INTERNATIONAL CIVIL AVIATION ORGANIZATION

First Meeting of the Africa - Indian Ocean Aviation System Planning and Implementation Group (AASPG/1)

Libreville, Gabon, 3 - 7 November 2025

Agenda Item 4: Implementation of air navigation goals, targets and indicators, including the priorities set in the regional air navigation plan

Evolution towards a global network of interoperable and seamless telecommunications in the AFI region

(Presented by ASECNA)

SUMMARY
This working paper aims to draw the attention of the AFI region on the need to upgrade all aeronautical telecommunications networks in the AFI region towards an ATN based on the TCP/IP protocol suite, to support current and future developments of ANS in our region. Furthermore, it aims to obtain the support of States so that the ANSPs providing telecommunication services can work together for a technological convergence of the existing VSAT networks (AFISNET, SADC, and NAFISAT) and related infrastructures, leading to the implementation of a truly regional, interoperable, and seamless ATN/IPS network, that efficiently meets the service requirements in the short, medium, and long term in the AFI region. Follow-up is provided for paragraph 3.

REFERENCE(S)	Annex 10, DOC 9750, GANP, Doc 8969, ("Manual for the ATN using IPS Standards and Protocols") AFI ATM Master Plan

1. INTRODUCTION

1.1. The global Air Traffic Management (ATM) system is evolving into an ecosystem in which aircraft are connected to the CNS/ATM system, which includes some of the most complex and integrated information and communication technology (ICT) systems in the world and is undergoing a rapid and irreversible digital transformation characterized by the emergence of Internet Protocol (IP) and the increasing exchange of digital data. Digitization and virtualization are at the core of operational activities, and mastering aeronautical data and metadata has become one of the most crucial challenges to be addressed in order to ensure the interoperability of the global ATM system.

1.2. In response to continued growth of air traffic and safety requirements, Africa must strengthen the efficiency, resilience and interoperability of its aeronautical telecommunications systems, primarily based on VSAT technologies, to meet this new challenge, in a context marked by the reallocation of one-third of the C-band spectrum allocated to States for the benefits of IMT (International Mobile Telecommunications) operators for 5G. To address these operational needs, the AFI region must therefore establish new network environments based on appropriate technologies. These environments must be built around the consolidation and optimization of existing VSAT networks, reinforced by resilient supporting infrastructure that can integrate, aggregate and synchronize operational data and metadata from various systems that contribute to the provision of air navigation services.

2. DISCUSSIONS

2.1. The ongoing implementation of the ground-to-ground modules of ASBU Block 1, which are applicable to the AFI region, requires an interoperable and seamless infrastructure for transporting data at an acceptable level of compliance, to ensure the integrity of the entire ATM system.

2.2. These services are currently provided by the AFISNET (ASECNA, NAMA, GCAA and Roberts FIR), SADC and NAFISAT (ATNS) networks. However, as these networks are built on different technologies, it is difficult and restrictive to implement the numerous links between states that do not belong to the same networks.

2.3. Indeed, the current AFISNET network establishes links using low-speed, point-to-point FDMA/SCPC satellite access via the Frame Relay protocol, prioritizing voice over data.

2.4. In contrast, the SADC/NAFISAT network uses TDMA satellite access technology and is evolving towards a digital network compatible with ATN/IPS.

2.5. Consequently, interoperability between centers belonging to different networks is ensured at Level 3 using FDMA/MCPC FRAD links. However, these are particularly challenging and time-consuming to implement due to the requirement for similar equipment and the inertia of bilateral technical coordination.

2.6. Against this worrying backdrop, marked by proven difficulties in the regular transmission of data necessary for the proper functioning of air navigation services in the AFI region, the APIRG/26 meeting adopted Conclusion 26/18, paragraph a), which states that ”to ensure the effective implementation of the ground-to-ground components of ATN (AMHS, AIDC, etc.) in the AFI region, States and industry stakeholders should accelerate the upgrade of obsolete aeronautical satellite telecommunications networks in a coordinated and harmonized manner”.

2.7. The specific challenges facing the AFI region in this regard are as follows:

- Fragmentation of infrastructure, with disparate VSAT technologies between states and ANSPs.
- Need for resilience in the face of outages, cybersecurity threats and political instability.
- Regional cooperation: alignment with effective coordination and technical cooperation frameworks between stakeholders.

- Budget optimization in terms of costs related to excessive frequency spectrum consumption, acquisition, maintenance and training, using innovative and non-proprietary standard technologies.

2.8. The mandate and terms of reference of the new AASPG IIM sub-group project in the field of communications, focusing on telecommunications infrastructures, should enable the States and organizations involved in managing the two main networks, AFISNET and SADC/NAFISAT, to define a hybrid and convergent target architecture applicable to the entire AFI region.

2.9. The new regional infrastructure targeted should ensure the interoperability of VSAT networks at level 1 in terms of satellite access protocol, gradually, through high-speed ground connectivity solutions based on the Internet protocol using appropriate and proven technologies such as:

- MPLS (Multiprotocol Label Switching) is ideal for critical infrastructures and for ensuring end -to- end quality of service for critical services.
- IPSEC VPN is ideal for flexible and distributed environments because it is cost-effective.

2.10. This new hybrid infrastructure (VSAT, IP MPLS and IPSEC VPN) will form the backbone of the region's ATN IPS network, built around standardized intermediate or terminal ATN routers, it will interface easily with adjacent non-AFI networks and effectively prepare the transition to implementing a SWIM infrastructure. This will be particularly beneficial for applications in the AIM and MET fields, as well as for the future implementation of FF-ICE.

2.11. This infrastructure will ultimately facilitate the speed, efficiency and cost of implementing bilateral links, thereby eliminating the need to acquire and deploy similar equipment in various states to ensure interconnection between operational centers.

2.12. To this end, regional governance mechanisms will be needed to harmonize procedures and implement mechanisms for exchanging information on operational performance, efficiency, in accordance with PBCS requirements and safety events, to strengthen the cyber resilience of the global ATM network. These mechanisms will be governed by a trust framework, supported by non-disclosure agreements, letters of agreement (LOA), and other mechanisms between the relevant ANSPs, such as peer review mechanisms, etc.

3. ACTION BY THE MEETING

The meeting is invited to:

1. Take note of the contents of this working paper;

2. Provide comments and contributions on the substantive issues raised;

3. Formulate decisions and recommendations for the integration of the AFI region into the master plan and the achievement of technological convergence of the VSAT networks (AFISNET and SADC/NAFISAT) and related ground infrastructure by 2029; and

4. Integrate into the mandate of the IIM sub-group the development of terms of reference for the future regional network based on the existing SADC/NAFISAT and AFISNET networks, with support from industry.

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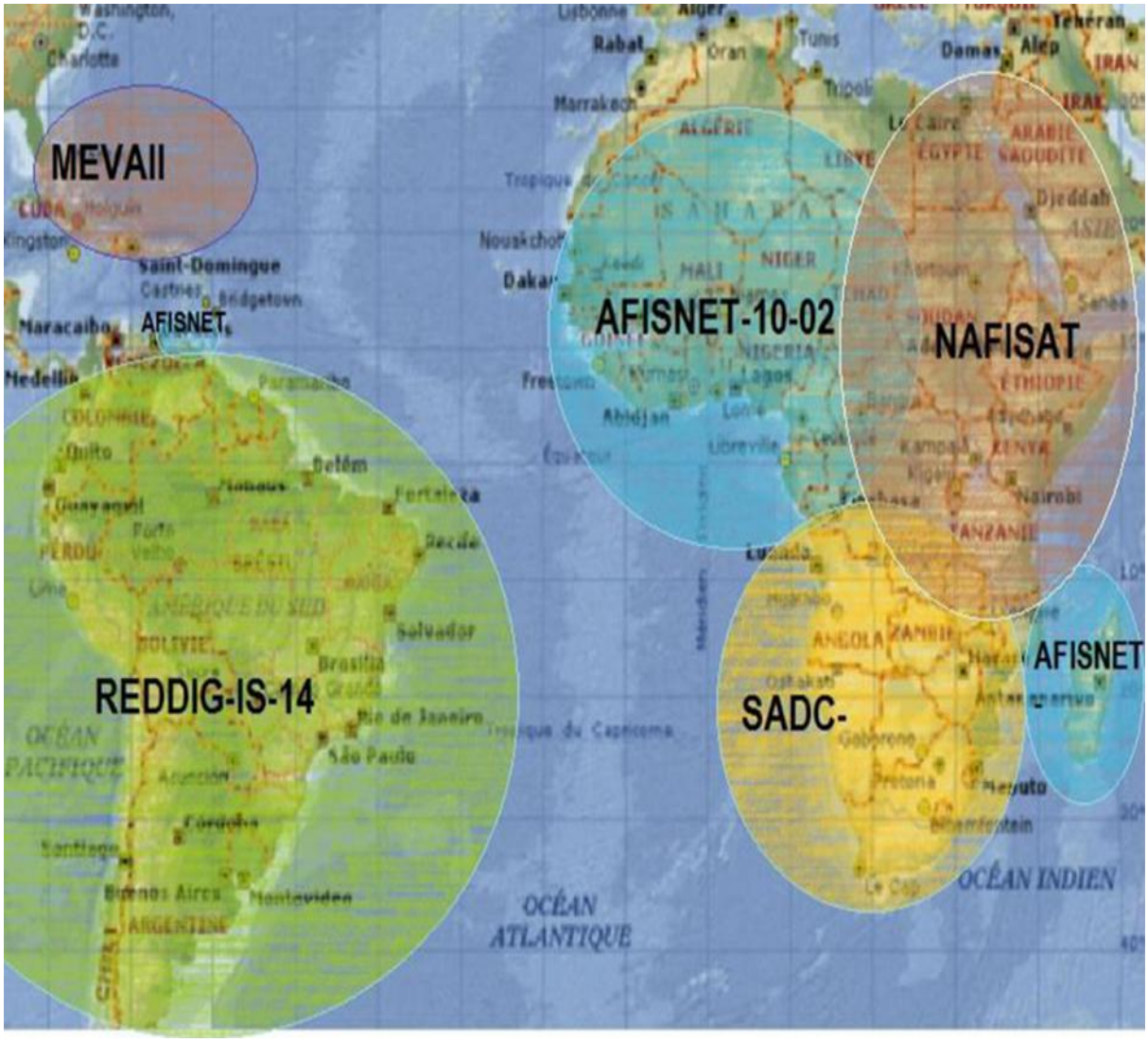

Hybrid network architecture design scheme

- VSAT IP
- IP MPLS / VPN IPSEC via public internet Cloud