INTERNATIONAL CIVIL AVIATION ORGANIZATION

Third Meeting of APIRG Infrastructure and Information Management Sub Group (IIM/SG/3)

(Virtual Meeting, 12-14 October 2020)

Agenda Item 4: Status of implementation of the regional projects adopted by APIRG

IMPLEMENTATION STATUS OF THE AVIATION SYSTEM BLOCKS UPGRADES (ASBU) BLOC 0 MODULES IN THE AIRSPACE MANAGED BY ASECNA

[Presented by ASECNA]

SUMMARY

This note describes, in a qualitative and quantitative way, the implementation status of Block 0 modules of the ASBU framework in the 17 African Member States of ASECNA as an Air Navigation Service Provider.

It presents the various Bloc 0 modules that the implementation is deemed necessary following the analysis of operational needs, in line with the Agency's strategy and its investment plan.

Strategic Objectives	This Working Paper is related to ICAO Strategic Objectives: **A - Safety:** Enhance global civil aviation safety. **B - Air Navigation Capacity and Efficiency**: Increase the capacity and improve the efficiency of the global civil aviation system. **C - Security & Facilitation**: Enhance global civil aviation security and facilitation. **E - Environmental Protection**: Minimize the adverse environmental effects of civil aviation activities.
References	- DOC 9750: Global Air Navigation Plan; - ASECNA' Investment Plan (PSE); - ASECNA Strategic Orientation Plan (POS); - APIRG 19, 20 et 21

1. INTRODUCTION

1.1 The Global Air Navigation Plan (GANP) and the Aviation System Blocks Upgrades (ASBU) concept, integrated into the GANP, provide a framework for future improvements in air navigation technologies and procedures, which are structured in a strategic consultative approach that combines specific global performance capabilities and flexibility, with timelines for improvements associated with each component.

1.2 The ASBU modules are structured in blocks and their implementation must be in accordance with the operational requirements of the region. The ASBU framework and the technology roadmap have been set to ensure that all planning conditions at national and regional level are met.

2. DISCUSSION

2.1 The AFI Region has adopted a classification by category (Essential, Desirable, Specific or Optional) and in order of priority (1 or 2) of the eighteen (18) modules of ASBU Block 0.

2.2 These 18 modules of Block 0 were the subject of a relevant analysis according to operational needs in the ASECNA member states.

2.3 Of the 18 modules, 12 modules were selected as required by the Agency's Member States for the provision of air navigation services.

2.4 The table in **Appendix A** presents these 12 modules with their classification by category and by priority according to the criteria used in the AFI Region.

2.5 The table in **Appendix B** presents the planning and details of the implementation status of Block 0 modules at ASECNA Member States level.

2.6 The ASBU Tracker realized on the level of implementation of ASBU in ASECNA zone gives the graph below (This graphic is presented for information only).
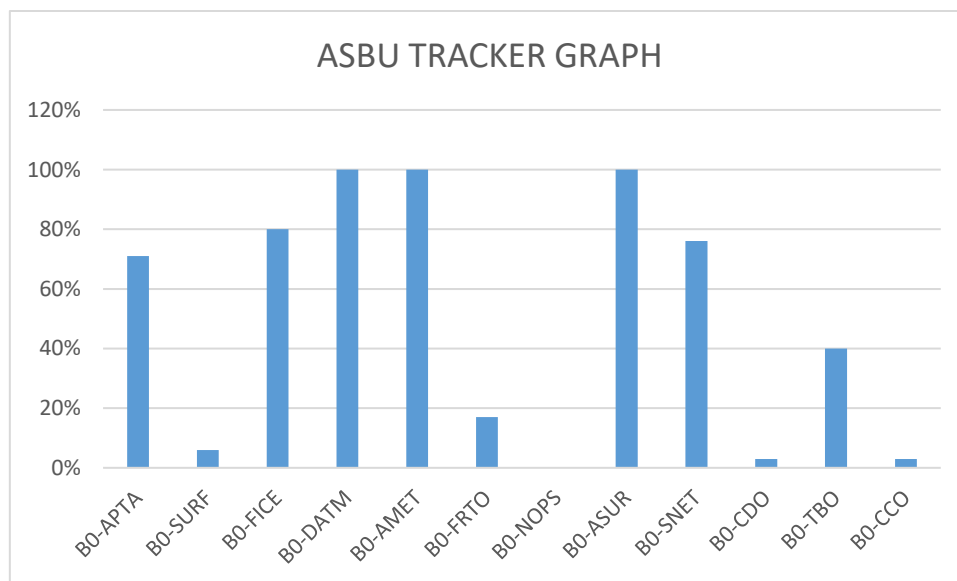
2.7 The implementation of some of the modules is very advanced in the ASECNA zone. These include B0-FRTO, B0-AMET, B0-DATM and B0-SNET. However, their completion cannot be done without coordination with adjacent centers in some cases. This is why ASECNA wants to know the level of implementation in these areas of its neighbors in order to carry out local work prior to the full implementation of certain modules.

3. **ACTION BY THE MEETING**

3.1 The meeting is invited to:

a) Take note of the implementation status of ASBU Block 0 modules in ASECNA Member States for the provision of air navigation services;

b) Call on States to strengthen the bilateral and multilateral cooperation necessary for the effective and coordinated implementation of the modules with a view to ensuring interoperability between systems and services.

Appendix A: INDICATORS FOR THE IMPLEMENTATION OF ASBU BLOCK 0 MODULES

Block O Module	Title	Category	Priority	High level implementation indicator	
				Wording	**Value** (for information)
PERFORMANCE IMPROVEMENT FIELD N°1: AIRCRAFT OPERATIONS					
APTA	Optimization of approach procedures, including vertical guidance	Essential	1	% of international aerodromes having a PBN procedure (APV Baro-VNAV or LPV) for at least one end of the track	**71%**
SURF	Safety and efficiency of surface operations (ASMGCS Levels 1-2)	Optional	2	% of international aerodromes having implemented the A-SMGCS Level 2	**6%**
PERFORMANCE IMPROVEMENT FIELD N°2 : GLOBAL INTEROPERABLE SYSTEMS AND DATA					
FICE	Enhancing interoperability, efficiency and capacity through ground-to-ground integration	Essential	1	% of FIR whose RCCs implemented at least one AIDC/OLDI interface with neighboring RCCs	**80%**
DATM	Improving services by managing digital aeronautical information	Essential	1	% of States that have implemented an AIS database based on AIXM	**100%**
				% of states that have implemented QMS	**100%**
AMET	Meteorological information supporting increased operational efficiency and safety	Essential	1	% of states that have implemented SADIS	**100%**
				% of states that have implemented QMS	**100%**
PERFORMANCE IMPROVEMENT FIELD N°3 : OPTIMUM CAPACITY AND FLEXIBLE FLIGHTS					
FRTO	Improved operations with better road trajectories	Essential	1	% of FIRs with flexible use of space (FUA)	**17%**
NOPS	Performance improvement by planning based on a network-wide vision	Desirable	2	% of FIRs with all RCCs using air traffic flow management systems (ATFM)	**0%**
ASUR	Initial capacity for ground surveillance	Desirable	2	% of FIR where ADS-B OUT and / or MLAT are implemented for the provision of surveillance services in identified areas	**100%**
SNET	Increased efficiency of ground-based safety nets	Desirable	2	% of states that have implemented ground-based safety nets (STCA, APW, MSAW, etc.)	**76%**
PERFORMANCE IMPROVEMENT FIELD N°4 : EFFECTIVE FLIGHT TRAJECTORIES					

Block O Module	Title	Category	Priority	High level implementation indicator	
				Wording	**Value** (for information)
CDO	Improved flexibility and efficiency of descent profiles using Continuous Descent Operations (CDO)	Essential	1	% of international aerodromes / TMA with STAR PBN	**56%**
				% of international aerodromes / TMA with CDO	**3%**
TBO	Improved security and efficiency through the initial application of en-route data links	Desirable	2	% of FIR using data links en-route in the spaces where it is applicable	**40%**
CCO	Improved Flexibility and Effectiveness of Start Profiles - Continuous Climb Operations (CCO)	Essential	1	% of international aerodromes / TMA with SID PBN	**56%**
				% of international aerodromes / TMA with CCO	**3%**

Appendix B: PLANNING AND IMPLEMENTATION STATUS OF ASBU BLOCK 0 AT ASECNA LEVEL

Performance improvement Areas (PIA)	Block 0 modules	Module entitled	Module description	Implementation status	ASECNA Dates
PIA 1: **AERODROME OPERATIONS**	B0-APTA	Optimization of approach procedures, including vertical guidance	The use of performance-based navigation (PBN) to improve the reliability and predictability of approaches for runways, thereby increasing safety, accessibility, efficiency and capacity. This is possible through the application of Global Navigation Satellite System (GNSS), Baro-Vertical Navigation (VNAV), Satellite Augmentation System (SBAS) and GBAS GLS.	Main airports: - SID/STAR PBN RNP1: 82% - LNAV/VNAV: 71% - LNAV only: 100% All major airports in ASECNA Member States have Baro VNAV procedures except Bangui (Central African Republic), Bamako (Mali), Cotonou (Benin), Lomé (Togo) and Nouakchott (Mauritania) International airports: - SID/STAR PBN RNP1: 56% - LNAV/VNAV: 71% - LNAV only: 86% An SBAS implementation program is underway	2018-2022
	B0-SURF	Safety and efficiency of surface operations (A-SMGCS levels 1-2)	Advanced Surface Movement Control and Guidance System (A-SMGCS) provides surveillance and alerting of aircraft and vehicle movements on the aerodrome surface, improving runway / airfield safety.	**A-SMGCS** systems already installed at Dakar-Diass and Nouakchott Oumtounsy airports.	2018-2022
PIA 2: **INTEROPERABLE SYSTEMS AND DATA IN THE WORLD**	B0-FICE	Increased interoperability, efficiency and capacity through ground-to-ground integration	Coordination of ground-to-ground data communications between air traffic management units through communications between ATS facilities (AIDC) defined in ICAO Doc 9694. The transfer of communication in a data link environment improves the efficiency	**AIDC:** Implementation includes activation of AIDC functionality on ATM systems for 100% traffic coordination between CCR.	2018-2022

Performance improvement Areas (PIA)	Block 0 modules	Module entitled	Module description	Implementation status	ASECNA Dates
			of this process, especially for Units that manage oceanic airspace.	ATM systems at ASECNA Member States' main airports have AIDC capability excepted Bangui center, which will be implemented as soon as possible In summary the point of implementation status of the AIDC is: - Implementation of links: Antananarivo/Plaisance (Mauritius), Brazzaville/Khartoum (Sudan), Dakar/Abidjan, Niamey/N'Djamena, N'Djamena/Brazzaville, N'Djamena/Khartoum (Sudan), Ouagadougou/Niamey, Ouagadougou/Bamako, Ouagadougou/Abidjan, Niamey/Bamako, Niamey/Lomé and Niamey/Cotonou, Douala/Ndjamena, Lomé/Cotonou, Accra/Abidjan, Accra/Lome, Accra/Cotonou, Accra/Niamey, Accra/Ouagadougou - Ongoing trials Dakar/Nouakchott, Dakar/Bamako. - Regional AIDC Implementation Project between ASECNA and NAMA Centers (Nigeria), FIR Roberts and ATNS (SADC, NAFISAT), SAM, MID is underway. **AMHS:** - Operational implementation of the AMHS in ten (10) Centers (Lomé, Cotonou, Nouakchott, Niamey, Antananarivo, Brazzaville, Bamako, N'Djamena, Ouagadougou and Dakar) including full AMHS operation. - AMHS project on going for the remaining centers (installation planned for December 2020) - Implementation of the first interregional AMHS link between AFI (Dakar) and SAM (Brasilia) on 25th June 2020	

Performance improvement Areas (PIA)	Block 0 modules	Module entitled	Module description	Implementation status	ASECNA Dates
				- Regional project to implement AMHS circuits between ASECNA, NAMA (Nigeria), GCAA (GHANA), FIR Roberts, Algiers FIRand ATNS (SADC, NAFISAT), SAM, MID, EUR is planned for 2021	

	B0-DATM	Improved service with digital aeronautical information management	Introduction of the digital processing and management of aeronautical information through the implementation of AIS / AIM using AIXM, transition to electronic AIP and improvement of data quality and availability.	**AIS/AIM**
				
				Implementation elements include:
				
				- AFTN / AMHS,
				
				- IP network in preparation for SWIM
				
				- Migration from AIS to AIM:
				
				   o Operational exploitation of the AIXM 4.5 database and production of the eAIP since 2018.
				
				   o eAIP full operational since 05 december 2019
				
				   o Migration to the AIXM 5.1 version and evolution of the GED-AIP in 2019-2022
				
				- QMS for AIM implemented. ISO 9001 V2015 certified in all Member States of ASECNA.
				
				- WGS-84 campaign planned for 2020, may be postponed to 2021 due to COVID-19
				
				- e-TOD and AMDB, projects planned for 2019-2022.
					2019-2022

	B0-AMET	Meteorological Information for Enhancing Operational Effectiveness and Security	Global, regional and local meteorological information provided by World Area Forecast Centers, Volcanic Ash Advisory Centers, Tropical Cyclone Advisory Centers and Aerodrome Meteorological Centers, supporting flexible space management aerial, improved situational awareness and collaborative decision-making, and dynamic optimization of	Implementation elements include: - QMS for MET implemented, ISO 9001 V 2015 certified in all Member States of ASECNA. - Reception of WAFCS products in all formats. - Cooperation agreement with the St Denis TCCA for better coordination in the monitoring of tropical cyclones.	2021

Performance improvement Areas (PIA)	Block 0 modules	Module entitled	Module description	Implementation status	ASECNA Dates
			flight path planning. This module includes elements that should be considered as a subset of all available meteorological information that can be used to support and improve operational efficiency and safety	- Improvement of the en route watch through the reinforcement of the capacities of the CVM for the detection and the emission of SIGMET envisaged of all the dangerous phenomena not taken into account by the regional centers (VAAC and TCCA). - Wind shear detection systems being installed or acquired at ten aerodromes. - Thunderstorm warning and warning systems in all FIRs managed by the agency	
PIA 3: **OPTIMUM CAPACITY AND FLEXIBLE FLIGHTS**	B0-FRTO	Improved operations with better en-route trajectories	Allows the use of airspace that would otherwise be excluded (military airspace) and flexible routes adapted to given traffic patterns. As a result, the number of possible routes will be increased, which will reduce congestion on main roads and high-traffic intersections, and hence the duration of flights and fuel consumption.	Implementation elements include: - SSR and ADS -B (Space-based and Ground-based) - Indian Ocean Strategic Partnership to Reduce Emissions (INSPIRE) implemented in Antananarivo FIR by ASIO ACG. - Preferred trajectories in the Dakar Oceanic FIR through the implementation of AORRA. - Implementation of flexible routes in the mainland Dakar FIR, Niamey FIR, FIR Brazzaville, Ndjamena FIR which include airspace for all Member States. - PBN Strategic Implementation Plan in coordination with national PBN plans of Member States - Implementation of CCO / CDO trajectories for accessibility of Libreville airport (operational since 10 September 2020), Ouagadougou airport (validation in progress), two airports are scheduled for 2021.	2021
	B0-NOPS	Improved traffic flow through planning	Collaborative ATFM measures to regulate peak currents, relating to departure slots, admission flow management in a given portion of	Implementation elements include: - The reorganization of the provision of navigation services.	2019-2022

Performance improvement Areas (PIA)	Block 0 modules	Module entitled	Module description	Implementation status	ASECNA Dates
		based on an overview of the network	airspace for traffic along a certain axis, the requested time of arrival at a waypoint or at the boundary of an FIR/sector, the spacing in miles in the wake to regulate the flow along certain axes, and the change of course to avoid saturated areas.	- Determination of ATC capacity of ATS units, in progress, expected end 2021 - Study on ATFM implementation in progress	
	B0-ASUR	Initial Ground Monitoring Functionality	Ground-based surveillance supported by ADS-B OUT and/or Extended Coverage Multilateration will improve safety, search and rescue and capacity through separation reductions. This feature will be integrated into various ATM services (traffic information, search and rescue, separation, etc.)	Implementation elements include: - SSR densification and ATM systems expected end 2021 due to covid-19. - Implementation of terrestrial ADS-B to supplement current radar coverage, achieved in 2017 - 100% Airspace coverage with Space Based ADS B from 2020 with pre-operational implementation. However, ADS-B surveillance will be operational in Libreville and Bissau ATC centers by end 2021, and in Malabo, Bangui and Moroni Centers by 2022 with the recovering/implementation of ATM systems.	2017-2022
	B0-SNET	Increased efficiency of ground safety nets	This module provides efficiency improvements to ground-based safety nets that help the air traffic controller and provide timely increased risk alerts for flight safety (short-term conflict alerts, proximity warnings, warnings). minimum safe altitude, etc.).	Implementation elements include: - backup nets of automated ground based ATM systems based on short-term conflict alerts and minimum safe altitude proximity warning alarms already implemented - all ATC centers are equipped with automated TOPSKY ATM system with ADS-C / CPDLC, FDPS, FPASD, RDP, SDP functions, excepted Bangui, Malabo, Moroni and Bissau.	2022

Performance improvement Areas (PIA)	Block 0 modules	Module entitled	Module description	Implementation status	ASECNA Dates
PIA 4: **EFFECTIVE FLIGHT TRAJECTORIES**	B0-CDO	Improved flexibility and efficiency in descent profiles (CDOs)	Application of performance-based airspace and arrival procedures that allow aircraft to follow their optimal profile given the complexity of airspace and traffic through Continuous Descent Operations (CDO).	As part of ICAO/ASECNA cooperation, CDO procedures studies have been undertaken for Libreville and Ouagadougou airports: - CDO/CCO procedure is operational for Libreville airport since 10 September 2020. - CDO/CCO procedure is designed for Ouagadougou airport and is under validation process. The implementation of CCO/CDO procedure is scheduled for two other airports by 2021.	2022
	B0-TBO	Improved security and efficiency with the initial application of en-route data links	Implementation of a first set of data link applications for surveillance and communications in air traffic control (ATC).	SSR Mode S systems, ADS-C / CPDLC implemented. Preferred trajectories implemented in both continental airspace and oceanic airspace. HF/DL and VDL provided for in the 2018-2022 investment plan. Installation of D-VOLMET planned in the 2018-2022 investment plan.	2018-2022
	B0-CCO	Improved Flexibility and Efficiency in Starting Profiles - Continuous Climbs (CCO)	Application of departure procedures to allow aircraft to follow an optimized profile given the complexity of airspace and traffic through Continuous Climb Operations (CCO).	As part of ICAO/ASECNA cooperation, CDO procedures studies have been undertaken for Libreville and Ouagadougou airports: - CDO/CCO procedure is operational for Libreville airport since 10 September 2020. - CDO/CCO procedure is designed for Ouagadougou airport and is under validation process. The implementation of CCO/CDO procedure is scheduled for two other airports by 2021.	2022

END.