

APPENDIX 3L - Draft second Edition of the Annual Air Navigation Report



ICAO

CAPACITY & EFFICIENCY



AFI Air Navigation Report (AANR)

Second Edition, December 2024

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

ASBU IMPLEMENTATION IN THE AFI REGION

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FOREWORD



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TEXT

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As Principal 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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EXECUTIVE SUMMARY

1.1. Global air navigation plan & ASBU Framework

(Insert Text)

1.2. Regional air navigation plan & applicable ASBU Elements

(Insert Text)

1.3. ASBU implementation monitoring & reporting

(Insert Text)

1.4. Overview of ASBU implementation in the AFI Region

(Insert Text)

1. INTRODUCTION

2.1. Background

(Insert Text)

2.2. Scope

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2.3. Organizational Structure of the APIRG

(Insert Text)

2.4. Collection of data

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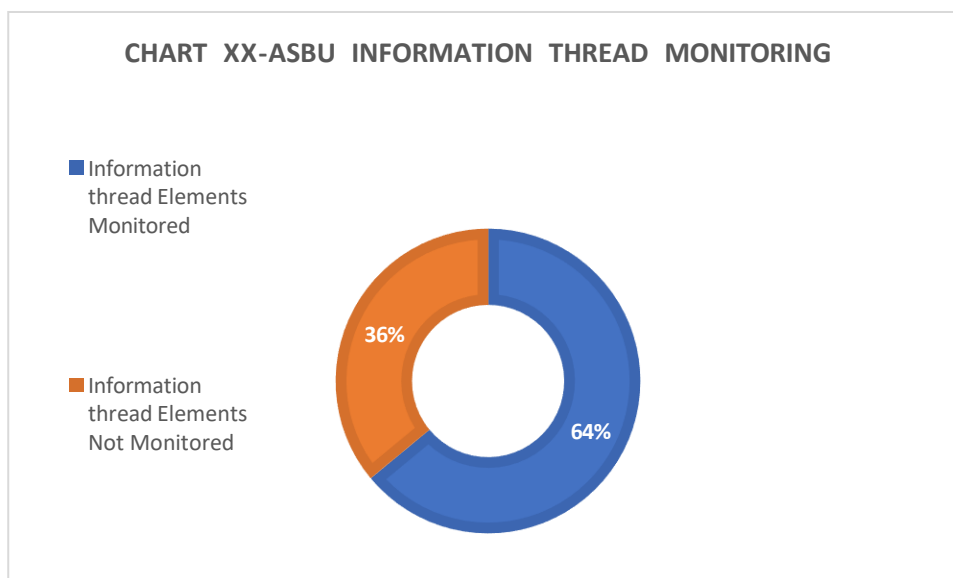
2.5. Structure of the Report

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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 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”.

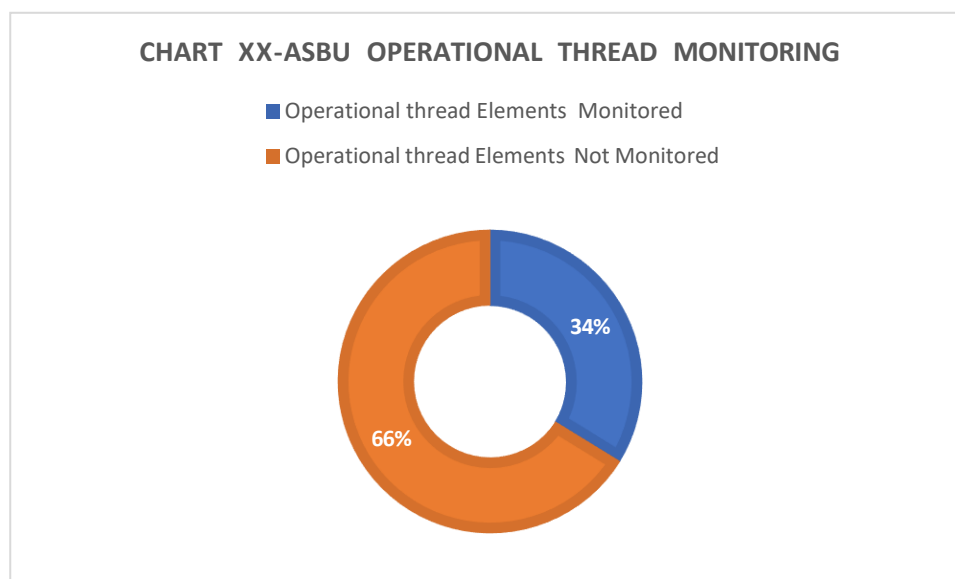
3.1. Information Threads Elements.



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



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

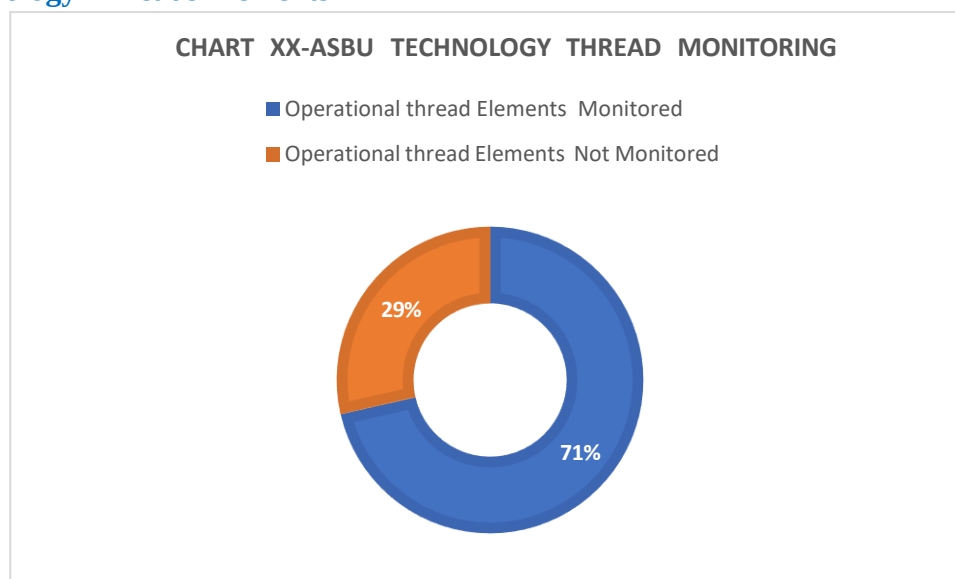
		APTA –B0/7	Performance based aerodrome operating minima – Advanced aircraft	Ready for implementation	Monitored
		APTA –B0/8	Performance based aerodrome operating minima – Basic aircraft	Ready for implementation	Monitored
		APTA –B1/1	PBN Approaches (with advanced capabilities)	Standardization	Monitored
		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
FRT0	Improved operations through enhanced en-route trajectories	FRT0 – B0/1	Direct routing (DCT)	Ready for implementation	Monitored
		FRT0 – B0/2	Airspace planning and Flexible Use of Airspace (FUA)	Ready for implementation	Monitored
		FRT0 – B0/3	Pre-validated and coordinated ATS routes to support flight and flow	Ready for implementation	Not Monitored
		FRT0 – B0/4	Basic conflict detection and conformance monitoring	Ready for implementation	Monitored
		FRT0 – B1/1	Free Route Airspace (FRA)	Standardization	Monitored
		FRT0 – B1/2	Required Navigation Performance (RNP) routes	Standardization	Monitored
		FRT0 – B1/3	Advanced Flexible Use of Airspace (FUA) and management of real time airspace data	Standardization	Not Monitored
		FRT0 – B1/4	Dynamic sectorization	Standardization	Not Monitored
		FRT0 – B1/5	Enhanced Conflict Detection Tools and	Standardization	Not Monitored

			Conformance Monitoring		
		FRT0 – B1/6	Multi-Sector Planning	Standardization	Not Monitored
		FRT0 – 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	OPFL – B0/1	In Trail Procedure (ITP)	Standardization	Not Monitored

	in oceanic and remote airspace	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
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3.3. Technology Threads Elements



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 Interconnection (ATN/OSI)	Ready for implementation	Monitored
		COMI-B0/3	VHF Data Link (VDL) Mode O/A	Ready for implementation	Monitored

COMI	Communication infrastructure	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 communication) for procedural airspace	Ready for implementation	Monitored
		COMS-B2/1	PBCS approved CPDLC (B2) for	Validation	Not Monitored

			domestic and procedural airspace		
		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. AOP Projects

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.

The Runway Safety Project document was approved and implementation initiated through Runway Safety Go Teams where States request for a mission to assist in Establishment of Runway Safety Teams, This project is currently under review 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.

The other two 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 scheduled for August 2024 in Nairobi Kenya for consideration.

4.2. ATM Projects

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

4.2.1.1 The AFI ATM Master Plan (AAMP) project that focus 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.

4.2.1.2 The Free Route Airspace (FRA) project which 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 at safely improving 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 FRT0 B0/1-DCT, FRT0 B1/1-Free Route Airspace.

4.2.1.3 The Civil-Military cooperation in ATM/Flexible Use of Airspace (CMC/FUA) project that 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 FRT0 B0/2- Airspace planning and Flexible Use of Airspace (FUA), FRT0 B1/3- Advanced Flexible Use of Airspace (FUA) and management of real time airspace data, FRT0 B1/4- Dynamic sectorization.

4.2.1.4 The Performance-based Navigation /AFI Optimized Route Trajectory and Airspace (PBN/AORTA) project which 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.

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

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

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.

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. MET Projects

There five (5) Projects under the Aeronautical Meteorology(MET) area. These Projects and their achievements in 2024 are:

MET Project 1 on xxx

(Insert Text)

MET Project 2 on xxx

(Insert Text)

MET Project 3 on xxx

(Insert Text)

MET Project 4 on xxx

(Insert Text)

MET Project 5 on xxx

(Insert Text)

4.5. SAR Projects

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 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.



4.6. AIM Projects

(Insert Text)

5. PROGRESS IN ASBU IMPLEMENTATION IN THE AFI REGION

5.1. Implementation summary per ASBU Threads

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.

5.1.1. Information category

Thread	2022	2023	Progress
AMET	X%	Y%	+(X-Y)%
DAIM			
FICE			

5.1.1.1 AMET – Meteorological Information

(Insert Text)

5.1.1.2 DAIM – Digital Aeronautical Information Management

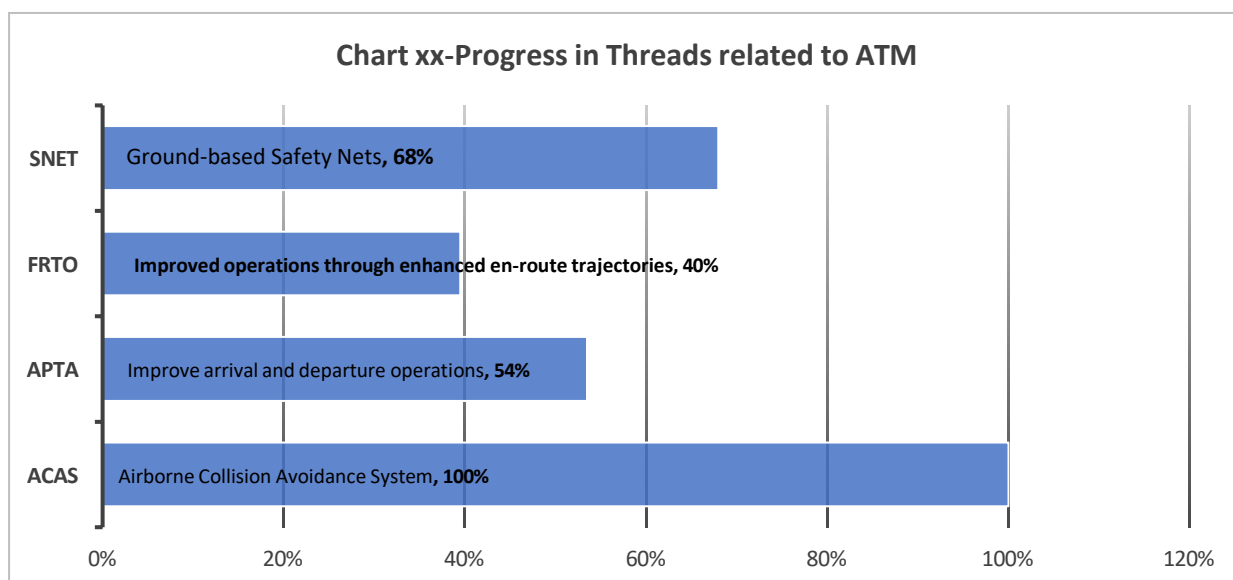
(Insert Text)

5.1.1.3 FICE - Flight and Flow Information for a Collaborative Environment

(Insert Text)

5.1.2. Operational category

Thread	2022	2023	Progress
ACAS	100%	100%	0%
ACDM	16%	25%	+9%
APTA		54%	
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	



5.1.2.1 ACAS - Airborne Collision Avoidance System

There is a full completion rate of 100% (48 States) for ACAS-B1/1 in the AFI region which is very positive from the perspective of the safety contribution.

5.1.2.2 ACDM - Airport Collaborative Decision Making

(Insert Text)

5.1.2.3 APTA - Improve arrival and departure operations

The implementation of the Thread shows good progress across all its constitutive Elements. The regional implementation is at 54% including 65% in ESAF and 42% in WACAF. The leading APTA elements in the region are currently B0/1-PBN Approaches (Basic) and B0/2-PBN SIDS and STAR procedures (Basic).

5.1.2.4 DATS - Remote Aerodrome Air Traffic Services

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.

5.1.2.5 FRT0 - Improved operations through enhanced en-route trajectories

The FRT0 thread elements is 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.

5.1.2.6 NOPS - Network Operations

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.

5.1.2.7 RSEQ - Improved traffic flow through runway sequencing

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.

5.1.2.8 SNET - Ground-based Safety Nets

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.

5.1.2.9 SURF - Surface operations

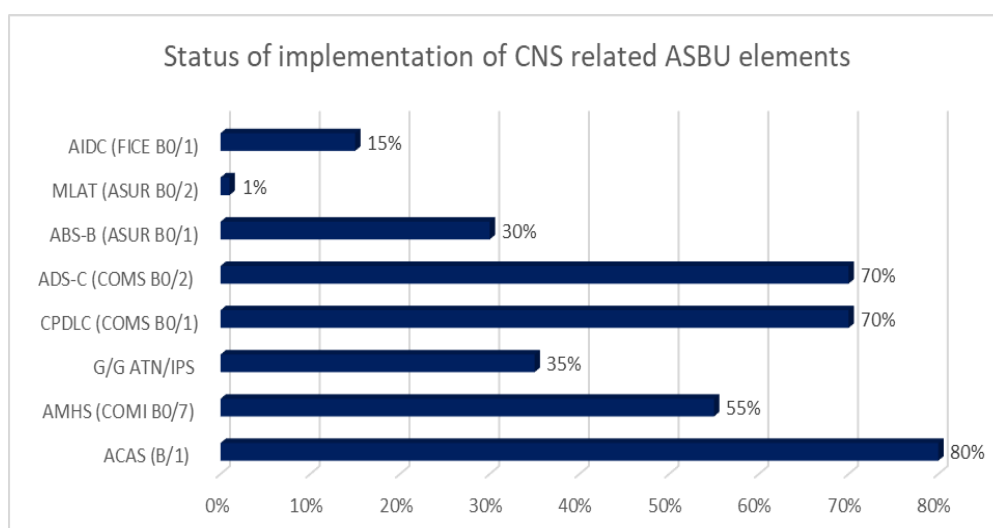
ASBU elements under this thread are currently not monitored in the region due to unavailability of information as well as low level of established relevant regulation in support of their implementation.

5.1.3. Technology category

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

AFI CNS - ASBU implementation STATUS

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,



5.1.3.1 ASUR - Surveillance systems

Based on the available information reported through the AFI ANP, as well as the lack of update from States, it is estimated that the capability to receive ADS-B data (en route or at airport) currently exists in XX States (8 ESAF States (33%)). The introduction of space-based ADS-B give the opportunity to increase surveillance coverage in support to RVSM operations. In many cases it is deployed as part of the Wide Area Multilateration (WAM) systems with ADS-B capability. Multilateration (MLAT) is implemented by 4 States (ESAF) where the interest in

using MLAT technique is to provide surveillance at airport or over wide areas and mainly to complement (and in some cases even replace) secondary surveillance radars (SSR).

B

5.1.3.2 COMI - Communication infrastructure

The implementation of Aeronautical Message Handling System (AMHS) is still ongoing, most of the AFI VSAT networks are upgraded and capable for 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.

5.1.3.3 COMS – ATS Communication Service

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.

5.1.3.4 NAVS - Navigation systems

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

States	Implementation Progress	Elements implemented	Ongoing Implementation
Angola			
Botswana			
Burundi			
Comoros			
Djibouti			
Eritrea			
Eswatini			
Ethiopia			
Kenya			
Lesotho			
Madagascar			
Malawi			
Mauritius			
Mozambique			
Namibia			
Rwanda			
Seychelles			
Somalia			

South Africa			
South Sudan			
Tanzania			
Uganda			
Zambia			
Zimbabwe			

ESAF REGION – ACAS/APTA/FRTO/SNET																										
	IMPLEMENTED	PARTIALLY IMPLEMENTED	NOT IMPLEMENTED																							
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	
ACAS - Airborne Collision Avoidance System (ACAS)																										
ACAS-B1/1- (ACAS Improvement)																										
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%	100%
FRTO - Improved operations through enhanced en-route trajectories																										
FRTO-B0/1- DCT																										71%
FRTO-B0/2 (Airspace planning and Flexible Use of Airspace (FUA))																										17%
FRTO-B0/3 (Pre-validated and coordinated ATS routes to support flight and flow)																										0%
FRTO-B0/4 (Basic conflict detection and conformance monitoring.)																										42%

FRTO-B1/1 (Free Route Airspace (FRA))																									25%
FRTO-B1/2 (Required Navigation Performance (RNP) routes)																									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))																									81%
APTA-B0/2 (PBN SIDS and STAR procedures (Basic))																									81%
APTA-B0/3 (SBAS/GBAS CAT I precision approach procedures)																									0%
APTA-B0/4 CDO (Basic)																									21%
APTA-B0/5 CCO (Basic)																									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																										71%
SNET-B0/2 MSAW																										71%
SNET-B0/3 APW																										58%
ANET-B0/4 APM																										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%	100%	65%

ESAF REGION - ASUR					
Element	Title	Applicability	Performance Indicators/	Performance Indicators/	Performance Indicators/
ASUR B0/1	Automatic Dependent Surveillance-	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.	30%	Dec 2023
ASUR B0/2	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).	17%	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	Mala	Mauritius	Mozambique	Namibia	Rwanda	Seychelles	Somalia	South Africa	South Sudan	Uganda	U.R Tanzania	Zambia	Zimbabwe	Average
B0/1																									30%
B0/2																									17%
B1/1																									17%
Average ASUR																									21%

ESAF REGION - COMI					
Element	Title	Applicability	Performance Indicators/	Performance Indicators/	Performance Indicators/
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	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	Mada	Mala	Mauritius	Mozambique	Namibia	Rwanda	Seychelles	Somalia	South Africa	South Sudan	Uganda	U.R Tanzania	Zambia	Zimbabwe	Average
B0/7																									63%
B1/1																									17%
Average COMI																									40%

ESAF REGION - COMS					
Element	Title	Applicability	Performance Indicators/	Performance Indicators/	Performance Indicators/
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	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%
B0/2										90%
Average COMS										95%

ESAF REGION - NAVS					
Element	Title	Applicability	Performance Indicators/	Performance Indicators/	Performance Indicators/

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
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NAVS	Angola	Botswana	Burundi	Comoros	Djibouti	Eritrea	Eswatini	Ethiopia	Kenya	Lesotho	Mada	Mala	Mauritius	Mozambique	Namibia	Rwanda	Seychelles	Somalia	South Africa	South Sudan	Uganda	U.R Tanzania	Zambia	Zimbabwe	Average
B0/3																									67%
Average NAVS																									67%

ESAF REGION - FICE					
Element	Title	Applicability	Performance Indicators/	Performance	Performance
FICE B0/1	Automated basic facility data exchange (AIDC)	All States	Indicator: % of States that have implemented AIDC to improve the efficiency of coordination and transfer of control between ATS units Supporting metric: Number of States that have implemented AIDC to improve the efficiency of coordination and transfer of control between ATS units.	25%	Dec 2023

FICE	Angola	Botswana	Burundi	Comoros	Djibouti	Eritrea	Ethiopia	Kenya	Lesotho	Madagascar	Malawi	Mauritius	Mozambique	Namibia	Reunion	Rwanda	Seychelles	Somalia	South Africa	South Sudan	Uganda	U.R Tanzania	Zambia	Zimbabwe	Average
B0/1																									25%
Average FICE																									25%

ESAF REGION – A-CDM					
Element	Title	Applicability	Performance Indicators/	Performance Indicators/	Performance Indicators/

FICE B0/1	A-CDM Implementation	All States	Percentage of International Aerodromes eligible for implementation of A-CDM and are currently in the process of implementation	25%	Dec 2023
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5.2.2. Progress in WACAF States

States	Implementation Progress	Elements implemented	Implementation in progress
Benin			
Burkina Faso			
Cameroon			
Cabo Verde			
CAR			
Chad			
Congo			
Cote d'Ivoire			
DRC			
Equatorial Guinea			
Gabon			
Gambia			
Ghana			
Guinea			
Guinea Bissau			
Liberia			
Mali			
Mauritania			
Niger			
Nigeria			
Sao Tome and Principe			
Senegal			
Sierra Leone			
Togo			

WACAF REGION – ACAS/APTA/FRTO/SNET



IMPLEMENTED



PARTIALLY IMPLEMENTED



NOT IMPLEMENTED

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	ESAF SCORE
ACAS - Airborne Collision Avoidance System (ACAS)																									
ACAS-B1/1- (ACAS Improvement)																									
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																									75%
FRTO-B0/2 (Airspace planning and Flexible Use of Airspace (FUA))																									4%
FRTO-B0/3 (Pre-validated and coordinated ATS routes to support flight and flow)																									0%
FRTO-B0/4 (Basic conflict detection and conformance monitoring.)																									75%

5.3. Details progress assessment per ASBU Element

5.3.1. Progress assessment of Information Threads Elements

The A-CDM Project document is under development. However, comparing data from ISTARs on traffic densities and Capacities, not all States will have to implement A-CDM given the operations at the Airports that may not meet the threshold for implementation. Details will be provided in the Project document which will highlight the Status of implementation once submitted to AAO/SG7 in August 2024.

5.3.2. Progress assessment of Operational Threads Elements

(Insert Text)

5.3.3. Progress assessment of Technology Threads Elements

(Insert Text)

6. Performance of the AFI Air Navigation System

Efficiency

Capacity

Infrastructure and Technology

Airports- overview of the capacity of airport infrastructure

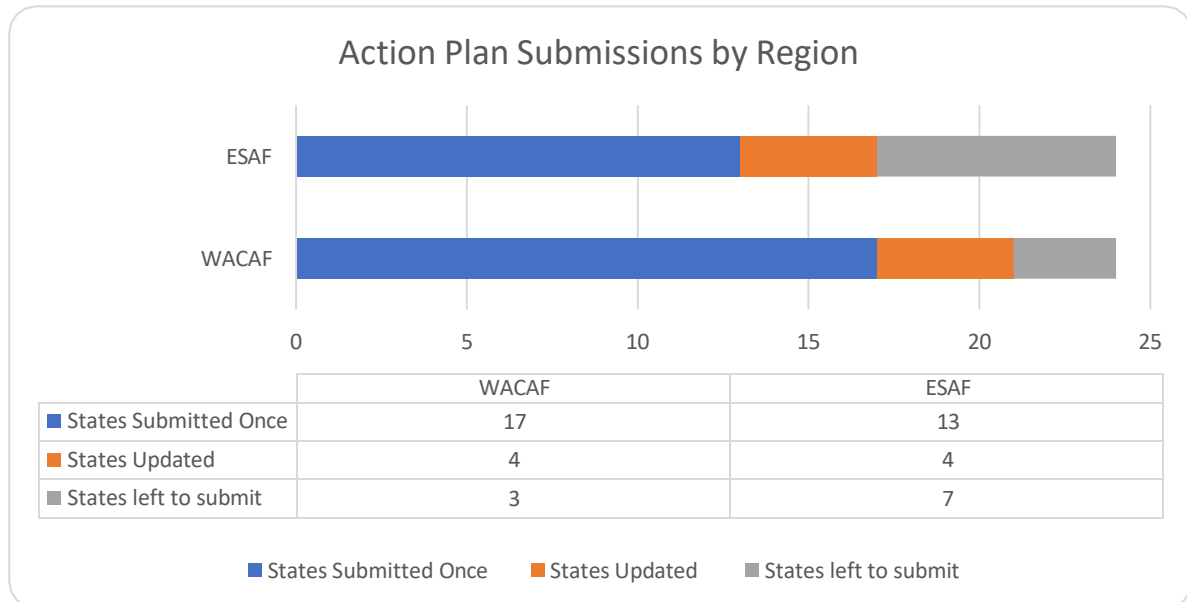
Air Navigation Services

7. BENEFITS OF ASBU IMPLEMENTATION ON ENVIRONMENTAL PROTECTION

7.1 State Action Plans (SAPs) on CO₂ emissions reduction

State Action Plans (SAPs) are a voluntary planning and reporting tool for States to communicate information on their activities to address CO₂ 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.

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.

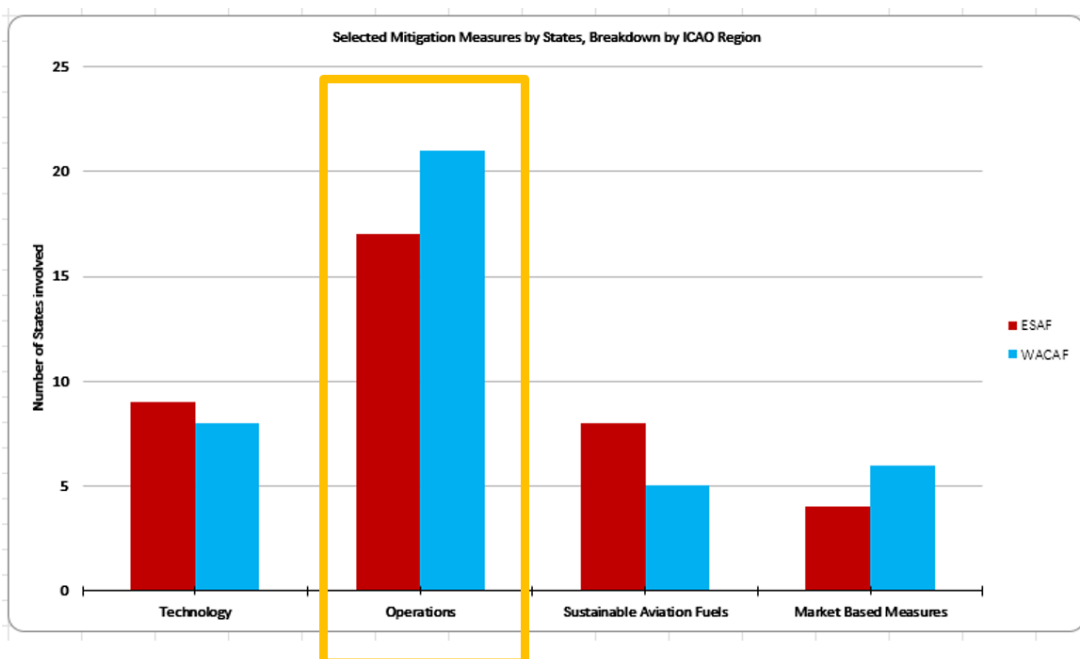


7.2. Environmental benefits of ASBU implementation in the AFI Region

The ASBU, while aiming to enhance the safety, efficiency, and capacity of global air traffic management systems, it 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

The ICAO SAP initiative is closely linked to ASBU implementation. States' most popular measure for reducing CO₂ emissions is on Operations.



ASBU elements linked to Operations xxxxx

These result in utilization of more efficient flight paths, minimization of the distance traveled by aircraft, ultimately resulting in substantial reductions in fuel consumption and associated carbon emissions.

In addition, ASBU enables more efficient use of airspace, reducing the need for aircraft to fly at higher altitudes or take longer routes e.g. elements like xxxx.

Looking into the future, ASBU will leverage NextGen technologies, like Automatic Dependent Surveillance-Broadcast (ADS-B), which enable more precise tracking and communication between aircraft and air traffic controllers. This improves efficiency and reduces emissions.

8. STATES AND INDUSTRY ACHIEVEMENTS AND BEST PRACTICES /

8.1. States

8.1.1. Modernization initiatives in KENYA

8.1.1.1 The State has engaged on 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.

8.1.1.2 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.

8.1.1.3 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).

8.1.1.4 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.

8.1.1.5 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.

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

8.1.2. Achievements in Senegal

8.1.2.1 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.

8.1.2.2 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.

8.1.2.3 Technology Elements: A vast programme of improvement 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.

8.1.2.4 Information Elements: The State through the ANSP ASECNA 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 increase 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.

8.1.2.5 A full details of initiatives taken by Senegal in implementing ASBU applicable elements is available at Appendix F to the report.

8.1.3. Modernization of ANS in The Democratic Republic of The Congo (DRC)

8.1.3.1 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.

8.1.3.2 Modernization of Airport infrastructure: The DRC has performed renovation work at Mbuji Mayi airport with the construction of new buildings including control tower, firefighting brigade 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.



Control Tower-Mbuji Mayi



New Kolwezi Terminal



New Kisangani Terminal

8.1.3.2 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.



New VSAT at Kinshasa Ndjili

8.1.3.3 Improvement of navigation: The DRC has developed a plan for the renewal and modernization of NAVAIDs in 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.



New DVOR of Kisangani

8.1.3.4 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.

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

8.2. Airport Operators

Through peer support initiatives with missions jointly arranged between ICA, IATA and State experts, some airport operators have been able to attain milestone in establishment of Runway Safety teams. Some of the States include: Uganda, South Sudan, Djibouti. There are planned activities for Somalia, Malawi in the near future.

8.3. Air Navigation Services Providers

(Insert Text)

8.4. Industry Partners

8.4.1. IATA

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 workshop and webinars on Runway Safety, and Bird and Wildlife strike Hazard management programs.

8.4.2. AFRAA – 2023-status of the Free Route Airspace implementation through User Preferred Route (UPR) Trials

8.4.2.1 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.

8.4.2.2 With AFREXIMBANK financial sponsorship, the project kick-off workshop was conducted in Addis Ababa from 29 October to 02 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.

8.4.2.3 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 to implement the first trials on the last day of the workshop, 02nd November 2023:

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



8.4.2.4 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.

8.4.2.5 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 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.

8.4.2.6 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 Tonnes, the CO2 footprint will be reduced by 29 000 Tonnes, and the airlines will cut more than USD 17 125 800 million from their fuel bill.

8.4.2.7 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.

9. CHALLENGES AND OPPORTUNITIES

9.1. Challenges in airport modernization

9.1.1 The main challenges in the AOP are the unavailability for experts to support the project and well as the development and or completion of project documents. Funding of the already approved projects especially Runway Safety remains a big challenge for the Region.

9.2. Challenges in airspace organization and management

9.2.1 Airspace optimization

9.2.1.1 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 SUAs 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.

9.2.1.2 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.

9.2.2 Technological advancements

(Insert Text)

9.2.3 Cybersecurity threats

(Insert Text)

9.2.4 Climate change impacts on air navigation e.g. hazardous weather

(Insert Text)

9.2.5 Human resource asset

(Insert Text)

9.3. Future trends and developments:

9.3.1 Increased automation and digitalization

(Insert Text)

9.3.2 Integration of new entrants into the airspace (e.g., urban air mobility)

(Insert Text)

9.3.3 Growing demand for air travel

(Insert Text)

10. CONCLUSION

APPENDIX A. STATUS OF IMPLEMENTATION OF BLOCK 0 ELEMENTS

APPENDIX B. STATUS OF IMPLEMENTATION OF BLOCK 1 ELEMENTS

APPENDIX C. ASBU BLOCK 0 IMPLEMENTATION OUTLOOK FOR 2023

APPENDIX D. ASBU BLOCK 1 IMPLEMENTATION OUTLOOK FOR 2023

APPENDIX E. ASBU IMPLEMENTATION IN KENYA

#	Initiative/Project title	Area	Strategic Objective	Description	Related ASBU element(s)
1.	Published GNSS instrument approach charts with LNAV and LNAV/VNAV minima for all 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: 2014 • Date of completion: 2018 • Objective(s): Safety, capacity, efficiency & Access. • Output(s): Published GNSS instrument approach charts with LNAV and LNAV/VNAV minima for all international airports. -The PBN procedures also support stabilized approach operations for aircraft equipped with advisory Baro-VNAV functionality. • Activities carried out: Airport surveys, design of PBN approach procedures, sensitization of ATCOs on PBN operations. • Challenges: Inadequate number of IFP designers • Opportunities: Continued training in IFP Designat AFPP	APTA-B0/1 PBN Approaches (with basic capabilities) GNSS-based PBN approach procedures Implemented (I)

2.	Published GNSS SIDs and STARs charts	☐ 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: 2018 • Objective(s): Safety, capacity, efficiency & Access. • Output(s): Published GNSS SIDs and STARs charts • Activities carried out: Airport surveys, design of PBN SIDs and STARs, sensitization of ATCOs on PBN operations.	APTA-B0/2 PBN SID and STAR procedures (with basic capabilities) Implemented (I)
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				- Challenges: Inadequate number of IFP designers - Opportunities: Continued training in IFP Design at 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 development of air transport ☐ Environmental protection	- Date of start: 2016 - Date of completion: 2020 - Objective: Safety, capacity, efficiency, Access and environmental protection - Output: Published GNSS CCO SIDs and CDO STARs charts - Activities carried out: Airport surveys, design of PBN 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-confliction of all the SIDs and STARs for TMAs with complex airspace structure and traffic capture regions while maintaining efficiency always requiring a trade-off. - Opportunities: Continued training in IFP Design and 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 development of 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 in Space (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 development of 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 Design at 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 development of air transport ☒ Environmental protection	- Date of start: N/A for now. No airfield in Kenya poses constraints that require APTA-B1/1 PBN Approaches (with advanced capabilities). -Implementation will be done on need basis. No IAPs in Kenya require use of RF legs or RNP AR 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 development of 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 RF legs 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 development of air transport ☒ Environmental protection	• Date of start: 2020 • Date of completion: Ongoing • Objective: Safety, capacity, efficiency, Access and environmental protection • Output: Published GNSS CCO SIDs and CDO STARs charts • Activities carried out: Airport surveys, design of PBN 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-confliction of all the SIDs and STARs for TMAs with complex airspace structure and traffic capture regions while maintaining efficiency always requiring a trade-off. Opportunities: Continued training in IFP Design and PBN airspace Design at AFPP and other ICAO trainings	APTA-B1/4 CDO (Advanced) Implementation ongoing APTA-B1/4 CCO (Advanced) Implementation ongoing
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9.	Surveillance coverage redundancy to the ground surveillance MSSR and PSR ADS-B Implementation committee set up awaiting State mandate for implementation of ADS-B	☐ AOP ☒ CNS ☒ ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☒ Safety ☒ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic development of 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 cost and increased surveillance coverage. - Output: Surveillance coverage redundancy to the ground surveillance MSSR and PSR - Activities carried out: ATCOs sanitization on use 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 development of 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 development of 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 development of 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 development of air transport ☐ Environmental protection	• Date of start: 2013 • Date of completion: 2014 • Objective: To provide a distributed message switching and storage infrastructure to enable the transfer of ATS messages, such as flight plans, NOTAM (Notice to Airman), and Meteorological information. • Output: Enhanced exchange of aeronautical data between states. • Activities carried out: Connection of AMHS network with Johannesburg, Addis Ababa, Mumbai, Brazzaville, Entebbe and Mauritius • Challenges: Setting up the AMHS connection to states is tedious, lack of skilled personnel in the different states to do the setup. • Opportunities: More data being exchanged between states.	COMI-B0/7 ATS Message Handling System (AMHS) - Implemented

14.		☐ AOP ☐ CNS ☐ ATM ☐ MET ☐ SAR	☐ Safety ☐ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic development of 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 development of 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 to the VHF communication	☐ AOP ☐ CNS ☐ ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☐ Safety ☐ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic development of air transport ☐ Environmental protection	• Date of start: 2012 • Date of completion: 2014 • Objective: Safety, capacity, and efficiency - support the provision of Air Traffic Services and operational applications with reduced workload. • Output: communication coverage for Oceanic regions and redundancy for VHF communication • Activities carried out: ATCOs trained. • Challenges: • Opportunities: Continued training	COMS-B0/1 CPDLC (FANS 1/A & ATN B1) for domestic and 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 development of 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 development of air transport ☐ Environmental protection	• Date of start: • Date of completion: • Objective: To ensure that aeronautical data and information comply with quality standards in order to meet the needs of the intended data users. • 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 aeronautical data originators, and use of information systems to process and store aeronautical information. • Challenges: Agreeing with data originators on the 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 for the 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 data and 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 development of 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 AIP data 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 AIP processing system; Training of AIM staff to operate the information systems; Migration of existing 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 typing of AIP data to information systems, and frequent need to enhance the AIM information systems capability. • Opportunities: Collaboration between AIS and the 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 integrated aeronautical 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 development of air transport ☐ Environmental protection	• Date of start: • Date of completion: • Objective: To avail digital terrain and obstacle data 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 TOD systems. • Challenges: Cost of installation and Maintenance of TOD system, data providers meeting the TOD data requirements • Opportunities: Training of TOD data originator on data requirements, establishment of survey unit'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 development of air transport ☐ Environmental protection	• Date of start: • Date of completion: ongoing. • Objective: To avail digital aerodrome mapping data 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 survey data 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 development of 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 standards such 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 to operate IFPD system, migrating the existing IFP to the system and capturing the newly designed IFP with the system. • Challenges: Requirement of IFPD concepts for AIM 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 design to 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 development of air transport ☐ Environmental protection	• Date of start: 2016 • Date of completion: Ongoing • Objective: To provide timely and relevant information about the status and condition of the ANS infrastructure to the next intended users via NOTAM. • Output: Timely distribution of relevant NOTAM • Activities carried out: Definition of NOTAM processing procedures to enable NOF to process relevant NOTAM information; improvement of NOTAM processing information systems; Training AIM personnel on 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 5.1 format.	DAIM-B1/7 NOTAM improvements - Implemented

				• Opportunities: Provision of all baseline aeronautical information in AIXM 5.1 digital format as well as enhancing aeronautical information exchange with NOTAM intended users or stakeholders.	
24.	Oceanic User preferred routing 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: 2016 • Date of completion: 2020 • Objective: Direct routings established to provide airspace users with shorter routes options on a larger scale across FIRs to reduce the track miles flown. • Output: Shorter routes for aircraft and reduced carbon emission • Activities carried out: Phase I involved tactful DRO by controllers on request from pilots; Phase II involved publication of flight plannable Direct Routes; implementation of User Preferred routing in part of the oceanic airspace • Challenges: Difficulty in achieving cross border DRO and FRA to accrue economic benefits to airlines. • Opportunities: Real time controller coordination that achieves cross border DRO. Saves time, fuel and track miles flown.	FRT0-B0/1 Direct routing (DCT) – Implemented Oceanic User preferred routing Implemented

25.	Airspace planning and Flexible Use of Airspace (FUA)	☐ AOP ☐ CNS ☒ ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT	☒ Safety ☒ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic development of 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 national security needs and reduces carbon emissions. • Output: Civil aircraft operations permitted in a number 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	FRT0-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 development of air transport ☒ Environmental protection	• Date of start: 2020 • Date of completion: 2025 • Objective: Direct routings established to provide airspace users with shorter routes options on a larger scale across FIRs to reduce the track miles flown. • Output: Shorter routes for aircraft and reduced carbon emission • Activities carried out: Phase I involved tactful DRO by controllers on request from pilots; Phase II involved publication of flight plannable Direct Routes; implementation of User Preferred routing in part of the oceanic airspace and safety assessment has been conducted to roll out FRA from FL260 and above • Challenges: Difficulty in achieving cross border DRO and FRA to accrue economic benefits to airlines. • 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 development of air transport ☒ Environmental protection	• Date of start: 2016 • Date of completion: 2018 • Objective: Deployment of RNP routes within en-route airspace • Output: More direct routes within the airspace • Activities carried out: Publication of the RNP routes.	FRTO-B1/2 Required Navigation Performance (RNP) routes - Implemented

		☐ ENV ☐ TRA		- Challenges: None-RNP equipped aircraft, unable to operate the RNP routes, and having to maintain the conventional routes. - Opportunities: Use of surveillance to provide leverage to monitor aircraft that are suitably equipped for RNP procedures.	
30.	Advanced Flexible Use of Airspace (FUA) and management of real-time airspace data - 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: - Date of completion: - Objective: collaborative airspace data sharing between all ATM actors, negotiation procedures, system support, and real-time ASM data integration. - Output: better and optimal airspace use Activities carried out: Real-time coordination between Controllers on specific requests from aircraft for access to restricted airspace. - 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	FRT0-B1/3 Advanced Flexible Use of Airspace (FUA) and management of real-time airspace data - In progress
31.	Enhanced Conflict Detection Tools 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: - 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	FRT0-B1/5 Enhanced Conflict Detection Tools and Conformance Monitoring - Implemented

				• Opportunities: Increased operational safety efficiency and capacity	
32.	Multi-sector planning has been implemented at HKJK ACC ATM System to allow a single planner role to be associated to multiple sector tactical roles and the planner and tactical roles to be combined on a controller work position	☐ 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: To enable the planning controller to provide 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 & Supervisor Positions. Both have Planner & Coordinator Positions. • Challenges: Lack of an adequate number of ATCOs • 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 development of air transport ☐ Environmental protection	• Date of start: • Date of completion: • Objective: • Output: Distress data access • Activities carried out: State to nominate POC to 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 development of air transport	• Date of start: 2024 • Date of completion: • Objective: To improve the efficiency of coordination and transfer of control between ATS units • Output:	FICE-B0/1 Automated basic inter facility data exchange (AIDC)
		☐ ACFT ☐ ENV ☐ TRA	☐ Environmental protection	• Activities carried out: System interoperability tests ongoing between Nairobi, Entebbe, and Mogadishu. Voice communication between ATS units should be replaced by automatic message exchange. • Challenges: • Opportunities:	Test ongoing between Nairobi and HUEC and HCSM for system interoperability.
35.		☐ 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: • 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 development of 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, and MSAW • Activities carried out: The ATM System installed at major airports has capabilities for STCA, APW, and MSAW • Challenges: Numerous safety Alerts could cause 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 Coordination Office established The office of the SMS unit was established at the HQ and at the station level with permanent 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 development of air transport ☒ Environmental protection	• Date of start: 2017 • Date of completion: • Objective: Oversee the implementation of Safety Management System within the organization • Output: a) Number of Safety Policy developed and signed. b) Number of Safety Management Manual developed. c) Hazards Identified and Safety Risk Mitigated • Activities carried out: Recruitment and training of SMS Personnel. Appoint an SMS Manager and appoint staff at ANS-HQ and at the stations.	
				• Challenges: Lack of adequate dedicated staff to 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 development of 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 staff to the unit at ANS-HQ and provide it with external training. • Challenges: Lack of adequate dedicated staff • Opportunities: Align Kenya's strategic plan and master plan with the ICAO Global Air Navigation Plan (GANP) and Global Air Safety Plan (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 development of 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 and departing 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 of handling 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 development of air transport ☐ Environmental protection	• Date of start: 2012 • Date of completion: • Objective: To enhance safety and efficiency on ground movement of aircraft. • Output: Procedures developed, and ground control implemented. • Activities carried out: Ground control frequency established, area of jurisdiction defined through procedures published in the AIP, ATCO numbers were increased, sensitization was done.	
41.	PBN implementation and the provision of ANS at smaller airports such as DIANI	☐ 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: 2017 • Objective: To enhance aircraft operations into small airports. • Output: Number of PBN Procedures designed and implemented • Activities carried out: a) Safety assessment b) Procedures developed and published • Challenges: Inadequate trained staff • Opportunities:	PBN implementation and the provision of ANS 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 development of 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 control tower and offices - Challenges: a) Unanticipated amount of cotton soil which needed 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 development of 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 in the 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 control tower and offices - Challenges: The delay was caused by El Nino rains that interfered with the building foundation works and stringent airport access requirements 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 development of air transport	• Date of start: July 2021 • Date of completion: June 2024 • Objective: To install and commission an Air traffic 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, and support during the warranty period. • Challenges: Delays in implementation of the contract. • Opportunities: Effective and efficient provision of 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 development of 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 and voice recording, and a master clock system. • Output: Operationalized ATM system at DRS ACC and at all Airports • Activities carried out: Supply, delivery, installation, training, commissioning, and support during the warranty period • Challenges: Delays in implementation of the contract. • Opportunities: Effective and efficient provision of 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 development of 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 provision of services and providing of Competent SAR personnel. • Challenges: Updating SAR software to meet a rapidly 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 for SAR.	

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 development of 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 and MIA • Activities carried out: Drawing of Equipment specifications, Delivery, installation, training, Testing, and commissioning. • Challenges: Delays in project completion. • Opportunities: Effective and efficient provision of ATM Services	
48.	Implementation of D-ATIS at JKIA, MIA, EIA & KIA	☐ AOP ☒ CNS ☒ ATM ☐ MET ☐ SAR ☐ AIM	☒ Safety ☐ Capacity & Efficiency ☒ Security & Facilitation ☐ Economic development of air transport	• Date of start: Aug 2021 • Date of completion: June 2023 • Objective: To procure and install a D-ATIS system to ensure compliance with ICAO requirements on implementation of	
		☐ ACFT ☐ ENV ☐ TRA	☐ Environmental protection	requirements on the on provision of Metrological information in digital format • Output: Commissioned D-ATIS equipment at JKIA, MIA, EIA & KIA • Activities carried out: Preparation and approval of specifications, Tendering and contract award, installation and commissioning • Challenges: Delays in the implementation of the contract and failure by contractor to adhere to contract specifications • Opportunities: Effective and efficient provision of 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 development of 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 implementing Kenya ANP 2015-2030. (a) Safety around operation zones, including airports, approach flight corridors, and holding areas, (b) Air quality associated with aircraft emissions, (c) Effects of noise and vibrations from aircraft operations, (d) Land use conflicts involving aircraft operations and social and economic activities on the ground, and (e) Influences on climate change associated with CO₂ emissions from the aircraft. • Output: (a) Undertake Environmental and Social Impact Assessment (ESIA) Study and seek approval for the proposed ANS installations and constructions, (b) Seek approval for the ANS construction with	
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				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 mechanisms during the removal, storage and final disposal. • Activities carried out: • Challenges: • Opportunities:	
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APPENDIX F. 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	☐ AOP ☐ CNS	☒ Safety ☒ Capacity & Efficiency	• Date of start: • Date of completion:	FRTO-B1/2

	UTA Oceanic sector	☒ ATM ☐ MET ☐ SAR ☐ AIM ☒ ACFT ☐ ENV ☐ TRA	☐ Security & Facilitation ☐ Economic development of air transport ☐ Environmental protection	- 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:	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 ☐ 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: Improve safety, increase capacity. - 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-B0/1 Short Term Conflict Alert (STCA) 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 ☐ AIM ☐ ACFT	☐ Safety ☒ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic development of air transport ☐ Environmental protection	• Date of start: • Date of completion: • Objective: • Output: ACARS implemented in Dakar FIR • Activities carried out: • Challenges: • Opportunities:	COMI-B0/1 (ACARS)

		☐ ENV ☐ TRA			
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	☐ AOP ☒ CNS ☐ ATM	☒ Safety ☐ Capacity & Efficiency ☐ Security & Facilitation	- Date of start: - Date of completion: - Objective: Improve the safety of air operations	ASUR-B0/3 Cooperative Surveillance Radar Downlink of aircraft

	(SSR) at Dakar ATS Unit	☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☐ Economic development of air transport ☐ Environmental protection	- Output: SSR with Down link of aircraft parameters installed at Dakar ACC and Blaise Diagne International Airport (AIBD). - Activities carried out: - Challenges: - Opportunities:	Parameters (SSR-DAPS)
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	☐ AOP ☐ CNS ☐ ATM ☐ MET	☒ Safety ☒ Capacity & Efficiency ☐ Security & Facilitation	- Date of start: - Date of completion: - Objective: Improve safety, improve efficiency of air operations	DAIM-B1/1 Provision of quality-assured aeronautical data and information

	and information in Senegal	☐ SAR ☒ AIM ☐ ACFT ☐ ENV ☐ TRA	☐ Economic development of air transport ☐ Environmental protection	• 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: • 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	☒ Safety ☒ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic development of air transport	• Date of start: • Date of completion: • Objective: Improve safety and efficiency of air operations	AMET-B0/1 Meteorological observations products

		☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☐ Environmental protection	• 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), -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	AMET-B0/2 Meteorological forecast and warning products

				- Activities carried out: - Challenges: - Opportunities:	
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: - Opportunities:	AMET-B0/3 Climatological and historical meteorological products
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 G. ASBU IMPLEMENTATION IN THE DRC

#	Initiative/Project title	Area	Strategic Objective	Description	Related ASBU element(s)
27.	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	
28.	Upgrading of Kolwezi airport from national to international category	☒ AOP ☒ CNS ☒ ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV	☒ Safety ☒ Capacity & Efficiency ☒ Security & Facilitation ☒ Economic development of air transport	• 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:	

		☐ TRA	☒ Environmental protection	• 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	
29.	Kisangani international airport, terminal construction and pavement rehabilitation	☒ AOP ☐ CNS ☐ ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT	☐ Safety ☒ Capacity & Efficiency ☒ Security & Facilitation ☒ Economic development of air transport	• 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	

		☐ ENV ☐ TRA	☐ Environmental protection	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.	
30.	VSAT network renovation	☐ AOP ☒ CNS ☐ ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☒ Safety ☒ Capacity & Efficiency ☐ Security & Facilitation ☐ Economic development of air transport ☐ Environmental protection	- Date of start: May 2022 - Date of completion: June 2025 - Objective: enhance traffic management - 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.	COM I-B0/2

				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.	
31.	Modernization of NAVAIDs In DRC	☐ AOP ☒ CNS ☐ ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT ☐ ENV ☐ TRA	☐ 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 : • 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.	COM I-B0/2

32.	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.	

				 2023/10/17 07:56 Kinshasa, République démocratique du Congo View of the DVOR, DME, and ILS bays – Training School at Kinshasa/Ndjili Airport.  View of the VHF radio system – Training at Ndjili Airport.	
33.	Improve navigation in terminal airspace of Mbuji-Mayi	☐ AOP ☒ CNS ☐ ATM ☐ MET ☐ SAR ☐ AIM ☐ ACFT	☒ Safety ☒ Capacity & Efficiency ☐ Security & Facilitation	• 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	☐ Economic development of air transport ☐ 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.	
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