



INTERNATIONAL CIVIL AVIATION ORGANIZATION

**Seventh Meeting of the APIRG Infrastructure and Information Management Sub-Group
(IIM/SG7)**

Dakar, Senegal, 5 - 8 August 2024

Agenda Item 3: Achievements in Infrastructure and Information Management

3.4. Reporting on planning and implementation by states and stakeholders

WP3.4A Progress Update on AFI VSAT networks : SADC and NAFISAT

(Presented by South Africa)

SUMMARY

<p>The SADC and NAFISAT VSAT networks are critical communication infrastructures for air traffic services in the AFI region. They are performing above 99% availability and undergoing modernization to meet evolving ATN IPS requirements. The networks are interoperable at the satellite level and with AFISNET through base band equipment. Future development includes exploring new satellite technologies, IP-based infrastructure, and a hybrid approach combining satellite and terrestrial communication. ATNS has successfully implemented VPN solutions in several locations and will continue to focus on satellite communication for its superior coverage and reliability. Collaboration among network operators is encouraged to achieve interoperability the different networks.</p>

<p>Action by Meeting under paragraph 3</p>
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<p>REFERENCE(S):</p>

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| <ul style="list-style-type: none">▪ ICAO Annexes and Doc▪ Manual for the ATN using IPS Standards and Protocols (Doc 9896)▪ Global Air Navigation Plan (GANP) |
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<p>This working document relates to ICAO Strategic Objectives:</p>
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| <ul style="list-style-type: none">• Safety• Air Navigation Capacity and Efficiency |
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1. INTRODUCTION

- 1.1 The SADC and NAFISAT VSAT networks are critical communication infrastructures for Air Traffic Services (ATS) and aeronautical information exchange in the AFI region.
- 1.2 The networks provide various services, including voice, data, and ATN connectivity, ensuring safe and efficient air navigation.

2. DISCUSSIONS

2.1 Current Status

- a) The networks are performing above 99% availability.
- b) Life extension and modernization efforts are underway to sustain the networks until 2029. The implementation of ATN backbone and tributary circuits has enabled service innovations like AMHS, Voice-over-IP, and data distribution for various applications (e.g., CAD, ADS-B, SWIM).
- c) The SADC/2 / NAFISAT networks are ATN IPS compliant with backward compatibility to accommodate legacy systems.

2.2 Interoperability

- a. The SADC and NAFISAT networks are fully interoperable at the satellite level and with AFISNET through baseband equipment.
- b. Operating at the satellite level is recommended to minimize delays for certain services.

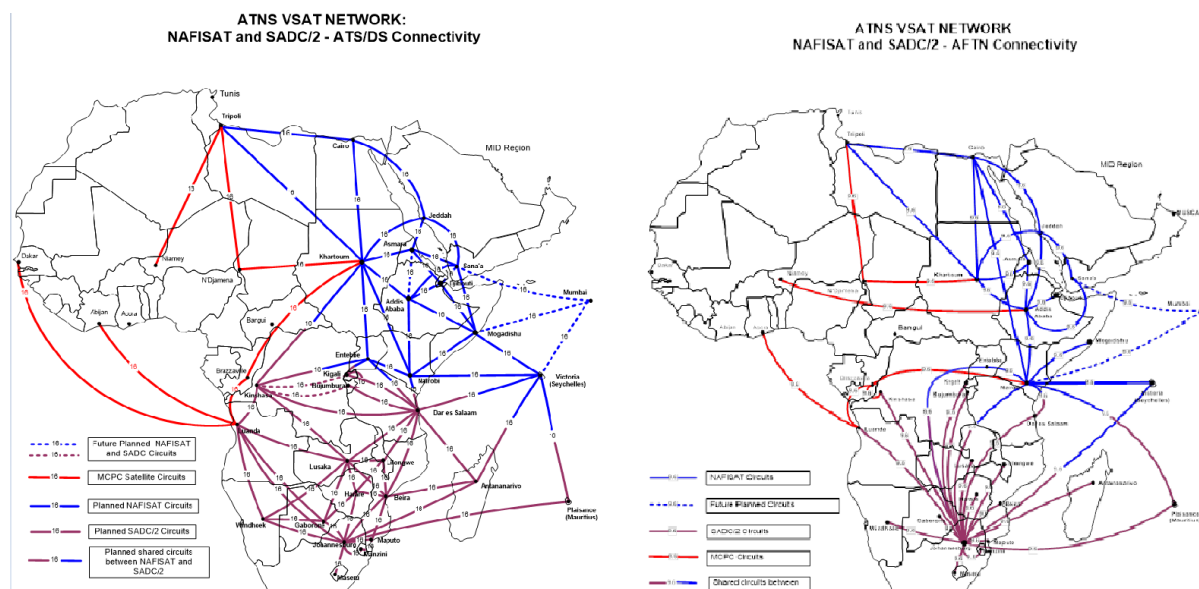


Figure 1: SADC/2 NAFISAT ASECNA NETWORK

2.3 Future Development to Meet ATN IPS Requirements

2.3.1. ATNS is actively investigating and implementing new technologies to enhance the AFI VSAT networks and meet evolving ATN IPS requirements. This includes:

- a) **New Satellite Technologies:** ATNS is exploring Low Earth Orbit (LEO) satellites, High Throughput Satellites (HTS), and advanced modulation techniques like DVB-S2 to improve network efficiency, reliability, and capacity. These technologies offer the potential for faster data rates, lower latency, and better coverage, which are crucial for modern aviation communication systems.

Internet Protocol-Based Infrastructure: ATNS is investigating new network infrastructure based on internet protocol (IP) to leverage commercial off-the-shelf (COTS) products. This approach can simplify deployment, reduce costs, and improve interoperability with other IP-based systems.

Hybrid Technology Mix: Recognizing the advancements in terrestrial telecommunication networks, ATNS has introduced a hybrid approach that combines satellite communication (SATCOM) with terrestrial Virtual Private Networks (VPNs). This allows them to leverage the strengths of both technologies and ensure reliable connectivity even in areas with limited terrestrial infrastructure.

2.4. Terrestrial VPN Implementation (SADC/2 and NAFISAT)

- 2.4.1. ATNS has successfully experimented and implemented virtual private network (VPN) solutions using COTS equipment (Multiplexers, port extenders and firewall routers) in several locations, including Angola, Sanaa, Sudan, and South Sudan.
- 2.4.2. This interim solution has proven effective in providing reliable connectivity and meeting circuit implementation goals.
- 2.4.3. Libya is identified as the next state for VPN implementation.

2.5. Continued Focus on Satellite Communication

- 2.5.1. While terrestrial networks offer advantages in certain areas, ATNS recognizes that satellite communication (SATCOM) remains superior in terms of coverage, reliability, and flexibility.
- 2.5.2. Therefore, SATCOM will continue to play a crucial role in the AFI VSAT networks.

2.6. Interoperability

- 2.6.1. To ensure seamless communication and data exchange between different networks and systems, ATNS emphasizes the importance of semantic interoperability. This involves standardizing the meaning and interpretation of data elements to avoid misunderstandings and errors.
- 2.6.2. ATNS encourages collaboration among network operators in future planning efforts to achieve this goal.

3. ACTIONS BY THE MEETING

- 3.1 The meeting is invited to :
 - a) Note the progress made in the development and maintenance of the AFI VSAT networks and alignment requirements for SADC/2, NAFISAT and ASECNA Networks
 - b) Consider the recommendations for further development, including the exploration of new technologies and infrastructure to meet the ATN IPS requirements with interoperability as key focus area.

- c) Encourage continued collaboration among stakeholders to ensure the seamless interoperability and modernization of the networks.

3.2 Draft IIM/SG7 Conclusion /Decision 7/xx : Title of Conclusion/Decision

That ;

- a) Note the progress made in the development and maintenance of the AFI VSAT networks, as presented in the working paper.
- b) Recognizes the importance of these networks for aviation safety and efficiency in the AFI region.
- c) Encourages SADC/2, NAFISA, ASECNA and other impacted and affected stakeholders to enhance efforts and collaboration in modernizing and enhancing the networks, including the exploration of new technologies and infrastructure to meet the evolving ATN IPS requirements.
- d) Urges continued collaboration among states, service providers, and other stakeholders to ensure the seamless interoperability and ongoing development of the AFI VSAT networks.

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