50%	50%	50%	50%	75%	75%	50%	50%	50%	50%	75%	50%	50%	50%	50%	50%	75%	75%	50%	75%	50%	75%	
Average COMI in ESAF																									**43%**

TABLE 15-Implementation status of COMS Modules in WACAF

Element	Title	Applicability	Performance Indicators/	Performance Indicators/	Reference
COMS B0/1	CPDLC (FANS 1/A & ATN B1) for domestic and procedural airspace	Cabo Verde Chad Congo Cote d'Ivoire DRC Ghana Mauritania Niger Nigeria Senegal	Indicator: % of States that have implemented CPDLC to support reduction of voice channel congestion, increase capacity in domestic airspace, improve communication and surveillance in airspace where procedural separation is being applied. Supporting metric: Number of States that have implemented CPDLC to support reduction of voice channel congestion, increase capacity in domestic airspace, improve communication and	90%	Dec 2023
COMS B0/2	ADS-C (FANS 1/A) for procedural airspace	Cabo Verde Chad Congo Cote d'Ivoire DRC Ghana Mauritania Niger Nigeria Senegal	Indicator: % of States that have implemented ADS-C to improve surveillance in airspace where procedural separation is being applied. Supporting metric: Number of States that implemented ADS-C to improve surveillance in airspace where procedural separation is being applied.	100%	Dec 2023

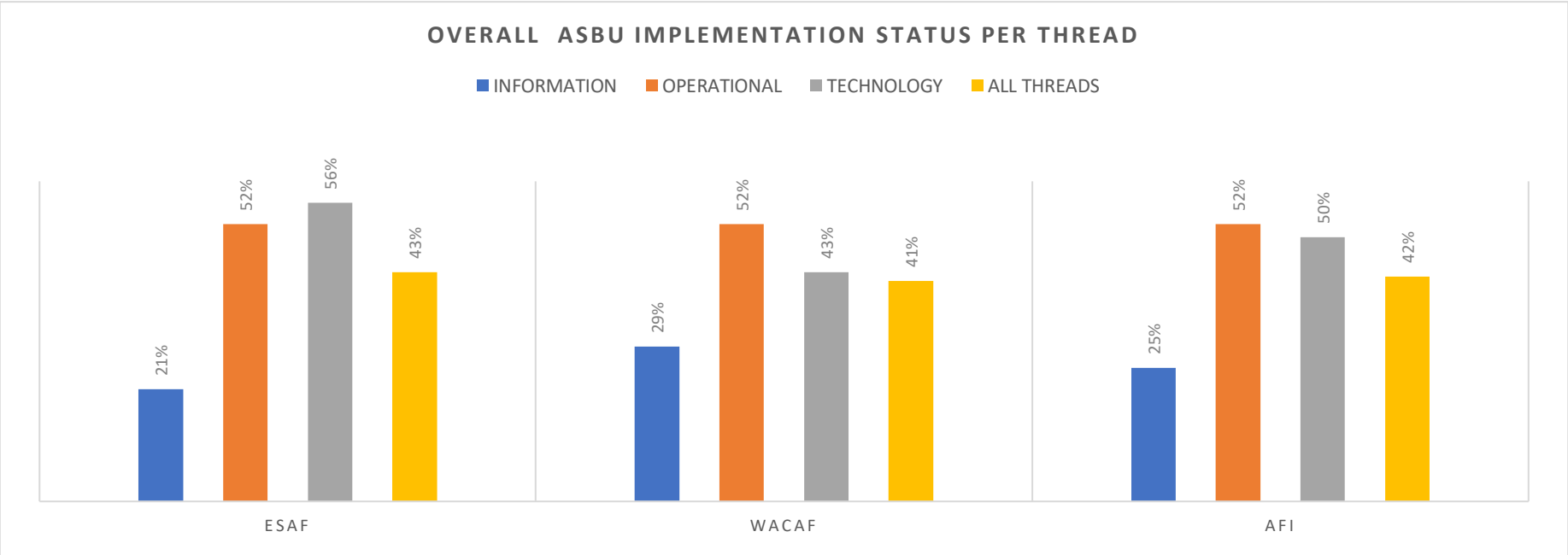
COMS	Cabo Verde	Chad	Congo	Cote d' Ivoire	DRC	Ghana	Mauritania	Niger	Nigeria	Senegal	Average
B0/1	100%	100%	100%	100%	0%	100%	100%	100%	100%	100%	90%
B0/2	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
SCORE	100%	100%	100%	100%	50%	100%	100%	100%	100%	100%	

	Average COMS IN WACAF	**95%**

TABLE 15-Implementation status of NAVS Modules in WACAF					
Element	**Title**	**Applicability**	**Performance Indicators/**	**Performance Indicators/**	**Reference**
NAVS B0/3	Aircraft Based Augmentation system (ABAS)	All States	Indicator: % of States requiring Aircraft Based Augmentation System (ABAS) equipage for aircraft with max certificated take-off mass greater than 5,700 Kg to enable PBN Operation Supporting metric: Number of States requiring Aircraft Based Augmentation System (ABAS) equipage for aircraft with max certificated take-off mass greater than 5,700 Kg to enable PBN Operation	95%	Dec 2023

COMI	**Benin**	**Burkina Faso**	**Cameroon**	**Cabo Verde**	**CAR**	**Chad**	**Congo**	**Cote d' Ivoire**	**DRC**	**Equatorial Guine**	**Gabon**	**Gambia**	**Ghana**	**Guinea**	**Guinea Bissau**	**Liberia**	**Mali**	**Mauritania**	**Niger**	**Nigeria**	**Sao Tome & Principe**	**Senegal**	**Sierra Leone**	**Togo**	**Average**
B0/3	100%	100%	100%	100%	100%	100%	100%	100%	50%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	50%	0%	100%	100%	100%	95%
Score	100%	100%	100%	100%	100%	100%	100%	100%	87%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	0%	100%	100%	100%	
Average COMI in WACAF																									**95%**

5.3 Overall ASBU Implementation Status in the AFI Region



5.3.1 Chart 16 provides figures for the implementation of ASBU threads in the AFI region including the breakdown for ESAF and WACAF. However, these figures do not depict the actual status of implementation of all ASBU elements applicable in the AFI region due to lack of or insufficient data on national ASBU implementation. The analysis was based on ASBU elements that are monitored at ICAO Regional offices in ESAF and WACAF.

5.3.2 The overall implementation of ASBU in the AFI region stands at 42%, including 43% in ESAF and 43% in WACAF. The information thread is the least performing with 25%, while the operational thread shows significant progress above 50% for the region.

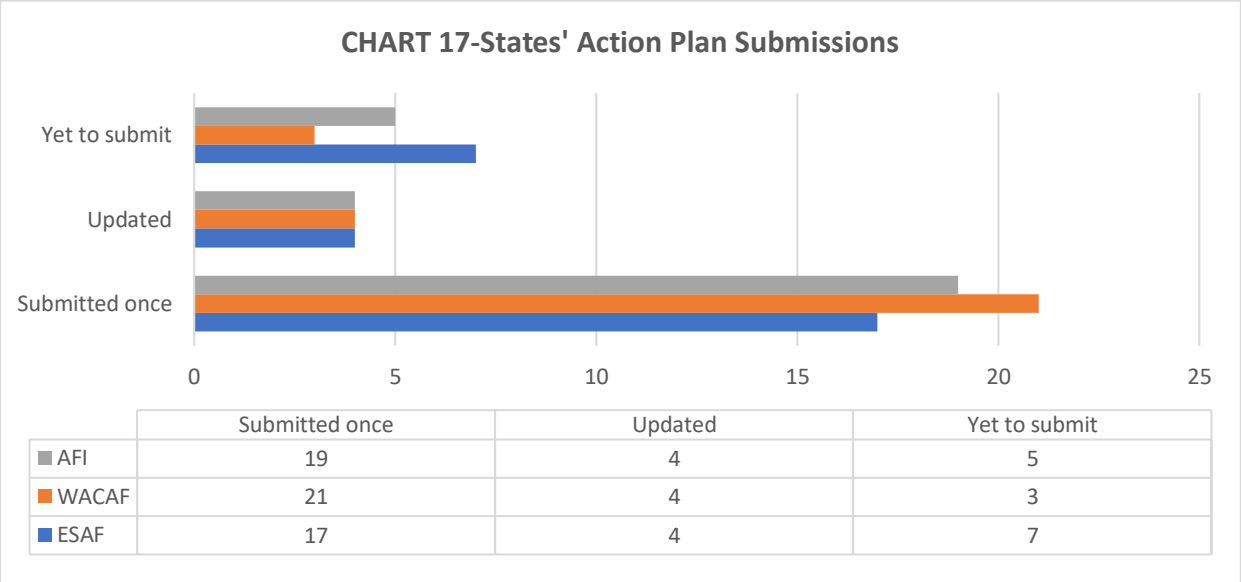
5.3.3 It is to note that there is a well-balanced implementation performance between ESAF and WACAF in all threads which indicates that there is a regionally coordinated and harmonized approach to the deployment of APIRG projects and other initiatives.

6 BENEFITS OF ASBU IMPLEMENTATION ON ENVIRONMENTAL PROTECTION

6.1 State Action Plans (SAP) On CO_2 Emissions Reduction

6.1.1 State Action Plans (SAPs) are a voluntary planning and reporting tool for States to communicate information on their activities to address CO_2 emissions from international civil aviation to ICAO. The ICAO State Action Plan 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 the national level.

6.1.2 On the other hand, SAPs enable ICAO to compile global progress towards meeting the goals set for the international aviation sector such as the Long-term Aspirational Goal (LTAG). Below is information on the 2023 overview of the SAP Initiative in the ESAF and WACAF Regions.



	Submitted once	Updated	Yet to submit
AFI	19	4	5
WACAF	21	4	3
ESAF	17	4	7

6.2 Environmental benefits of ASBU implementation in the AFI Region

6.2.1 The ASBU, while aiming to enhance the safety, efficiency, and capacity of global air traffic management systems, also involves the implementation of advanced technologies and procedures that will significantly reduce fuel consumption and emissions.

Key Environmental Benefits of ASBU in the AFI Region in 2023

6.2.2 The ICAO SAP initiative is closely linked to ASBU implementation. States' most popular measure for reducing CO_2 emissions is on Operations.

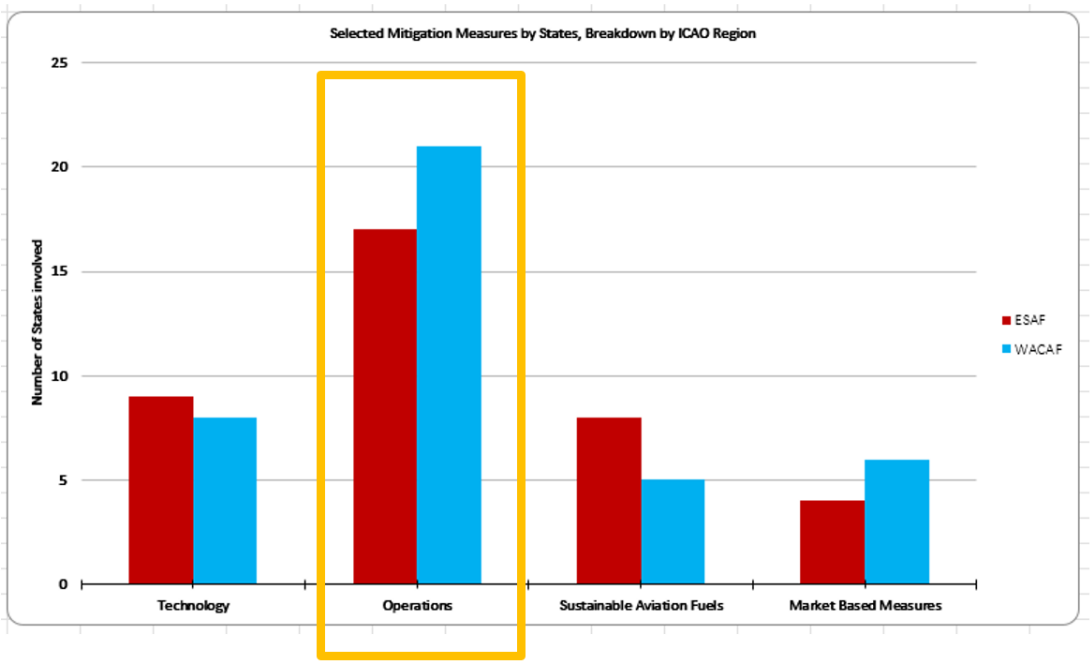


CHART 18-ASBU impact on environmental protection

6.2.3 ASBU modules such as APTA-B0, APTA-B1, APTA-B2, APTA-B3, FRTO-B0, FRTO-B1, NAV-B0, TBO-B1, TBO-B2, and TBO-B3 when implemented consistently contribute to the substantial reductions in fuel consumption and associated carbon emissions through efficient management of flight trajectories and flight time during en route or approach.

6.2.4 ASBU leverages NextGen technologies, like Automatic Dependent Surveillance-Broadcast (ADS-B), which enables more precise tracking of aircraft and the provision of a more efficient ATC surveillance service that contributes to flight trajectory optimization and the reduction of delay during approach and departure, thus improving efficiency and reduces emissions.

7 STATES AND INDUSTRY ACHIEVEMENTS AND BEST PRACTICES

7.1 ASBU implementation initiatives in Kenya

7.1.1 The State has engaged in many projects and initiatives to modernize its air navigation services and facilities. Initiatives conducted include improvement of air traffic services, aeronautical information services, aeronautical meteorological service as well as search and rescue service through significant investment in communication, navigation and surveillance facilities and equipment.

7.1.2 The modernization of ANS in Kenya was carried out following a project-based approach which was developed in the framework of the ASBU methodology and the associated technological roadmap.

7.1.3 **Modernization of communication:** The State focused on the improvement of ground/ground communication infrastructure such as ATS Message handling system (AMHS)- ASBU COMI-B0/7, as well as air/ground communication service with the implementation of CPDLC FANS1/A and ATN B1 (ASBU COMS-B0/1).

7.1.4 **Modernization of navigation**: The State implemented PBN flight procedures on all its major airports such as Nairobi Jomo Kenyatta and Wilson Airport where PBN procedures are implemented namely as PBN approach with Basic capabilities (APTA-B0/1), PBN SID and STAR (APTA-B0/2) as well as CDO (APTA-B0/4) and CCO (APTA-B0/5). These new procedures will contribute to the improvement of airspace capacity and access to aerodromes, flight efficiency and the reduction of environmental impact of aviation activities.

7.1.5 **Airspace optimization**: Kenya has implemented Direct Routing (DCT, FRTO-B0/1) and user preferred route for en-route operations in the oceanic part of the airspace under its responsibility. However, Free Route Airspace (FRA, FRTO-B1/1) as well as Flexible use of airspace (FUA, FRTO-B0/2) are still work in progress with target date of completion set for 2025.

7.1.6 A full detail of initiatives taken by Kenya in implementing ASBU applicable elements is available at Appendix E to the report.

7.2 ASBU implementation initiatives in Senegal

7.2.1 Senegal undertook the modernization process of its air navigation services and facilities since the early days of ASBU. A modernization programme was developed including improvement in aerodrome and airspace operations. The State has implemented ASBU elements in all three categories including operational, information and technology.

7.2.2 **Operational elements**: Emphasis was put on the implementation of PBN procedures with four out of eight elements in block 0 are implemented at Blaise Diagne International Airport (AIBD), namely PBN approaches with LNAV/VNAV (APTA – B0/1), PBN STAR (APTA – B0/2), Continuous Descent Operations (CDO) (APTA – B0/4) and Continuous Climb Operations (CCO) (APTA – B0/5). The State has also engaged on the implementation of Free Route Airspace (FRTO – B1/1) in Dakar UTA and a dynamic sectorization (FRTO – B1/4) of the Oceanic sector is implemented.

7.2.3 **Technology Elements**: A vast programme of improvements of communication and surveillance was undertaken through the modernization of air-ground and ground-ground communication as well as surveillance infrastructure. Air-ground communication service and infrastructure were improved through the implementation at Dakar ATS unit of services such as CPDLC FANS 1/A & ATN B1 (COMS – B0/1), ADS-C FANS 1/A (COMS – B0/2), SATVOICE (COMS – B1/3). Ground-ground communication was also improved with the operationalization of AMHS (COMI B0/7) at Dakar and Diass ATS units. The ATC surveillance service was enabled at Dakar Area Control Center (ACC) and at the Approach unit following the implementation of cooperative surveillance radar- downlink of aircraft parameters (ASUR – B0/3) and the implementation of Space-Based ADS-B (ASUR – B1/1) with full coverage of Dakar FIR down to 100ft above ground level.

7.2.4 **Information Elements**: The State through ASECNA (the ANSP) has established and operationalize the Automated Inter facility Data Communication (AIDC) (ASBU – B0/1) between units' pair of Dakar ACC/Abidjan ACC IN Cote d'Ivoire and Dakar/Atlántico ACC in Brazil. The automated system allows a direct exchange of flight information between units and thus improves safety and increases ATM capacity through the reduction of ATC workload. The electronic aeronautical information publication (eAIP) (ASBU – B1/2) was also implemented thus increasing timely accessibility to relevant aeronautical information. Meteorological products processing and dissemination process were significantly improved through the implementation of modernization of MET services and equipment.

7.2.5 Full detail of initiatives taken by Senegal in implementing ASBU applicable elements is available at Appendix F to the report.

7.3 Modernization of Air Navigation Services in The DRC

7.3.1 The DRC has engaged on a vast programme of modernization and improvement of its Air navigation services and infrastructures at the major State's airport as well as in the Kinshasa FIR. The State has deployed several projects in different Air Navigation areas covering investment in the renewal or acquisition of NAVAID, Communication, Surveillance as well as training of technical personnel.

7.3.2 **Modernization of Airport infrastructure**: The DRC has performed renovation work at Mbuji Mayi airport with the construction of new buildings including control tower, firefighting premises as well as the extension of the runway from 2000m to 3000m. In the same, Kisangani and Kolwezi airports have undergone renovation works on terminal facilities and ground-aids.

PIC2-Control Tower-Mbuji Mayi

PIC3- New Kolwezi Terminal

PIC4- New Kisangani Terminal

7.3.3 **Improvement of aeronautical communications**: The State has launched a four-year programme for the renewal of VSATs in different sites countrywide between May 2022 and June 2025. The new VSATs are expected to improve the transmission of VHF air/ground modulations, ADS-B data, messaging exchanges between air traffic services, and direct ATS/DS ground-to-ground communication.

PIC5- New VSAT at Kinshasa Ndjili

7.3.4 **Improvement of navigation**: The DRC has developed a plan for the renewal and modernization of NAVAIDs in the State. The plan included the replacement of CVOR by DVOR which provides more stable signals for navigation. Eight of twelve planned VOR/DVOR have been installed at various stations including Kisangani/Bangoka, Bunia, Kinshasa/Ndjili, Mbandaka, Kindu, Goma, Lubumbashi/Luano, and Mbuji-Mayi. Although these new equipment are expected to improve radio navigation service, the scarcity of electrical power supply is an issue that

may generate frequent unavailability of the signals. The State is currently working on a plan to mitigate this risk.

PIC6- New DVOR of Kisangani

7.3.5 **Improvement of Air Traffic Services**: The DRC has upgraded ATS in Kinshasa FIR from procedural control to procedural control with surveillance system through the deployment of automated ATM system at Kinshasa ACC and Lubumbashi ACC. The upgrade of ATS also included the implementation of ADS-C/CPDLC that has improved the air/ground communications in remote areas initially covered by HF frequencies only. The State is planning to move to ATS surveillance service in the coming years with the implementation of ADS-B.

7.3.6 A complete status of modernization of Air Navigation Services and infrastructure in the DRC is at Appendix G to the report.

7.4 Airport operators

7.4.1 Through peer support initiatives with missions jointly arranged between ACI, IATA and State experts, some airport operators have been able to attain milestones since establishment of Runway Safety teams. Some of the States include Uganda, South Sudan, Djibouti. There are planned activities for Somalia, Malawi soon.

7.5 Air Navigation Services Providers

No input

7.6 Industry Partners

IATA-supporting runway safety go team

7.6.1 IATA has been supporting the Runway Safety Go team activities in the Region which has led to increased number of International Aerodromes with operational Runway Safety team. Similarly, the FAA has been very supportive in workshops and webinars on Runway Safety, and Bird and Wildlife strike Hazard management programs.

AFRAA –User preferred route (UPR) initiative in the AFI region

7.6.2 The African Aviation Industry Group (AAIG) conducted a laboratory on Africa Air Transport Sustainability from 27 June to 1 July 2022 in Nairobi, Kenya. Aviation, trade, and tourism stakeholders attended the laboratory. One of the five projects retained from the laboratory was on FRA trials to accelerate the implementation of FRA at a continental level. Indeed, at its meeting in 2019 at Accra, Ghana, APIRG passed a conclusion on FRA targeting 2023 for implementation.

Therefore, the project's central deliverable was implementing the FRA trial, which would reduce the costs of flight operations and the impact on the environment. The trials would also produce data to support FRA implementation in the Region.

7.6.3 With AFREXIMBANK financial sponsorship, the project kick-off workshop was conducted in Addis Ababa from 29 October to 2 November 2023, bringing together Ethiopian Airlines, Kenya Airways, AFRAA, IATA, ICAO, CANSO, ANSPs/States. Latin American facilitators explained how CADENCE works through the step-by-step FRA implementation. The facilitators shared with the participants the steps they followed, from collecting data relating to a User-Preferred Route (UPR) to the analysis, assessment, and approvals by the ANSPs to implementing the trials.

7.6.4 Motivated by the acquired knowledge of the step-by-step approach and taking advantage of having the relevant stakeholders in the same room, participants reviewed a set of proposed User Preferred Routes (UPR) trajectories. They approved them and implemented the first trials on the last day of the workshop on 2 November 2023:

- Kenya Airways: KQA520 [NBO-ACC]
- Ethiopian Airlines: ETH935 [ADD-ABJ].

PIC7- Screenshot of UPR trial flight by Ethiopian Airline and Kenya Airways

7.6.5 In line with APIRG Conclusion 26/09, the trial schedule was set for 2024 as follows:

- ***Ethiopian Airlines trial flights between Addis Ababa and Abidjan***
  - o Three-day one-way trials
  - o Three-day two-way trials
  - o Seven-day two-way trials
  - o One-month two-way trials etc.

- **Ethiopian Airlines trial flights between Addis Ababa and Cape Town**
  - o One-day one-way trial
  - o Three-day one-way trials
  - o Three-day two-way trials
  - o Seven-day two-way trials
  - o One-month two-way trials etc.

- ***Kenya Airways trial flights between Nairobi and Abidjan***
  - o One-day one-way trial
  - o Three-day one-way trials
  - o Three-day two-way trials
  - o Seven-day two-way trials
  - o One-month two-way trials etc.

- ***Kenya Airways trial flights between Nairobi and Cape Town***
  - o One-day one-way trial
  - o Three-day one-way trials
  - o Three-day two-way trials
  - o Seven-day two-way trials
  - o One-month two-way trials etc.

7.6.6 In 2024, AFRAA plans to share the trial outcome with the AFRAA Executive Committee to eventually attract additional airline volunteers to participate in the trials along with many city pairs. The collected data will be further shared with the FRA Project Management Team during a workshop to draw a roadmap and present it to the 2024 APIRG Meeting for endorsement.

7.6.7 Data assessment indicated that a wide-body aircraft saves 1258 kgs on an average UPR return flight (East-West or East-South). Extending free routing flights to 20 daily flights, the operator's fuel savings will be 9 180 Tones, the CO2 footprint will be reduced by 29,000 Tones, and the airlines will cut more than USD 17,125,800 million from their fuel bill.

7.6.8 Through the projected 2024 trials, the Region will learn appropriate lessons that will lead to the demonstration of improved flight operations' efficiency through reduced operating costs, such as fuel and time savings, and decreased CO2 emissions. Operating cost reduction reduces air service prices and supports intra-Africa trade and tourism development.

7.6.9 These UPR trials were successfully achieved thanks to the efforts made by States of the AFI region in the implementation of key ASBU elements such as FRTO-B0/1(Direct Routing) and FRTO-B1/1(Free Route Airspace) in the champion FIRs.

7.6.10 Onboard navigation capabilities also contributed to the achievement of the project as most airlines in the region are equipped with advanced navigation technologies associated with ASBU elements NAV-B0/3 (ABAS) which has become an aircraft certification requirement in 97% of States in the AFI region.

8 CHALLENGES AND OPPORTUNITIES

8.1 Challenges in airport modernization

8.1.1 A-CDM implementation is a challenge in the AFI region. The effective implementation of the fundamental A-CDM element A-CDM B0/1-*Airport CDM information sharing (ACIS)* requires:

1. A formal milestone procedure.
2. A formal system for information sharing.
3. A standard terminology document.
4. MoUs established and signed among all parties for the sharing and exchange of information as well as data protection.
5. Training programme for all stakeholders involved.

8.1.2 However, there is a lack of formal documentation from States/airports to confirm the implementation of A-CDM. Most airports have established informal mechanisms for information sharing but haven't yet developed formal A-CDM procedures, especially a formal milestone procedure, which is the backbone of A-CDM implementation. Furthermore, States have not yet developed formal guidelines for the implementation of A-CDM

8.1.3 The APIRG A-CDM Project Management Team is developing generic documentation to support AFI States and airports in A-CDM implementation. Assistance to States/airports on A-CDM implementation is expected to begin once the generic documentation is validated at the regional level and the A-CDM workshop, which is scheduled for 2025, is conducted.

8.2 Capacity constraints

Airspace optimization

8.2.1 Although significant progress has been made in airspace planning and management in the Region, there are still some outstanding challenges that prevent effective airspace optimization. The implementation of FRA, FUA and PBN are significantly hampered by the fixed nature of the airspace configuration, the high number of special use airspace and the low level of civil/military cooperation implementation in the region (overall implementation is at 17%). The African aviation infrastructure gap analysis conducted in 2023 revealed a high number of Special Use Airspace (SUA) erected around main international airports. Around 364 SUA are concentrated within 100NM of 68 international airports in AFI, representing a density of 6 SUA/airports. It was also observed from the study that the ceilings of the SUA, especially the prohibited areas, vary from 5000 feet to unlimited. The airspace organization added to low collaborative decision making makes cross-border air traffic management less effective especially during contingency events.

8.2.2 Recent contingency events in the AFI region have proved it difficult to activate published State's contingency plan due mainly to uncoordinated cross border strategic planning or lack of robustness. In addition, many contingency events led to the closure of the airspace above the State concerned which caused traffic deviation from usual planned route hence an increase in traffic load in adjacent airspace without advanced preparation. It was identified that the lack of inter FIRs ATFM solutions contributed to the inefficiency of Air Traffic Management during contingency events. The implementation of ASBU elements pertaining to ATFM implementation such as NOPS-B0/1 (Initial integration of collaborative airspace management with air traffic flow management) is essential for the region to improve airspace optimization.

Technological advancements

8.2.3 The ASBU framework includes a technology roadmap for a harmonized and scalable global modernization of aviation infrastructure and services.

8.2.4 The AFI region, in defining its regional ASBU priorities and implementation strategies, has also provided guidance on the technology enablers. However, it can be observed that although APIRG has set the regional framework for a harmonized implementation of ASBU, several initiatives are carried out outside the established frame. Thus, generating some issues such as low or lack of compatibility or interoperability of equipment mainly in communication, navigation and surveillance.

8.2.5 The region is also experiencing safety issues related to satellite-based navigation systems, namely the GNSS radio frequency interference which has brought APIRG to reconsider its policy on the decommissioning of legacy ground-based navigation equipment such as VOR, VOR/DME, NDB and ILS.

8.2.6 The advancement of technology brings the international civil aviation community to constantly review and improve standards and practices. Standardization of performance requirements sometimes goes with cost incurred by various AFI stakeholders such as airlines, ANSPs and CAA to adapt their infrastructure, services and procedures to maintain the acceptable level of safety and services.

Cybersecurity threats

8.2.7 Cybersecurity awareness in the civil aviation sector within the AFI region is a growing focus. ICAO has been actively working on initiatives to enhance cybersecurity resilience in this region.

8.2.8 The AFI region has identified various cyber threats targeting Air Navigation Services (ANS). Efforts are being made to assess and improve the current cyber resilience of these services. A cyber safety and resilience framework has been developed to guide States and organizations in assessing cybersecurity risks, threats, and vulnerabilities. This framework includes guidelines for mitigating risks and enhancing cyber resilience.

8.2.9 Increasing cybersecurity awareness among stakeholders is crucial. Initiatives include training programs and workshops to educate personnel on best practices and emerging threats. Collaboration between different countries and organizations within the AFI region is essential. This includes sharing information, resources, and strategies to combat cyber threats effectively.

8.2.10 These efforts aim to ensure that the civil aviation sector in the AFI region can modernize its air navigation infrastructure and services in a safe and secure manner despite the growing cyber threats.

Human resources

8.2.11 The AFI Region has demonstrated strong commitment to contribute to the improvement of global air navigation through the planning and implementation of programmes that are aligned to the GANP and its ASBU framework.

8.2.12 The Progress observed in ASBU implementation is the result of political commitment through significant investment in infrastructure and human resources. Although the continent has a huge potential workforce, there are still persistent challenges in the recruitment training and retention of qualified personnel at the regulatory and industrial levels.

8.2.13 Capacity building of State's technical personnel on ASBU planning, implementation and monitoring is key. However States are still lacking expertise in ASBU despite several workshops and training initiated by ICAO and other regional bodies.

8.2.14 High turnover at State's level is another cause of slow progress in some States, as staff initially trained to support ASBU implementation often move to other areas within or outside their organization.

8.2.15 Experience has shown that the stability in implementation of the State's national plans is highly dependent on the stability in the human resources assets. In defining the implementation strategies, States are expected to assess the risk related to the workforce necessary to ensure effective implementation of their plans.

8.3 Future trends and developments:

Increased automation and digitalization

8.3.1 Artificial intelligence (AI) and digitalization are game changers in aviation, as in every other sector. The use of AI and digitalization technologies allows for more safety, adaptability, optimization, efficiency, capacity and more support to all aviation stakeholders. AI and digitalization will deeply impact the competencies of aviation professionals, and there is a need for the whole aviation sector to prepare for this significant change. New or updated standards and regulations will be necessary to allow the application of AI technologies. New concepts for certification, qualification and data sharing are particularly needed.

8.3.2 More and more data are generated and exchanged by the aircraft systems, by the surveillance systems, air traffic control systems, but also between these ones and the airport operation systems and other stakeholders. These data are the basis for creating new services, and their aggregation and interoperability can bring even more value to the whole ecosystem of aviation.

8.3.3 It is expected that an effective implementation of ASBU in the AFI region will strongly depend on the level of automation and digitalization of the aviation industry in the continent. States and industry should anticipate the adaptation of their infrastructure and services modernization strategies to integrate these new trends.

Integration of new entrants into the airspace

8.3.4 The term "New entrants" refers to higher airspace and unmanned aircraft system (UAS) Traffic Management (UTM) operations. They represent an increasing body of actors who are seeking to implement new aviation concepts in the airspace where there is currently little managed activity. The scope covers unmanned aircraft system (UAS) traffic management (UTM), typically in airspace below 500 feet, including over cities, and higher airspace operations, in airspace above levels used by existing airspace users, typically above FL660.

8.3.5 These actors are often new to aviation and use or intend to use new technologies and air vehicle concepts, experimental prototypes, or sometimes aircraft still in the research and development (R&D) phase (e.g. supersonic or hyper-sonic projects), manned and unmanned, to carry out low

altitude arial work such as in agriculture, medical delivery, as well as in higher airspace for telecommunication networking.

8.3.6 The growing volume of activities of UAS and higher altitude Operations vehicles is fueled by the technical enablers which are engineered in various ASBU modules such as ASUR, COMI, CSEP, FRTO and the related technology roadmaps.

8.3.7 The ICAO Global ATM Operational Concept states that all airspace should be a usable resource, any restriction on the use of any particular volume of airspace should be considered transitory, and all airspace should be managed flexibly. It implies that States are expected to consider the integration of new entrants in their aviation system through the modernization of regulations, infrastructure and air navigation services.

9 OPPORTUNITIES

9.1 Digitalization of the aviation system

9.1.1 Digitalization and AI technologies are technical enablers for the development of new functions and services, to improve the level of safety, the environmental and economic efficiency, and the capacity in Aviation.

9.1.2 For States, AI and digitalization may impact rulemaking and oversight processes and operations, by allowing a better use of available data to guide collaborative decision making among stakeholders.

9.1.3 Digitalization and AI may also provide an opportunity for the States and the industry to improve the competencies of aviation professionals through training and qualification for adaptation to a digitalized environment that forms part of the modernization process of the aviation system.

9.2 Single African Air Transport Market (SAATM)

9.2.1 The Single African Air Transport Market (SAATM) is a flagship project of the African Union Agenda 2063, an initiative of the African Union to create a single unified air transport market in Africa to advance the liberalization of civil aviation in Africa and act as an impetus to the continent's economic integration agenda.

9.2.2 SAATM will ensure aviation plays a major role in connecting Africa, promoting its social, economic and political integration and boosting intra-Africa trade and tourism as a result.

9.2.3 The achievement of the vision and goals of the SAATM requires robust regional collaboration and initiatives. It is an opportunity for African States and all stakeholders to develop collaborative bankable projects to enhance and modernize the aviation infrastructure and services in the continent in line with the Global air navigation plan and the regional air navigation plan.

APPENDICES

APPENDIX A. -ASBU implementation in Kenya

#	Initiative/Project title	Area	Strategic Objective	Description	Related ASBU element(s)
1.	Published GNSS instrument approach chartswith LNAV and LNAV/VNAV minima for all international airports.	☐ AOP ☐ CNS ☒ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☒Safety ☒Capacity & Efficiency ☐ Security & Facilitation ☐ Economic developmentof air transport ☒ Environmental protection	• Date of start: 2014 • Date of completion:2018 • Objective(s): Safety, capacity, efficiency &Access. • Output(s): Published GNSS instrument approach charts with LNAV and LNAV/VNAVminima for all international airports. -The PBN procedures also support stabilized approach operations for aircraft equipped withadvisory Baro-VNAV functionality. • Activities carried out: Airport surveys, design ofPBN approach procedures, sensitization of ATCOs on PBN operations. • Challenges: Inadequate number of IFPdesigners • Opportunities: Continued training in IFP Designat AFPP	**APTA-B0/1 PBN** Approaches (with basic capabilities) GNSS-based PBN approach procedures Implemented (I)
2.	Published GNSSSIDs and STARscharts	☐ AOP ☐ CNS ☒ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☐ Safety ☒Capacity & Efficiency ☐ Security & Facilitation ☐ Economic developmentof air transport ☐ Environmental protection	• Date of start: 2014 • Date of completion: 2018 • Objective(s): Safety, capacity, efficiency &Access. • Output(s): Published GNSS SIDs and STARscharts • Activities carried out: Airport surveys, design ofPBN SIDs and STARs, sensitization of ATCOs on PBN operations.	**APTA-B0/2 PBN** SID and STAR procedures (with basic capabilities) Implemented (I)

				• Challenges: Inadequate number of IFP designers • Opportunities: Continued training in IFP Designat AFPP	
3.	Published GNSS CCO SIDs and CDO STARs charts HKJK and HKMO STARs for CDOs Implemented HKJK and HKMO SIDs for CCOs Implemented	☐ AOP ☐ CNS ☒ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☒Safety ☒Capacity & Efficiency ☐ Security & Facilitation ☐ Economic developmentof air transport ☐ Environmental protection	• Date of start: 2016 • Date of completion: 2020 • Objective: Safety, capacity, efficiency, Accessand environmental protection • Output: Published GNSS CCO SIDs and CDO STARs charts • Activities carried out: Airport surveys, design ofPBN CCO SIDs and CDO STARs, sensitization of ATCOs on PBN CCO SIDs/CDO STARs operations • Challenges: Inadequate number of IFP designers and airspace designers. -Difficulty in achieving strategic de-conflictionof all the SIDs and STARs for TMAs with complex airspace structure and traffic captureregions while maintaining efficiency always requiring a trade-off. • Opportunities: Continued training in IFP Designand PBN airspace Design at AFPP and other ICAO trainings	**APTA-B0/4 CDO** (Basic) Implemented HKJK and HKMO STARs for CDOs Implemented (I) **APTA-B0/5 CCO** (Basic) Implemented (I) HKJK and HKMO SIDs for CCOs Implemented (I)

4.	Published Helicopter PinS procedures	☐ AOP ☐ CNS ☒ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT	☒Safety ☒Capacity & Efficiency ☐ Security & Facilitation ☐ Economic developmentof air transport ☐ Environmental protection	• Date of start: 2020 • Date of completion: To be notified • Objective: Safety, capacity, efficiency and improved access • Output: Published Helicopter PinS procedures • Activities carried out: Draft design for helicopter PinS procedures	**APTA-B0/6 PBN** Helicopter Point inSpace (PinS) Operations – In Progress **APTA-B0/7** Performance-based

		☐ ENV ☐ TRA		• Challenges: a) Inadequate capacity in IFP designer for helicopter PinS procedures b) Limited training. c) Inadequate regulatory framework for IFR helicopter operations. • Opportunities:	aerodrome operating minima – Advanced aircraft – In Progress
5.	Published Instrument approaches procedures (IAPs)to non-instrument runways, improving airport access.	☐ AOP ☐ CNS ☒ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☒Safety ☒Capacity & Efficiency ☐ Security & Facilitation ☐ Economic developmentof air transport ☒ Environmental protection	• Date of start: 2014 • Date of completion: 2018 • Objective(s): Safety, capacity, efficiency & Access. • Output(s): Published Instrument approaches procedures (IAPs) to non-instrument runways,improving airport access. • Activities carried out: Airport surveys, design of PBN IAPs, sensitization of ATCOs on PBN operations. • Challenges: Inadequate number of IFP designers Opportunities: Continued training in IFP Designat AFPP	**APTA-B0/8** Performance-based aerodrome operating minima – Basic aircraft- In progress
6.	Optimization of Approach Procedures including vertical guidance	☐ AOP ☐ CNS ☒ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☒Safety ☒Capacity & Efficiency ☐ Security & Facilitation ☐ Economic developmentof air transport ☒ Environmental protection	• Date of start: N/A for now. No airfield in Kenyaposes constraints that require **APTA-B1/1 PBN**Approaches (with advanced capabilities. -Implementation will be done on a necessary basis.No IAPs in Kenya require use of RF legs or RNPAR procedures • Date of completion: • Objective: • Output: • Activities carried out: • Challenges: • Opportunities:	**APTA-B1/1 PBN** Approaches (with advanced capabilities – Implementation will be on need basis.

7.		☐ AOP ☐ CNS ☒ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☒Safety ☒Capacity & Efficiency ☐ Security & Facilitation ☐ Economic developmentof air transport ☒ Environmental protection	Date of start: N/A for now. No airfield or TMA in Kenya poses constraints that require **APTA-B1/2 PBN** SID and STAR procedures (with advanced capabilities) -Implementation will be done on need basis. No SIDs and STARs in Kenya require use of RFlegs or RNP AR procedures • Date of completion: • Objective: • Output: • Activities carried out: • Challenges: Opportunities:	**APTA-B1/2 PBN** SID and STAR procedures (with advanced capabilities)– Implementation will be on need basis.
8.	Published GNSS CCO SIDs and CDO STARs charts	☐ AOP ☐ CNS ☒ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☒Safety ☒Capacity & Efficiency ☐ Security & Facilitation ☐ Economic developmentof air transport ☒ Environmental protection	• Date of start: 2020 • Date of completion: Ongoing • Objective: Safety, capacity, efficiency, Accessand environmental protection • Output: Published GNSS CCO SIDs and CDO STARs charts • Activities carried out: Airport surveys, design ofPBN CCO SIDs and CDO STARs, sensitization of ATCOs on PBN CCO SIDs/CDO STARs operations • Challenges: Inadequate number of IFP designers and airspace designers. -Difficulty in achieving strategic de-conflictionof all the SIDs and STARs for TMAs with complex airspace structure and traffic captureregions while maintaining efficiency always requiring a trade-off. Opportunities: Continued training in IFP Designand PBN airspace Design at AFPP and other ICAO trainings	**APTA-B1/4 CDO** (Advanced) Implementation ongoing **APTA-B1/4 CCO** (Advanced) Implementation ongoing

9.	Surveillance coverage redundancy tothe ground surveillance MSSR and PSR ADS-B Implementation committee set up awaiting State mandate for implementationof ADS-B	☐ AOP ☒CNS ☒ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☒Safety ☒Capacity & Efficiency ☐ Security & Facilitation ☐ Economic developmentof air transport ☐ Environmental protection	• Date of start: 2024 • Date of completion: • Objective: Safety, capacity, efficiency - support the provision of Air Traffic Services and operational applications at reduced costand increased surveillance coverage. • Output: Surveillance coverage redundancy tothe ground surveillance MSSR and PSR • Activities carried out: ATCOs sanitization onuse of the ADS-B procedures • Challenges: Some aircraft are not ADS-B equipped, especially general aviation.	**ASUR-BO/1** Automatic Dependent Surveillance-Broadcast-ADS-B –In progress
10.		☐ AOP ☒ CNS ☐ ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☐ Safety ☒ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic developmentof air transport ☐ Environmental protection	• Date of start: • Date of completion: • Objective: • Output: • Activities carried out: • Challenges: • Opportunities:	COMI-B0/1 Aircraft Communication Addressing and Reporting System (ACARS) - Not Implemented
11.		☐ AOP ☒ CNS ☐ ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☐ Safety ☐ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic developmentof air transport ☐ Environmental protection	• Date of start: • Date of completion: • Objective: • Output: • Activities carried out: • Challenges: • Opportunities:	COMI-B0/2 Aeronautical Telecommunication Network/Open System Interconnection (ATN/OSI) - Not Implemented

12.		☐ AOP ☒ CNS ☐ ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☐ Safety ☐ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic developmentof air transport ☐ Environmental protection	• Date of start: • Date of completion: • Objective: • Output: • Activities carried out: • Challenges: • Opportunities:	COMI-B0/3 VHF Data Link (VDL) Mode 0/A - Not Implemented COMI-B0/4 VHF Data Link (VDL) Mode 2 Basic - Not Implemented
13.	Implementation of Message Handling System(AMHS)	☐ AOP ☒ CNS ☒ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☒Safety ☒Capacity & Efficiency ☒Security & Facilitation ☐ Economic developmentof air transport ☐ Environmental protection	• Date of start: 2013 • Date of completion: 2014 • Objective: To provide a distributed message switching and storage infrastructure to enablethe transfer of ATS messages, such as flight plans, NOTAM (Notice to Airman), and Meteorological information. • Output: Enhanced exchange of aeronauticaldata between states. • Activities carried out: Connection of AMHS network with Johannesburg, Addis Ababa, Mumbai, Brazzaville, Entebbe and Mauritius • Challenges: Setting up the AMHS connectionto states is tedious, lack of skilled personnel inthe different states to do the setup. • Opportunities: More data being exchangedbetween states.	COMI-B0/7 ATS Message Handling System (AMHS) - Implemented

14.		☐ AOP ☒ CNS ☐ ATM ☐ MET ☐ SAR	☐ Safety ☐ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic developmentof air transport	• Date of start: • Date of completion: • Objective: • Output: • Activities carried out: •	COMI-B1/1 Ground-Ground Aeronautical Telecommunication Network/Internet Protocol Suite

		☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☐ Environmental protection	• Challenges: • Opportunities:	(ATN/IPS) - Not Implemented
15.		☐ AOP ☒ CNS ☐ ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☐ Safety ☐ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic developmentof air transport ☐ Environmental protection	• Date of start: • Date of completion: • Objective: • Output: • Activities carried out: • Challenges: • Opportunities:	COMI-B1/2 VHF Data Link (VDL) Mode 2 Multi-Frequency - Not Implemented
16.	Communication coverage redundancy tothe VHF communication	☐ AOP ☒ CNS ☐ ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☐ Safety ☐ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic developmentof air transport ☐ Environmental protection	• Date of start: 2012 • Date of completion:2014 • Objective: Safety, capacity, and efficiency - support the provision of Air Traffic Servicesand operational applications with reduced workload. • Output: communication coverage for Oceanicregions and redundancy for VHF communication • Activities carried out: ATCOs trained. • Challenges: • Opportunities: Continued training	COMS-B0/1 CPDLC (FANS 1/A & ATN B1) for domesticand procedural airspace – Implemented COMS-B0/2 ADS-C (FANS 1/A) for procedural airspace – Implemented
17.		☐ AOP ☒ CNS ☐ ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT	☐ Safety ☐ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic developmentof air transport ☐ Environmental protection	• Date of start: • Date of completion: • Objective: • Output: • Activities carried out: • Challenges: • Opportunities:	COMS-B1/1 PBCS approved CPDLC (FANS 1/A+) for domestic and procedural airspace - Not Implemented

		☐ ENV ☐ TRA			
18.	Definition of processes compliant with aeronautical data quality.	☐ AOP ☐ CNS ☐ ATM ☐ MET ☐ SAR ☒AIM ☐ ACFT ☐ ENV ☐ TRA	☒Safety ☒Capacity & Efficiency ☐ Security & Facilitation ☐ Economic developmentof air transport ☐ Environmental protection	• Date of start: • Date of completion: • Objective: To ensure that aeronautical data and information comply with quality standardsin order to meet the needs of the intended datausers. • Output: Quality-assured aeronautical data and information. • Activities carried out: Defining the data quality procedures in AIM MANSOPS and ISO procedures, Signing of SLAs with aeronauticaldata originators, and use of information systems to process and store aeronautical information. • Challenges: Agreeing with data originators onthe terms of data provision, adopting quality procedures, and cost of installation and maintenance of AIM information systems • Opportunities: Extending AIM information systems to data originators and regulators forthe purpose of aeronautical data capturing. Sensitizing the data originator on the format and content of aeronautical data.	DAIM-B1/1 Provision of quality-assured aeronautical dataand information – Implemented Transition from AIS to AIM

19.	Availing of digital AIP data and information.	☐ AOP ☐ CNS ☐ ATM ☐ MET ☐ SAR ☒AIM ☐ ACFT ☐ ENV	☒Safety ☐ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic developmentof air transport ☐ Environmental protection	• Date of start: • Date of completion: • Objective: To make digital AIP data and information available through interoperable industry standards such as AIXM. Use the AIPdata sets to process (for the affected parts)and provide the AIP, AIP SUP and AIC in electronic format, i.e html and pdf.	DAIM-B1/2 Provision of digital Aeronautical Information Publication (AIP)data sets – Implemented

		☐ TRA		• Output: digital AIP data sets, eAIP • Activities carried out: Installation of AIM information systems, i.e Integrated Aeronautical information database and AIPprocessing system; Training of AIM staff to operate the information systems; Migration ofexisting AIP data from paper to electronic; acquiring platform for hosting the eAIP and acquiring CD-ROM for eAIP distribution. • Challenges: The cost of installation and maintenance of the AIM information systems,training of AIM staff on AIXM concepts and operationalization of AIM information systems,manual tying of AIP data to information systems, and frequent need to enhance the AIM information systems capability. • Opportunities: Collaboration between AIS andthe department in charge of ICT on the provision of platform and expertise on eAIP access and distribution. Extending training on AIXM concepts to all AIM officers. Integration of TOD, IFPD, and Aeronautical chart production systems with a central integratedaeronautical information database.	Migration to electronic AIP and Electronic Terrain and Obstacle Data(eTOD) Aeronautical information exchange model (AIXM) Better quality and availability of data through: • QMS Implementation • SLAs with data originators • AIRAC cycle adherence • Online flight planning and briefing
20.	Availing of digital terrain and obstacle data and information	☐ AOP ☐ CNS ☐ ATM ☐ MET ☐ SAR ☒AIM ☐ ACFT ☐ ENV ☐ TRA	☒Safety ☐ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic developmentof air transport ☐ Environmental protection	• Date of start: • Date of completion: • Objective: To avail digital terrain and obstacledata and information in an interoperable format using industry standards such as AIXM. • Output: digital elevation model, digital obstacles data sets. • Activities carried out: Installation of TOD information systems, sensitize TOD data	DAIM-B1/3 Provision of digital terrain data sets - Implemented DAIM-B1/4 Provision of digital obstacle data sets - Implemented

				providers on requirements of the aeronautical data, train AIM staff on how to operate TODsystems. • Challenges: Cost of installation and Maintenance of TOD system, data providersmeeting the TOD data requirements • Opportunities: Training of TOD data originatorson data requirements, establishment of surveyunit's in AIM for the purpose of data collection, independent survey data verification and processing.	
21.	Availing of digital aerodrome mapping data and information	☐ AOP ☐ CNS ☐ ATM ☐ MET ☐ SAR ☒AIM ☐ ACFT ☐ ENV ☐ TRA	☒Safety ☐ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic developmentof air transport ☐ Environmental protection	• Date of start: • Date of completion: ongoing. • Objective: To avail digital aerodrome mappingdata and information in an interoperable format using industry standards such as AIXM. • Output: digital aerodrome mapping data sets • Activities carried out: Digitizing available aerodrome graphical information, using surveydata to create aerodrome mapping data. • Challenges: The existing aerodrome mapping data from the aerodrome operators is limited,high cost of acquiring quality aerodrome mapping data. • Opportunities: Collaboration between AIM and aerodrome operator on acquisition on aerodrome mapping data.	DAIM-B1/5 Provision of digital aerodrome mapping data sets - Implemented
22.	Availing of digital instrument flight procedure data and information	☐ AOP ☐ CNS ☐ ATM ☐ MET ☐ SAR ☒AIM	☒Safety ☐ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic developmentof air transport	• Date of start: • Date of completion: on going • Objective: To avail digital instrument flight procedure data and information in an interoperable format using industry standardsuch as AIXM.	DAIM-B1/6 Provision of digital instrument flight procedure data sets - In progress

		☐ ACFT ☐ ENV ☐ TRA	☐ Environmental protection	• Output: Digital instrument flight procedure data sets. • Activities carried out: Installation of IFPD information system, training AIP staff on how tooperate IFPD system, migrating the existing IFPto the system and capturing the newly designed IFP with the system. • Challenges: Requirement of IFPD concepts forAIM officers, tedious work of transferring IFP from charts and text to electronic format. • Opportunities: Training AIM staff on IFPD concepts and participation of AIM in IFP designto ensure a seamless encoding of flight procedures to AIM systems.	
23.	Improvement of NOTAM	☐ AOP ☐ CNS ☐ ATM ☐ MET ☐ SAR ☒AIM ☐ ACFT ☐ ENV ☐ TRA	☒Safety ☐ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic developmentof air transport ☐ Environmental protection	• Date of start: 2016 • Date of completion: Ongoing • Objective: To provide timely and relevant information about the status and condition ofthe ANS infrastructure to the next intended users via NOTAM. • Output: Timely distribution of relevant NOTAM • Activities carried out: Definition ofNOTAM processing procedures to enable NOF toprocess relevant NOTAM information; improvement of NOTAM processing information systems; Training AIM personnelon the operation of AIM information system. • Challenges: Cost of installing information systems; capability of NOTAM processing systems to provide digital NOTAM and availability of baseline information in AIXM 5.1format.	DAIM-B1/7 NOTAM improvements - Implemented

				• Opportunities: Provision of all baseline aeronautical information in AIXM 5.1 digitalformat as well as enhancing aeronautical information exchange with NOTAM intendedusers or stakeholders.	
24.	Oceanic User preferred routing Implemented	☐ AOP ☐ CNS ☒ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☒Safety ☒Capacity & Efficiency ☐ Security & Facilitation ☐ Economic developmentof air transport ☒ Environmental protection	• Date of start: 2016 • Date of completion: 2020 • Objective: Direct routings established to provide airspace users with shorter routes options on a larger scale across FIRs to reducethe track miles flown. • Output: Shorter routes for aircraft and reducedcarbon emission • Activities carried out: Phase I involved tactful DRO by controllers on request from pilots; Phase II involved publication of flight plannableDirect Routes; implementation of User Preferred routing in part of the oceanicairspace • Challenges: Difficulty in achieving cross borderDRO and FRA to accrue economic benefits toairlines. • Opportunities: Real time controller coordination that achieves cross border DRO.Saves time, fuel and track miles flown.	**FRTO-B0/1** Direct routing (DCT) – Implemented Oceanic User preferred routing Implemented
25.	Airspace planning and Flexible Useof Airspace (FUA)	☐ AOP ☐ CNS ☒ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT	☒Safety ☒Capacity & Efficiency ☐ Security & Facilitation ☐ Economic developmentof air transport ☒ Environmental protection	• Date of start: 2016 • Date of completion: Ongoing • Objective: Enable more efficient use of airspace that meets both the civil and nationalsecurity needs and reduces carbon emissions. • Output: Civil aircraft operations permitted in anumber of Special Use Airspace (SUAs) in	**FRTO-B0/2** Airspace planning and Flexible Use of Airspace (FUA) - In progress

		☐ ENV ☐ TRA		Kenya; Some SUAs are not permanent, only activated NOTAM; shorter track miles flown by aircraft. • Activities carried out: Publication of the SUA activated by NOTAM. • Challenges: The prolonged and lengthy negotiations with the military for the use of some of the restricted airspaces. • Opportunities: Continued engagement for FUA in Civil-Military coordination meeting.	
26.	Pre-validated and coordinated ATS routes to support flight and flow – In progress	☐ AOP ☐ CNS ☒ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☒Safety ☒Capacity & Efficiency ☐ Security & Facilitation ☐ Economic development of air transport ☒ Environmental protection	• Date of start: 2016 • Date of completion: • Objective: A collection of routes that have been pre-validated and coordinated with impacted air route traffic control centers and airspace users. • Output: Preferred routes and Coded Departure Routes (CDR) • Activities carried out: Publication of preferred routes Coded Departure Routes (CDR) • Challenges: Nil • Opportunities: Increased safety and efficiency	**FRTO-B0/3** Pre-validated and coordinated ATS routes to support flight and flow – In progress
27.	Basic conflict detection and conformance monitoring - Implemented	☐ AOP ☐ CNS ☒ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☒Safety ☐ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic development of air transport ☐ Environmental protection	• Date of start: • Date of completion: 2010 • Objective: Reduction of ATCO's workload via early conflict detection and monitoring • Output: MONA with diverse capabilities • Activities carried out: Deployment of MONA with lateral, longitudinal, vertical and Cleared Flight Level (CFL) deviations; basic conflict detection tools (MTCD, STCD,) and conformance monitoring warnings • Challenges: Nil	**FRTO-B0/4** Basic conflict detection and conformance monitoring - Implemented

				• Opportunities: Increased operational safety efficiency and capacity	
28.	Free Route Airspace (FRA) –In progress	☐ AOP ☐ CNS ☒ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☒Safety ☒Capacity & Efficiency ☐ Security & Facilitation ☐ Economic developmentof air transport ☒ Environmental protection	• Date of start: 2020 • Date of completion: 2025 • Objective: Direct routings established to provide airspace users with shorter routesoptions on a larger scale across FIRs to reduce the track miles flown. • Output: Shorter routes for aircraft and reducedcarbon emission • Activities carried out: Phase I involved tactful DRO by controllers on request from pilots; Phase II involved publication of flight plannableDirect Routes; implementation of User Preferred routing in part of the oceanic airspace and safety assessment has beenconducted to roll out FRA from FL260 andabove • Challenges: Difficulty in achieving cross borderDRO and FRA to accrue economic benefits toairlines. • Opportunities: Real time controller coordination that achieves cross border DRO.Saves time, fuel and track miles flown. • Participation in the AFI region FRA Implementation initiative	FRTO-B1/1 Free Route Airspace (FRA) –In progress
29.	Required Navigation Performance (RNP) routes - Implemented	☐ AOP ☐ CNS ☒ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT	☒Safety ☒Capacity & Efficiency ☐ Security & Facilitation ☐ Economic developmentof air transport ☒ Environmental protection	• Date of start: 2016 • Date of completion: 2018 • Objective: Deployment of RNP routes withinen-route airspace • Output: More direct routes within the airspace • Activities carried out: Publication of the RNProutes.	**FRTO-B1/2** Required Navigation Performance (RNP) routes - Implemented

		☐ ENV ☐ TRA		• Challenges: None-RNP equipped aircraft, unable to operate the RNP routes and havingto maintain the conventional routes. • Opportunities: Use of surveillance to provideleverage to monitor aircraft that are suitably equipped for RNP procedures.	
30.	Advanced Flexible Use of Airspace (FUA) and managementof real-time airspace data - Inprogress	☐ AOP ☐ CNS ☒ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☒Safety ☒Capacity & Efficiency ☐ Security & Facilitation ☐ Economic developmentof air transport ☒ Environmental protection	• Date of start: • Date of completion: • Objective: collaborative airspace data sharingbetween all ATM actors, negotiation procedures, system support, and real-timeASM data integration. • Output: better and optimal airspace use Activities carried out: Real-time coordination between Controllers on specific requests fromaircraft for access to restricted airspace. • Challenges: The prolonged and lengthy negotiations with the military for the use ofsome of the restricted airspaces • Opportunities: Continued engagement for FUAin Civil-Military coordination meeting	**FRTO-B1/3** Advanced Flexible Use of Airspace (FUA) and management of real-time airspacedata - In progress
31.	Enhanced Conflict Detection Toolsand Conformance Monitoring - Implemented	☐ AOP ☒ CNS ☐ ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☐ Safety ☐ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic developmentof air transport ☐ Environmental protection	• Date of start: • Date of completion: • Objective: Mid-term conflict detection (MTCD)/ monitoring alert (MONA) functions to improve ATCO productivity and reduce workload. • Output: MONA with diverse capabilities • Activities carried out: Deployment of MONA with lateral, longitudinal, vertical, and Cleared Flight Level (CFL) deviations; basic conflict detection tools (MTCD, STCD) and conformance monitoring warnings • Challenges: Nil	**FRTO-B1/5** Enhanced Conflict Detection Tools and Conformance Monitoring - Implemented

				• Opportunities: Increased operational safety efficiency and capacity	
32.	Multi-sector planning hasbeen implemented at HKJK ACC ATM System to allow a single planner role to be associated to multiple sector tactical roles andthe planner and tactical roles to be combined on acontroller work position	☐ AOP ☐ CNS ☒ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☒Safety ☒Capacity & Efficiency ☐ Security & Facilitation ☐ Economic developmentof air transport ☐ Environmental protection	• Date of start: • Date of completion: • Objective: To enable the planning controller toprovide support to several tactical controllers operating in different adjacent sectors and reduce the ATCO workload related to intra- center coordination. • Output: Sectorization of Nairobi ACC • Activities carried out: Sectorization of Nairobi ACC into Area North/ Area South & SupervisorPositions. Both have Planner & Coordinator Positions. • Challenges: Lack of an adequate number ofATCOs • Opportunities:	**FRTO-B1/6** Multi-Sector Planning - In progress
33.	Contact directory service - Implemented	☐ AOP ☐ CNS ☐ ATM ☐ MET ☒SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☐ Safety ☐ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic developmentof air transport ☐ Environmental protection	• Date of start: • Date of completion: • Objective: • Output: Distress data access • Activities carried out: State to nominate POCto access the data. • Challenges: • Opportunities: Access of distress data	**GADS-B1/2** Contact directory service - Implemented
34.	Automated basic inter-facility data exchange (AIDC)	☐ AOP ☒ CNS ☒ATM ☐ MET ☐ SAR ☐ AIM	☒Safety ☒Capacity & Efficiency ☐ Security & Facilitation ☐ Economic developmentof air transport	• Date of start: 2024 • Date of completion: • Objective: To improve the efficiency of coordination and transfer of control betweenATS units • Output:	**FICE-B0/1** Automated basic interfacility data exchange (AIDC)

		☐ ACFT ☐ ENV ☐ TRA	☐ Environmental protection	☐ Activities carried out: System interoperability tests ongoing between Nairobi, Entebbe, andMogadishu. Voice communication between ATS units should be replaced by automatic message exchange. ☐ Challenges: ☐ Opportunities:	Test ongoing between Nairobiand HUEC and HCSM for system interoperability.
35.		☐ AOP ☒ CNS ☐ ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☐ Safety ☐ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic developmentof air transport ☐ Environmental protection	• Date of start: • Date of completion: • Objective: • Output: • Activities carried out: • Challenges: • Opportunities:	**OPFL-B0/1** In Trail Procedure(ITP) – Not implemented **OPFL-B1/1** Climb and Descend Procedure (CDP) - Not implemented
36.	Aircraft Tracking Safety Nets The ATM System installed at major airports has capabilities for STCA, APW, and MSAW	☐ AOP ☐ CNS ☒ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☒Safety ☐ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic developmentof air transport ☐ Environmental protection	• Date of start: 2010 • Date of completion: • Objective: To assist the air traffic controller in preventing collision between aircraft, using position data from ground surveillance • Output: The ATM System installed at major airports with capabilities for STCA, APW, andMSAW • Activities carried out: The ATM System installedat major airports has capabilities for STCA, APW, and MSAW • Challenges: Numerous safety Alerts couldcause distraction to ATC officers • Opportunities: Enhanced safety monitoring	**SNET-B0/1** Short-Term Conflict Alert (STCA) - Completed **SNET-B0/2** Minimum Safe Altitude Warning(MSAW) - Completed **SNET-B0/3** Area Proximity Warning (APW) - Completed **SNET-B0/4**

					Approach Path Monitoring (APM) - Completed **SNET-B1/1** Enhanced STCA with aircraft parameters - Completed **SNET-B1/2** Enhanced STCA in complex TMAs - Completed
37.	SMS CoordinationOffice established The office of the SMS unit was established at theHQ and at the station level withpermanent staff at HQs and ad-hoc staff at the stations	☐ AOP ☒CNS ☒ATM ☐ MET ☒SAR ☒AIM ☐ ACFT ☐ ENV ☐ TRA	☒Safety ☒Capacity & Efficiency ☐ Security & Facilitation ☐ Economic developmentof air transport ☒ Environmental protection	• Date of start: 2017 • Date of completion: • Objective: Oversee the implementation ofSafety Management System within the organization • Output: a) Number of Safety Policy developed andsigned. b) Number of Safety Management Manual developed. c) Hazards Identified and Safety Risk Mitigated • Activities carried out: Recruitment and trainingof SMS Personnel. Appoint an SMS Manager and appoint staff at ANS-HQ and at the stations.	

				• Challenges: Lack of adequate dedicated staffto undertake SMS Coordination at stations • Opportunities: Provide external technical assistance on SMS to other states.	
38.	ANS Planning & Projects Office established The office of ANS Planning was established and staffed with officers at the ANS-HQ. This also undertakes the ATM Security Management.	☐ AOP ☒CNS ☒ATM ☐ MET ☒SAR ☒AIM ☐ ACFT ☐ ENV ☐ TRA	☒Safety ☒Capacity & Efficiency ☒Security & Facilitation ☒Economic developmentof air transport ☐ Environmental protection	• Date of start: 2017 • Date of completion: • Objective: Undertake R&D activities and coordinate ANS Project implementation as envisioned in the Kenya ANP 2015-2030 • Output: Projects implemented Monitored & Evaluated • Activities carried out: Appoint an "ANS Planning & Projects" Manager, and other staffto the unit at ANS-HQ and provide it with external training. • Challenges: Lack of adequate dedicated staff • Opportunities: Align Kenya's strategic plan andmaster plan with the ICAO Global Air Navigation Plan (GANP) and Global Air SafetyPlan (GASP) to ensure interoperability and consistency of implementation.	

39.	Implementation of the TMA in Wajir Airport.	☐ AOP ☒ CNS ☐ ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☐ Safety ☐ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic developmentof air transport ☐ Environmental protection	• Date of start: 2016 • Date of completion: 2017 • Objective: To enhance safety and efficiency of increased number of flights into and out of Wajir Airport. • Output: Enhance safety between arriving anddeparting IFR flights • Activities carried out: a) TMA Demarcated b) Procedures developed c) ATCOs trained d) TMA Published in the Kenyan AIP	Implementation of the TMA in Wajir Airport.

				• Challenges: Mixed military and civil operations. • Opportunities: Capability to handle more traffic safely and efficiently.	
40.	Implementation of ground control position at Wilson tower.	☐ AOP ☐ CNS ☒ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☒Safety ☒Capacity & Efficiency ☐ Security & Facilitation ☐ Economic developmentof air transport ☐ Environmental protection	• Date of start: 2012 • Date of completion: • Objective: To enhance safety and efficiency onground movement of aircraft. • Output: Procedures developed, and groundcontrol implemented. • Activities carried out: Ground control frequency established, area of jurisdiction defined through procedures published in theAIP, ATCO numbers were increased, sensitization was done.	
41.	PBN implementation and the provisionof ANS at smallerairports such as DIANI	☐ AOP ☐ CNS ☒ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☒Safety ☒Capacity & Efficiency ☐ Security & Facilitation ☐ Economic developmentof air transport ☒ Environmental protection	• Date of start: 2016 • Date of completion: 2017 • Objective: To enhance aircraft operations into small airports. • Output: Number ofPBN Procedures designedand implemented • Activities carried out: a) Safety assessment b) Procedures developed and published • Challenges: Inadequate trained staff • Opportunities:	PBN implementation and the provision ofANS at smaller airports such as DIANI
42.	Construction of Air Traffic Control Tower and office Block development at Wilson Airport	☐ AOP ☒ CNS ☒ATM ☐ MET ☒SAR ☒AIM ☐ ACFT	☒Safety ☒Capacity & Efficiency ☒Security & Facilitation ☒Economic developmentof air transport ☒ Environmental protection	• Date of start: • Date of completion: 30th November 2018 • Objective: New ATC tower building • Output: New ATC tower building • Activities carried out: a) Designing the ATC Tower building and Offices	.

		☐ ENV ☐ TRA		b) Risk and Safety Assessment of the proposed ATC tower and Offices c) Construction of a new air traffic controltower and offices • Challenges: a) Unanticipated amount of cotton soil whichneeded extra excavation b) Restricted entry into the airside for the contractor thereby causing delays. • Opportunities: Better ATM Service delivery	
43.	Construction of new ATC Control Towers at Kisumu Airport ongoing	☐ AOP ☒CNS ☒ATM ☐ MET ☒SAR ☒AIM ☐ ACFT ☐ ENV ☐ TRA	☒Safety ☐ Capacity & Efficiency ☐ Security & Facilitation ☒Economic developmentof air transport ☐ Environmental protection	• Date of start: July 2022 • Date of completion: 14th FEB 2025 • Objective: Construction of an ATC Tower and offices to support the air navigation services inthe Kisumu International Airport. • Output: New ATC tower building • Activities carried out: a) Designing the ATC Tower building and Offices b) Risk and Safety Assessment of the proposed ATC tower and Offices c) Construction of a new air traffic controltower and offices • Challenges: The delay was caused by El Nino rains that interfered with the building foundation works and stringent airport accessrequirements for contractor staff. Opportunities: Better ATM Service delivery	

44.	Procure, installation, and commission of ATM systems	☐ AOP ☒ CNS ☒ ATM ☐ MET ☐ SAR	☒Safety ☒Capacity & Efficiency ☐ Security & Facilitation ☐ Economic developmentof air transport	• Date of start: July 2021 • Date of completion: June 2024 • Objective: To install and commission an Airtraffic management system for • Output: Operationalized ATM system at JKIA	.

	were undertaken for JKIA	☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☒ Environmental protection	• Activities carried out: Supply, delivery, installation, training, commissioning, andsupport during the warranty period. • Challenges: Delays in implementation of thecontract. • Opportunities: Effective and efficient provisionof ATM Services	
45.	Procure, install, and commission New ATM systems for all the airports.	☐ AOP ☒ CNS ☒ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☒Safety ☒Capacity & Efficiency ☐ Security & Facilitation ☐ Economic developmentof air transport ☒ Environmental protection	• Date of start: July 2022 • Date of completion: June 2025 • Objective: To install and commission an Air traffic management system for the Disaster Recovery system and a synchronized data andvoice recording, and a master clock system. • Output: Operationalized ATM system at DRSACC and at all Airports • Activities carried out: Supply, delivery, installation, training, commissioning, andsupport during the warranty period • Challenges: Delays in implementation of thecontract. • Opportunities: Effective and efficient provisionof ATM Services	
46.	Establishing Rescue Coordination Centre (RCC) Rescue Coordination Centre (RCC) established and equipped with integrated	☐ AOP ☐ CNS ☐ ATM ☐ MET ☒SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☒Safety ☒Capacity & Efficiency ☐ Security & Facilitation ☐ Economic developmentof air transport ☐ Environmental protection	• Date of start: 2017 • Date of completion: Continuous • Objective: Continuous distress monitoring • Output: Efficient and Effective SAR services • Activities carried out: Establishment of RCC and equipping it with proper tools for provisionof services and providing of Competent SAR personnel. • Challenges: Updating SAR software to meet arapidly evolving field.	

	aeronautical SAR software. The offices are manned 24/7. A dedicated frequency for SAR communications with the search aircraft, away from the operational frequencies, has been provided.			• Opportunities: Better understanding by industry on the benefits and requirements forSAR.	
47.	Replacement of the VCCS in Malindi and Kisumu implemented. New VCCS also installed at JKIA and MIA	☐ AOP ☒ CNS ☒ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☒Safety ☒Capacity & Efficiency ☐ Security & Facilitation ☐ Economic developmentof air transport ☒ Environmental protection	• Date of start: June 2020 • Date of completion: July 2022 • Objective: To ensure effective provision of air navigation services at Malindi, Kisumu, Wajir, Lokichoggio, JKIA and MIA • Output: Commissioned VCCS equipment at Malindi, Kisumu, Wajir, Lokichoggio, JKIA andMIA • Activities carried out: Drawing of Equipment specifications, Delivery, installation, training,Testing, and commissioning. • Challenges: Delays in project completion. • Opportunities: Effective and efficient provisionof ATM Services	
48.	Implementation of D-ATIS at JKIA, MIA, EIA & KIA	☐ AOP ☒ CNS ☒ATM ☐ MET ☐ SAR ☐ AIM	☒Safety ☐ Capacity & Efficiency ☒Security & Facilitation ☐ Economic developmentof air transport	• Date of start: Aug 2021 • Date of completion: June 2023 • Objective: To procure and install a D-ATISsystem to ensure compliance with ICAOrequirements on implementation of	

		☐ ACFT ☐ ENV ☐ TRA	☐ Environmental protection	requirements on the provision of Metrological information in digital format • Output: Commissioned D-ATIS equipment atJKIA, MIA, EIA & KIA • Activities carried out: Preparation and approvalof specifications, Tendering and contract award, installation and commissioning • Challenges: Delays in the implementation ofthe contract and failure by contractor to adhere to contract specifications • Opportunities: Effective and efficient provisionof digital MET data to flights.	
49.	Undertake Strategic Environmental Assessment (SEA) for the projects under Kenya ANP 2015-2030	☐ AOP ☒ CNS ☒ATM ☐ MET ☒SAR ☒AIM ☐ ACFT ☐ ENV ☐ TRA	☐ Safety ☐ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic developmentof air transport ☐ Environmental protection	• Date of start: • Date of completion: April 2020 • Objective: A strategic environmental assessment (SEA) has been prepared to address the implications of implementingKenya ANP 2015-2030. (a) Safety around operation zones, including airports, approachflight corridors, and holding areas, (b) Air quality associated with aircraft emissions, (c) Effects of noise and vibrations from aircraft operations, (d) Land use conflicts involvingaircraft operations and social and economic activities on the ground, and (e) Influences onclimate change associated with CO2 emissions from the aircraft. • Output: (a) Undertake Environmental and Social Impact Assessment (ESIA) Study andseek approval for the proposed ANS installations and constructions, (b) Seekapproval for the ANS construction with	

				National Environmental Management Authority (NEMA) and other approving authorities, (c)KCAA to initiate a comprehensive special waste handling plan and prepare a decommissioning Plan for all obsolete equipment with clear supervised mechanismsduring the removal, storage and final disposal. • Activities carried out: • Challenges: • Opportunities:	

APPENDIX B. -ASBU implementation in Senegal

#	Initiative/Project title	Area	Strategic Objective	Description	Related ASBU element(s)
OPERATIONAL					
1.	Implementation of PBN Approaches (with basic capabilities) at International Airports	☐ AOP ☐ CNS ☒ ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☒ ENV ☐ TRA	☐ Safety ☒ Capacity & Efficiency ☐ Security & Facilitation ☒ Economic development of air transport ☒ Environmental protection	• Date of start: • Date of completion: 11 July 2024 (last update) • Objective(s): Improve efficiency of air operations, improve airport accessibility to airport • Output(s): Updated instrument flight procedures • Activities carried out: Revise PBN procedures including PBN STARs for Blaise Diagne International Airport (AIBD) and Cap skirring international airport. • Challenges: • Opportunities:	APTA – B0/1 APTA – B0/2
2.	Implementation of CDO/CCO at international airports	☐ AOP ☐ CNS ☒ ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☒ ENV ☐ TRA	☒ Safety ☒ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic development of air transport ☒ Environmental protection	• Date of start: • Date of completion: 11 July 2024 (last update) • Objective: Improve safety and efficiency of air operations • Output: New CDO/CCO procedures implemented for Blaise Diagne International Airport (AIBD) • Activities carried out: Design, validation and approval of CDO/CCO procedures • Challenges: • Opportunities: Flexible use of airspace	APTA – B0/4 APTA – B0/5
3.	TCAS 7.1 Mandatory carriage	☐ AOP ☐ CNS ☐ ATM ☐ MET ☐ SAR ☐ AIM ☒ ACFT ☐ ENV ☐ TRA	☒ Safety ☐ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic development of air transport ☐ Environmental protection	• Date of start: • Date of completion: • Objective: • Output: TCAS 7.1 mandatory carriage implemented • Activities carried out: • Challenges: • Opportunities:	ACAS-B1/1 (ACAS Improvements)

4.	Implementation of Free Route Airspace in Dakar UTA continental sector	☐ AOP ☐ CNS ☒ ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☐ Safety ☒ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic development of air transport ☒ Environmental protection	• Date of start: • Date of completion: 25 January 2024 • Objective: Improve safety, increase airspace capacity and enhance efficiency of air operations • Output: Free route airspace operations implemented in Dakar UTA continental sector. • Activities carried out: Design, validation and approval of FRA operational procedures • Challenges: • Opportunities:	FRTO-B1/1 (Free Route Airspace)
5.	Implementation of RNP 10 in Dakar UTA Oceanic sector	☐ AOP ☐ CNS ☒ ATM ☐ MET ☐ SAR ☐ AIM ☒ ACFT ☐ ENV ☐ TRA	☒ Safety ☒ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic development of air transport ☐ Environmental protection	• Date of start: • Date of completion: • Objective: Improve safety, increase capacity, improve efficiency of air navigation. • Output: RNP 10 Implemented • Activities carried out: Feasibility study conducted, safety assessment conducted, training of ATS staff conducted, amendment of regulation and procedures, implementation • Challenges: • Opportunities:	FRTO-B1/2 Required Navigation Performance (RNP) routes
6.	Implementation of dynamic sectorization in Dakar UTA Oceanic sector	☐ AOP ☐ CNS ☒ ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☒ Safety ☒ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic development of air transport ☐ Environmental protection	• Date of start: • Date of completion: • Objective: Improve safety, increase capacity • Output: UTA dynamically sectorized based on demand/capacity evaluation • Activities carried out: Feasibility study conducted, safety assessment conducted, training of ATS staff conducted, amendment of regulation and procedures, implementation • Challenges: • Opportunities:	FRTO-B1/4 (Dynamic sectorization)
7.	Implementation of advanced ATM automation system at Dakar ATS Unit	☐ AOP ☐ CNS ☒ ATM	☒ Safety ☒ Capacity & Efficiency ☐ Security & Facilitation	• Date of start: • Date of completion: 2010 • Objective: Improve safety, increase capacity.	SNET-B0/1 Short Term Conflict Alert (STCA)

		☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☐ Economic development of air transport ☐ Environmental protection	• Output: ATM System upgraded and automated including all safety nets. • Activities carried out: System commissioning, safety assessment conducted, training conducted for ATS staff, system trial, system operationalization. • Challenges: • Opportunities:	SNET – B0/2 Minimum Safe Altitude Warning (MSAW) SNET – B0/3 Area Proximity Warning (APW)
8.	Enhancement of ground traffic management at AIBD	☒ AOP ☐ CNS ☒ ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☒ Safety ☐ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic development of air transport ☐ Environmental protection	• Date of start: • Date of completion: 2017 • Objective: Improve safety of traffic during ground operations • Output: Surface Movement Guidance and control System (SMGCS) implemented. • Activities carried out: System commissioning, safety assessment conducted, training conducted for ATS and ground staff, system trial, system operationalization. • • Challenges: • Opportunities:	SURF – B0/1 (Basic ATCO tools to manage traffic during ground operations)
9.	Implementation of aircraft tracking system in Dakar Search and Rescue Region	☐ AOP ☐ CNS ☐ ATM ☐ MET ☒ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☒ Safety ☐ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic development of air transport ☐ Environmental protection	• Date of start: • Date of completion: • Objective: Improve safety of air transport • Output: Aircraft tracking effected through ACARS and SB ADS-B for remote continental areas and oceanic areas of Dakar SRR. SSR-DAPS is used in Dakar TMA/UTA. • Activities carried out: • Challenges: • Opportunities:	GABS-B1/1 Aircraft Tracking
TECHNOLOGY					
10.	Implementation of Aircraft Communication addressing and Reporting System	☐ AOP ☒ CNS ☒ ATM ☐ MET ☐ SAR	☐ Safety ☒ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic development of air transport	• Date of start: • Date of completion: • Objective: • Output: ACARS implemented in Dakar FIR • Activities carried out:	COMI-B0/1 (ACARS)

		☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☐ Environmental protection	• Challenges: • Opportunities:	
11.	Implementation of AMHS in all major ATS units in Senegal	☐ AOP ☒ CNS ☐ ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☒ Safety ☒ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic development of air transport ☐ Environmental protection	• Date of start: • Date of completion: • Objective: • Output: AMHS implemented at Dakar ATS Unit • Activities carried out: • Challenges: • Opportunities:	COMI-B0/7 (ATS Message Handling System)
12.	Implementation of SATCOM at Dakar ACC	☐ AOP ☒ CNS ☐ ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☒ Safety ☒ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic development of air transport ☐ Environmental protection	• Date of start: • Date of completion: • Objective: • Output: SATCOM Voice I implemented at Dakar ACC • Activities carried out: • Challenges: • Opportunities:	COMI-B1/3 (SATCOM Class B Voice and Data)
13.	Implementation of CPDLC at Dakar ACC	☐ AOP ☒ CNS ☐ ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☒ Safety ☒ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic development of air transport ☐ Environmental protection	• Date of start: • Date of completion: • Objective: • Output: CPDLC implemented at Dakar ACC • Activities carried out: • Challenges: • Opportunities:	COMS-B0/1 (CPDLC (FANS 1/A & ATN B1) for domestic and procedural airspace)

14.	Implementation of ADS-C at Dakar ACC	☐ AOP ☒ CNS ☐ ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☒ Safety ☒ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic development of air transport ☐ Environmental protection	• Date of start: • Date of completion: • Objective: • Output: ADS-C implemented at Dakar ACC • Activities carried out: • Challenges: • Opportunities:	COMS-B0/2 (ADS-C (FANS 1/A) for procedural airspace)
15.	Implementation of SATVOICE at Dakar ACC	☐ AOP ☒ CNS ☐ ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☒ Safety ☒ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic development of air transport ☐ Environmental protection	• Date of start: • Date of completion: • Objective: • Output: SATVOICE implemented at Dakar ACC • Activities carried out: • Challenges: • Opportunities:	COMS-B1/3 (SATVOICE (incl. routine communication) for procedural airspace)
16.	Implementation of ABAS in Dakar FIR	☐ AOP ☐ CNS ☐ ATM ☐ MET ☐ SAR ☐ AIM ☒ ACFT ☐ ENV ☐ TRA	☒ Safety ☐ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic development of air transport ☐ Environmental protection	• Date of start: • Date of completion: 2006 • Objective: Improve safety of air operations • Output: Aircraft Based Augmentation system implemented in Dakar FIR through ANACIM Decision ANACS 06-607 • Activities carried out: • Challenges: • Opportunities:	NAVS-B0/3 Aircraft Based Augmentation system (ABAS)
17.	Implementation of secondary surveillance radar (SSR) at Dakar ATS Unit	☐ AOP ☒ CNS ☐ ATM ☐ MET ☐ SAR	☒ Safety ☐ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic development of air transport	• Date of start: • Date of completion: • Objective: Improve the safety of air operations • Output: SSR with Down link of aircraft parameters installed at Dakar ACC and Blaise Diagne International Airport (AIBD).	ASUR-B0/3 Cooperative Surveillance Radar Downlink of aircraft Parameters (SSR-DAPS)

		☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☐ Environmental protection	• Activities carried out: • Challenges: • Opportunities:	
18.	Implementation of ADS-B in Dakar FIR	☐ AOP ☒ CNS ☐ ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☒ Safety ☐ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic development of air transport ☐ Environmental protection	• Date of start: • Date of completion: • Objective: Improve safety of air operations • Output: Space based ADS-B implemented in Dakar FIR • Activities carried out: • Challenges: • Opportunities:	ASUR-B1/1 Reception of aircraft ADS-B signals from space (SB ADS-B)
INFORMATION					
19.	Implementation of AIDC at Dakar ACC	☐ AOP ☒ CNS ☐ ATM ☐ MET ☐ SAR ☒ AIM ☐ ACFT ☐ ENV ☐ TRA	☒ Safety ☒ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic development of air transport ☐ Environmental protection	• Date of start: • Date of completion: 2021 • Objective: Improve safety, improve efficiency of ATS • Output: Automated basic Inter facility Data Exchange (AIDC) installed and operationalized with connection to Abidjan and Atlántico ATS Units • Activities carried out: • Challenges: • Opportunities:	FICE-B0/1 Automated basic facility data exchange (AIDC)
20.	Implementation of quality-assured aeronautical data and information in Senegal	☐ AOP ☐ CNS ☐ ATM ☐ MET ☐ SAR ☒ AIM ☐ ACFT ☐ ENV ☐ TRA	☒ Safety ☒ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic development of air transport ☐ Environmental protection	• Date of start: • Date of completion: • Objective: Improve safety, improve efficiency of air operations • Output: Quality Management System in AIS implemented, WGS 84 survey renewed periodically (last campaign was in 2023), Service level agreement established with information users • Activities carried out: • Challenges:	DAIM-B1/1 Provision of quality-assured aeronautical data and information

				• Opportunities:	
21.	Implementation of eAIP in Senegal	☐ AOP ☐ CNS ☐ ATM ☐ MET ☐ SAR ☒ AIM ☐ ACFT ☐ ENV ☐ TRA	☐ Safety ☒ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic development of air transport ☐ Environmental protection	• Date of start: 2019 • Date of completion: 2024 • Objective: Improve accessibility to aeronautical data and information • Output: Dataset AIXM 4.5 deployment in 2024 • Activities carried out: • Challenges: • Opportunities:	DAIM-B1/2 Provision of digital Aeronautical Information Publication (AIP) data sets
22.	NOTAM improvements at Dakar NOTAM Office	☐ AOP ☐ CNS ☐ ATM ☐ MET ☐ SAR ☒ AIM ☐ ACFT ☐ ENV ☐ TRA	☐ Safety ☒ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic development of air transport ☐ Environmental protection	• Date of start: • Date of completion: • Objective: Reduce the number of old NOTAMs, improve the quality of NOTAMs content • Output: A NOTAM follow-up application (ANAIS) operationalized • Activities carried out: • Challenges: • Opportunities:	DAIM-B1/7 NOTAM improvements
23.	Provision of meteorological observations products in Dakar FIR	☐ AOP ☐ CNS ☐ ATM ☒ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☒ Safety ☒ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic development of air transport ☐ Environmental protection	• Date of start: • Date of completion: • Objective: Improve safety and efficiency of air operations • Output: The following MET products are provided in Dakar FIR; -Automatic Weather Observation System (AWOS) -Local reports (MET REPORT / SPECIAL), -Aerodrome reports (METAR / SPECI), -Ground-based weather radar information, -Meteorological satellite imagery, -Aircraft meteorological report (ie. ADS-B, AIREP, AMDAR etc.), -Vertical wind and temperature profiles, -Volcano Observatory Notice for Aviation (VONA),	AMET-B0/1 Meteorological observations products

				-Wind shear alerts • Activities carried out: • Challenges: • Opportunities:	
24.	Provision of MET forecast and warning products in Dakar FIR	☐ AOP ☐ CNS ☐ ATM ☒ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☒ Safety ☒ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic development of air transport ☐ Environmental protection	• Date of start: • Date of completion: • Objective: Improve safety and efficiency of air transport • Output: The following MET forecast and warning products are provided in Dakar FIR -World Area Forecast System (WAFS) gridded products -Significant Weather (SIGWX) -Aerodrome Forecast (TAF) -Trend Forecast (TREND) -Tropical Cyclone Advisory (TCA) -Volcanic Ash Advisory (VAA) -AIRMET -SIGMET -Aerodrome Warning -Wind Shear Warning • Activities carried out: • Challenges: • Opportunities:	AMET-B0/2 Meteorological forecast and warning products
25.	Provision of climatological and historical MET products in Dakar FIR	☐ AOP ☐ CNS ☐ ATM ☒ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☒ Safety ☒ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic development of air transport ☐ Environmental protection	• Date of start: • Date of completion: • Objective: Improve safety and efficiency of air transport • Output: Availability of -Aerodrome climatological tables, -Aerodrome climatological summaries, -historical products including meteorological observations, forecasts, advisories and warnings • Activities carried out: • Challenges:	AMET-B0/3 Climatological and historical meteorological products

				• Opportunities:	
26.	Dissemination of meteorological products	☐ AOP ☐ CNS ☐ ATM ☒ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☒ Safety ☒ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic development of air transport ☐ Environmental protection	• Date of start: • Date of completion: • Objective: Improve safety and efficiency of air transport • Output: MET products disseminated via AMHS and secure internet services (WIFS/SADIS) • Activities carried out: • Challenges: • Opportunities:	AMET-B0/4 Dissemination of meteorological products

APPENDIX C. -ASBU implementation in The DRC

#	Initiative/Project title	Area	Strategic Objective	Description	Related ASBU element(s)

1.	Implementation of ATC Surveillance in the Kinshasa FIR.	☐ AOP
		☒ CNS
		☒ ATM
		☐ MET
		☐ SAR
		☐ AIM
		☐ ACFT
		☐ ENV
		☐ TRA
			☒ Safety
			☒ Capacity & Efficiency
			☐ Security & Facilitation
			☒ Economic development of air transport
			☐ Environmental protection
				• Date of start: 2014
				• Date of completion: 2017 with continuous updates
				• Objective(s):
				  • Implementation of Advanced Air Traffic Management Systems
				  • **Upgrading Communication Systems**:
				  • **Enhancement of Surveillance Capabilities**:
				  • **Achievement of a ATS personnel Comprehensive Training**
				Outputs
				• **Construction of a modern regional control center in Kinshasa Ndjili**, which hosts a control tower, an approach control office, an area control center, and a training center for air traffic controllers within the same building.
				• This center is equipped with flight management systems featuring automation through TOPSKY ATC X systems and AMHS messaging, air-ground VHF communication systems with remote stations covering the entire FIR, comprehensive ADS-B ground-based stations, and full coverage with ADS-C and CPDLC. The process is underway to enhance ground ADS-B with satellite-based ADS-B.
				• The center includes three modern control positions for en-route control, as well as a state-of-the-art simulator with functionalities matching operational positions.
				• The briefing office, the Aeronautical Telecommunications Operations Office, the approach control office, and the	

				control tower have all been equipped with flight plan processing and aeronautical messaging systems.  Kinshasa ACC • **Construction of a new Control Tower in Lubumbashi**, which will house approach control and the regional control center for the Lubumbashi sector. All ATS entities in Lubumbashi are equipped with the same automated traffic management systems as Kinshasa, except for the simulator. • **Renovation of the Control Tower at Kisangani Bangoka International Airport**, which houses approach control and the regional control center for the Kisangani sector, all with state of the art equipements. • **Training and refreshing of all air traffic controllers at RVA** in regional control using ADS-B surveillance systems, approach control, and aerodrome operations at ENAC, EAMAC, and ATNS. • **Training of Air Traffic Control instructors**, starting with equipment from Thales/France, followed by training at ENAC,	

				the ASECNA ATC center in Brazzaville, and then in Kinshasa for practical training and qualification in control with surveillance systems.	
2.	Modernization of Mbuji Mayi airport	☒ AOP ☒ CNS ☐ ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☒ Safety ☒ Capacity & Efficiency ☐ Security & Facilitation ☒ Economic development of air transport ☐ Environmental protection	• Date of start: 2021 • Date of completion: In progress • Objective(s): Upgrading AGA and ANS infrastructures • Output(s): • Activities carried out: Work to modernize the airport is progressing well, including the extension of the runway from 2,000 m to 3,000 m, the construction of a new control tower, a fire station, a terminal building, a power plant, the installation of a D-VOR/DME in 2021 and a photovoltaic field. • Challenges: Difficult access to material and equipment, which have an impact on the cost of the implementation. • Opportunities: Government and AfDB support	
3.	Upgrading of Kolwezi airport from national to international category	☒ AOP ☒ CNS ☒ ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☒ Safety ☒ Capacity & Efficiency ☒ Security & Facilitation ☒ Economic development of air transport ☒ Environmental protection	• Date of start: Juillet 2023 • Date of completion: In progress • Objective: Upgrading AGA and ANS • Output: Activities carried out: The airport is currently being modernized, will soon move from national to international category with a number of projects underway: • Rehabilitation of the runway and creation of a second runway to improve airport capacity. • Construction of a new terminal building to modernize passenger services. • Development of the main tarmac to optimize aircraft parking and movement.	

				• Construction of a new control tower to enhance air traffic management. • The design of a fire station to improve the safety of airport operations. • The installation of an airport fence to secure the airport perimeter. • Construction of a presidential pavilion to accommodate dignitaries and official events. • The creation of a terminal area and the restructuring of the airspace and ATS route network. • Challenges: No specific challenge • Opportunities: Government will and support	
4.	Kisangani international airport, terminal construction and pavement rehabilitation	☒ AOP ☐ CNS ☐ ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☐ Safety ☒ Capacity & Efficiency ☒ Security & Facilitation ☒ Economic development of air transport ☐ Environmental protection	• Date of start: April 2019 • Date of completion: Decembre 2024 • Objective: Facilitation and Economic growth in air transport. • Output: Infrastructure renewal • Activities carried out: The construction of the new terminal is nearly completed and is now awaiting its inauguration. At the same time, the rehabilitation work on the runway is also nearing completion. In addition, the construction of a new access road and a second taxiway is almost finished. • Challenges: No specific challenge • Opportunities: Government and AfDB support.	
5.	VSAT network renovation	☐ AOP ☒ CNS ☐ ATM ☐ MET	☒ Safety ☒ Capacity & Efficiency ☐ Security & Facilitation	• Date of start: May 2022 • Date of completion: June 2025 • Objective: enhance traffic management	COM I-B0/2

		☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☐ Economic development of air transport ☐ Environmental protection	• Output: Renewed CNS infrastructure for improved communication, navigation, and surveillance coverage to enhance traffic management. Activities carried out: Trial of migrating from analogic VSAT to Internet Protocol VSAT, the rest of VSAT station will follow : For communication infrastructures, contract underway for the renewal of VSAT (Very Small Aperture Terminal): Matadi, Kinshasa/Ndjili, Mbandaka, Gbadolite, Boende, Buta, Isiro, Bunia, Kisangani, Kindu, Bukavu, Kalemie, Lubumbashi, Kamina, Tshikapa, Mbuji-Mayi, Ilebo, Kikwit. These VSATs facilitate the transmission of VHF air/ground modulations, ADS-B data, messaging exchanges between air traffic services, and direct ATS/DS ground-to-ground communication. Challenges: Insufficient public electricity supply at over 80% of operational sites has led to reliance on costly backup energy sources, such as generators. • Opportunities: Funding available.	
6.	Modernization of NAVAIDs In DRC	☐ AOP ☒ CNS ☐ ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV	☐ Safety ☐ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic development of air transport ☐ Environmental protection	• Date of start : 2018 • Date of completion: completed already • Objective : replacing CVOR by DVOR • Output: Improve safety • Activities carried out: Eight out of twelve planned VOR stations in the AFI Air Navigation Plan have been implemented. **VOR/DME Stations :**	COM I-B0/2

		☐ TRA		• Kisangani/Bangoka • Bunia **DVOR/DME Stations:** • Kinshasa/Ndjili • Mbandaka • Kindu • Goma • Lubumbashi/Luano • Mbuji-Mayi These are navigation aids used by aircraft for directional navigation and distance measurement across various locations in the Democratic Republic of the Congo. • Challenges: Timely flight calibration. • Opportunities: Ongoing signing of contract for the provision of regular flight calibration by flight calibration service provider.	
7.	Technical personnel training simulator	☐ AOP ☒ CNS ☐ ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☒ Safety ☐ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic development of air transport ☐ Environmental protection	• Date of start: 2021 • Date of completion: Already completed • Objective: Improve safety • Output: Modern CNS personnel training facility. • Activities carried out: Establishment of a training center equipped with educational materials, including: • A new technology VHF radio system with a 2-position ATC console • A DVOR • A DME • An ILS This training center will provide hands-on experience with modern aviation equipment, helping students learn how to use important navigation and communication tools. • Challenges: Many experienced staff retiring at the same year, delay in preparing new staff, shortage of instructors • Opportunities: Training of foreign technical staff on request.	

				 View of the DVOR, DME, and ILS bays – Training School at Kinshasa/Ndjili Airport.  View of the VHF radio system – Training at Ndjili Airport.	
8.	Improve navigation in terminal airspace of Mbuji-Mayi	☐ AOP ☒ CNS ☐ ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT	☒ Safety ☒ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic development of air transport	• Date of start: 2023 • Date of completion: completed in 2024 • Objective: Improve safety • Output: Installation of an ILS/DME system is currently underway at Mbuji-Mayi National Airport. • Activities carried out:	

		☐ ENV ☐ TRA	☐ Environmental protection	This project aims to enhance the airport's navigation capabilities, improving safety and efficiency for incoming and outgoing flights. The ILS (Instrument Landing System) will assist pilots during landing in low visibility conditions, while the DME (Distance Measuring Equipment) will provide accurate distance information. This upgrade is a significant step in modernizing the airport's infrastructure. • Challenges: Poor visibility due to fog is very frequent in Mbuji Mayi, thus leading to delay, postpone, reroute or cancel flights. • Opportunities: Funding by AfDB available for this project.	