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Building a Seamless Sky in Africa

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Agenda Item 3: Air Navigation Capacity and Efficiency

Building a Seamless Sky in Africa

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SUMMARY

This working paper emphases the need for the AFI region to build a seamless sky to make air navigation in Africa more efficient and safer, and thus contribute sustainably to the operationalization of the Single African Air Transport Market (SAATAM) and stimulate the economic and social development of the African continent.

The initiative taken by ASECNA so-called CUPA (Ciel Unique Pour l'Afrique - Single Sky for Africa) is a global, collaborative, and inclusive approach of the entire AFI region considering the contributions of all States, air navigation service providers and other interested stakeholders to achieve and guarantee a high level of civil aviation performance on the African continent.

The concept aims to harmonize Air Traffic Management procedures in the region in line with what ASECNA has developed for more than 60 years and which EUROCONTROL is experimenting across the European continent.

This harmonization will enhance the safety and efficiency of operations and reduce their environmental impact and will offer to the populations and economic operators of the continent more connectivity at more affordable rates for the recovery of our States economies.

For this purpose, it will be set up, under the leadership of the African Union, an organization, called AFI CONTROL, based on the ASECNA model, responsible for the monitoring, and proactive and predictive management of data and exchanges, and of air traffic management.

Way forward :

- Consolidate initiatives at the level of Regional Economic Communities to pursue a global implementation from 2032 of the CUPA, through champion ANSP, and create under the aegis of the AU the body called AFI CONTROL.

1 INTRODUCTION

1.1 Africa contributes today for less than **3% of world air transport while it houses**

17% of the world's population. In 2050, Africa alone will account for **50% of the world's population.** These statistical data sufficiently show the efforts that our continent must make in the next 30 years, at the level of African air transport and starting from civil aviation, to offer more services, connectivity to our States (economic operators and populations), to streamline travel and trade, to boost the air transport offer and sustainably support the socio-economic development of our States.

1.2 The African Union in its Agenda 2063 is working on the liberalization of air transport on the continent, and on the completion of the Single African Air Transport Market (SAATAM) following the Yamoussoukro (YD) Decision. The implementation of a such programme therefore calls for the development of a seamless airspace architecture for Air Traffic Management, hence pillars 4 and 5 of the priority action plan for the operationalization of the SATAM.

1.3 Offering more services to the continent, at affordable costs, means for Air Navigation Service Providers to carry out the following actions:

- Increase security in the African skies
- Increase airspace capacity
- Increase the most efficient trajectories (punctuality and competitiveness)
- Control the costs of user charges.
- Respect the sovereignty of the States over their airspace.
- Participate sustainably in the protection of our ecosystem through "green" projects.

2. DISCUSSION

2.1. These challenges for air navigation service providers, that can be summed up to issues of safety, efficiency, punctuality, and competitiveness for the future of African civil aviation, require a pooling of air traffic management procedures, which includes the Seamless Sky approach for Africa, which I have presented to our Member States, and which earned my appointment as Director General of ASECNA for its conduct and implementation.

2.2. The Single Sky for Africa initiative is an ambitious programme that aims to minimize the current fragmentation of airspace and harmonies the provision of air navigation services with the same level of performance through measures based on innovative technical means in line with ASBU, and similar procedures between ANSPs, allowing to establish continuous operational services, interoperable in a secure environment. Backed by the operational structures of Air Traffic Management, an organization called "AFI CONTROL" will be set up. This agency will be responsible for monitoring and making available to the States, ANSPs, all the data and information required for optimal flight management called AFI

Control.

2.3. The CUPA concept includes:

2.3.1 Dedicated airspace
2.3.2 Working procedures based on innovative technologies themselves derived from ICAO ASBUs
2.3.3 Young, competent, and well-trained human resources
2.3.4 Autonomous financial resources in line with ICAO standard provisions and oriented towards the sustainable development of air transport
2.3.5 A body under the leadership of the AU responsible for the provision of this service called **AFI Control.**

2.3.1. The CUPA airspace concept, in its first phase, proposes to delimit the concerned airspace to the upper airspace; from flight level FL245 to FL600. It will concern en-route traffic or traffic in transit, usually managed by the ACCs (Area Control Centers). This first stage of the airspace structuring in the implementation of the CUPA aims to minimize the susceptibilities of States with respect to sovereignty issues over their airspace. In this CUPA concept, it is important to note that there will be no change in the current outlines of FIRs, UTA, TMA or CTR as contained in the relevant ICAO documents. The current boundaries of these airspaces will be maintained but they will be transparent from the point of view of use in Air Traffic Management through the procedures that will be established.

2.3.2. Concerning the working procedures to be put in place, they will in fact be the real drivers of this uniform sky. They shall allow the transit of an aircraft from the airspace of one State to the airspace of another State, **without substantial modification of the initial flight profile of the aircraft** (unless safety requires it) so as not to affect its performance in the conduct of the flight. These procedures will therefore consist in avoiding any modification of the flight parameters (flight level, aircraft speed, attitude, flight configuration etc.) which are likely to impact the efficiency of the flight unless safety requires it or the crew expresses the need for change. This presupposes perfect coordination between the ground agencies responsible for Air Traffic Management in these areas; hence, the issues of harmonization and interoperability in the technologies to be adopted between the States and ANSPs for the cooperative management of airspace.

It's in this regard, at the beginning of my mandate, I proposed and obtained from our Member States that henceforth, at the level of ASECNA, no structuring project be retained and planned in the plan of services and equipment only if it meets the following five requirements:

a. Serve a regional or even continental interest,

b. Be part of the needs requested by airspace users (States, Airlines, Military etc.)
c. Have been selected as an enabling technology approved in the Global Air Navigation Plan and as part of the modules selected in the various ICAO ASBU block Modules.
d. Demonstrate the profitability of the project through a positive cost-benefit analysis
e. Demonstrate the effectiveness of the project in preserving our environment through a favorable carbon footprint.

Based on this approach that at the ASECNA level, the following enabling technologies are proposed to support the three essential pillars of Air Traffic Management (Communication, Navigation Surveillance), with openings to other technologies if they are interoperable with each other.

2.3.2.1 Thus, with respect to communications, the direction taken is the use of data links (CPDLC), VHF and SATVOICE. For the latest SATVOICE option, ASECNA has already initiated experimentations with partner ANSPs such as ENAIRE in the EUR SAM corridor, to test the technology.

2.3.2.2 With respect to navigation, ASECNA proposes the use of SBAS complemented by a minimum operational conventional infrastructure. Indeed, the SBAS is the primary means of navigation of tomorrow, and support operations for all phases of flight, from en-route down to landings, throughout the continent, and without the need for local infrastructure at airports. The use of SBAS will improve flight safety through the reduction of accidents, and improve their efficiency while reducing their environmental impact, thanks to optimized trajectories and a reduction of delays, cancellations, and diversions. SBAS will also improve the accessibility of airports, including secondary airports.

SBAS history at ASECNA goes back to 2005 when the Member States decided on the use of this technology like WAAS in the USA and EGNOS in Europe. A cooperation agreement has been signed between ASECNA and the European Union to take advantage of the cooperation between Africa and the European Union and support the development of satellite navigation in Africa.

In this perspective, young engineers have been trained and have conducted the necessary studies to ensure the feasibility of this technology on the African continent.

This is the place for me to highlight to the whole continent, the prowess that our young engineers have achieved with the support of European

institutional and industrial partners by completing a great world first; that of:

- Have a SBAS correction algorithm adapted to the ionospheric conditions of Africa that has demonstrated the feasibility of making an SBAS service compliant with ICAO Standards and Recommended Practices.
- Since September 2020, have been providing an SBAS demo service in this region of the world, thanks to a test-bed infrastructure.

In addition, the particularity of the SBAS developed by ASECNA is original. It's based on an indigenous infrastructure allowing autonomous provision of services. The ground installations are indeed located in the states of the continent and the space segment comes from a payload positioned on an African satellite, in this case the NIGCOMSAT 1-R from Nigeria.

On this basis, ASECNA's SBAS has been recognized by ICAO and is now listed in the Annex 10 to the Chicago Convention. It is also recognized by the American authorities, owner of the GPS, who have assigned to the Agency the PRN codes necessary for the broadcasting of the signal in space. The demonstration service has enabled the conduct of field tests for aircraft, helicopters, and other sectors such as agriculture, land, river transport etc., which have demonstrated the significant potential of this technology to contribute to the socio-economic development of Africa.
With its desire to build together for the continent a common tool, this SBAS technology was proposed by ASECNA to the African Union so that it can be used by the entire Region with a view of building African unity through aviation.

2.3.2.3 Finally, with respect to surveillance, ASECNA proposes the use of ADS-B. To date, several States on the continent (more than 70%) already use this ADS-B technology, whether by satellite or terrestrial. The aircraft are more than 80% equipped for those flying in ASECNA airspace where surveys have been conducted. A mandate to carry ADS-B compatible transponder has been approved by APIRG for June 2023. The end systems for displaying the plots from various surveillance sensors (ADS-B, Radar, MLAT, ...) integrate them without difficulty. The regulation foresees for the use of ADS-B for separations identical to those applicable to radar. Finally, surveillance data via the Space Based ADS-B of a State or ANSP, can be made easily available in this State or ANSP from the means already put in place by ASECNA without for this State or ANSP to set up new additional equipment that can be very expensive. Finally, it is not excluded

today with the development of nano satellites that Africa through its Air Navigation Service Providers, is itself able to replace current providers to offer the surveillance service.

2.3.3. Human resources are the key to success. Investing in human capital must be our priority at the moment. Well-trained girls and boys are needed to operate these new technologies that we plan to implement. The notion of gender must be at the centre of this approach. Our proposal is 60% women against 40% for men with ages ranging from 20 to 28 years. The example of SBAS and ADS-B in progress at ASECNA is evocative. The system built today was built with young people who were trained for this purpose. A new generation of professionals must be built by the elders that we are in the perspective of building a united Africa.

2.3.4. In terms of financial resources, it is more than urgent that the collection of charges for the use of air navigation services should comply with the regulatory framework recommended by ICAO**.**

These royalties, which are public funds, must refinance the aviation sector, but they must also be managed according to virtuous governance. The proliferation of taxes that negatively impact the price of tickets must be the subject of good regulation at the level of the AFCAC.

2.3.5 The implementation of AFI CONTROL is in line with the desire of providing the African continent with a single body responsible for the safety of air navigation services in Africa. This, would involve extending the ASECNA model to the continent based on the following considerations:

a) Civil aviation is a factor of economic and social development that must dock with the principles of equity, solidarity and sharing
b) Air transport contributes profoundly to the strengthening of relations between peoples and is a vector by excellence for the construction of a united Africa
c) The development of civil aviation must be carried out in a safe, orderly, and coordinated manner on a continental scale to ensure its constant adaptation to internal and external challenges and contexts
d) The training of personnel must obey well-developed ethical rules to allow Africa in 50 years to manufacture itself what it needs for its consumption whether it is aircraft or satellites etc.

AFI CONTROL will therefore be in charge of:

- The provision of en-route air navigation services in the airspace of the Region.
- The organization of airspace and airways in accordance with the needs of end users and the relevant provisions of ICAO
- Aeronautical information management
- Forecasting, Flight Protection, and transmission of information in the area of aeronautical meteorology.
- Provision of rescue and firefighting services at airports
- Definition of specifications for functions, systems and means, as well as procedures and working methods to be implemented.
- Studies, definition of specifications, purchase, acceptance, installation, technical verification, maintenance in operational condition, operation of equipment and facilities related to communication, navigation, surveillance and air traffic management systems as well as aeronautical meteorology systems.
- The establishment of a safety and quality management system in accordance with ICAO standards and recommended practices.

3 CONCLUSION AND FOLLOW-UP

The implementation of a seamless sky for Africa may seem like a complex activity, but in reality, it is already underway with the initiatives that exist here and there such as in Roberts FIR, ASECNA etc.

Today's innovative and enabling technologies facilitate the pooling and interoperability of means, resources, and process harmonization.

It’s all about will and the key success factor lies in the desire for integration of the African continent. Whatever time it takes, Africa's salvation goes through this stage. It’s up to us to do everything possible to shorten the implementation deadlines.

3.1 The meeting is invited to.

1. Take note of this working paper
2. Make such adjustments as it deems necessary for the implementation of this program
3. Request the AU to set up a Task Force to propose the founding texts of the PAN-African body AFI CONTROL
4. Provide the Task Force with a clear roadmap with a binding agenda and deadline