



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****WP3.4B Implementation of Ground/Ground Communication (AFTN and AMHS) in South Africa***(Presented by South Africa)***SUMMARY**

This working paper presents an update on the implementation of Ground/ground (AFTN and AMHS) communication aimed at ensuring operational traffic data flow and information management in South Africa; challenges encountered and recommendations.

Action by the meeting in paragraph 3

REFERENCE(S):

- ICAO Annexes and Docs
- AMHS EUR Docs
- ATNS Policies and Instructions

This working document relates to **ICAO Strategic Objectives: Safety and Air Navigation Capacity and Efficiency**

1. INTRODUCTION

- 1.1 The Aeronautical Fixed Service provides, among other things, for the exchange of messages about the safety of air navigation and the regular, efficient and economical operation of air traffic services.
- 1.2 The framework of the technologies Roadmap for Communication defined in the Global Air Navigation Plan (GANP) and the Africa-Indian Ocean (AFI) strategy assist States in the implementation of:
 - a) Aeronautical Fixed Telecommunication Network (AFTN); and
 - b) Air Traffic Service Message Handling System (AMHS)
- 1.3 The implementation of Ground/ground (AMHS and AFTN) communication is in accordance with the operational requirements of Annex 3 – Aeronautical Meteorology, Annex 10 Volume II – Aeronautical telecommunication, Annex 11 – Air Traffic Service, Annex 15 – Aeronautical Information Service, and the relevant supporting guidance documents (Doc 9896 – Manual for the ATN using IPS Standards and Protocols, Doc 9880 – Manual on Detailed Technical Specifications for the Aeronautical Telecommunication Network (ATN) using ISO/OSI Standards and Protocols Doc 9694 Manual on Air Traffic Services Datalink Applications.

2. DISCUSSIONS

2.1 AFTN/ AMHS

- 2.1.1 AFTN was implemented in South Africa in 2001 and the AMHS was implemented in 2009 with the upgrade of the Aeronautical Message Switching System (AMSS).
- 2.1.2 The South African AMHS solution also caters for the three (3) AMHS protocols (P1, P3 and P7).
- 2.1.3 The Aeronautical Telecommunication Network (ATN) router was upgraded from supporting Internet Protocol version 4 (IPv4) only to supporting IPv4 and Internet Protocol version 6 (IPv6) in 2007.
- 2.1.4 All domestic airports using AFTN were also migrated to Transmission Control Protocol/Internet Protocol (TCP/IP). The domestic migration from AFTN to AMHS (UA P7) has been a success, with South Africa assisting other states with their implementation.
- 2.1.5 The AMHS systems deployed (by different vendors) within South Africa successfully tested the interchange of IWXXM messages between the RODB (Pretoria Met) and the Communication Centre in September 2016. The RODB is currently engaging with IROG Toulouse to start exchanging messages in IWXXM format.
- 2.1.6 Introduced AMHS P1 connection between South Africa – Argentina and South Africa - Spain, through the REDDIG II (MPLS), in 2023. At the Fifth Workshop/Meeting of Supervisors/Operators of the SAM Region AMHS COM Centres, evidence was presented related to messages routing from the APAC Region to the SAM Region via FAOR (Johannesburg) and SAEZ (Ezeiza) COM Centres. This information greatly pleased the SAM States because they wanted to reach the main centers of the APAC Region through AMHS connections as a priority, and the following route was proposed:
- Primary route: through Ezeiza (SAEZ) and Johannesburg (FAOR);
 - Secondary route: through Atlanta (KATL) and Salt Lake City (KSLC).
- This was accepted by both South Africa and Australia, with the APAC region also routing their messages for the SAM Region through Australia and South Africa COM Centres.
- 2.1.7 With the introduction of the AMHS P1 between South Africa and Egypt, ATNS proposed Egypt as a main alternate for the Johannesburg-Madrid connection. This was agreed by all states and registered with the AMC.
- 2.1.8 South Africa is currently, busy with the process of replacing the AFTN/AMHS system with a new system that will ensure that South Africa continues to deliver the required service as the regional AFTN/AMHS communications centre, as provided for in the ICAO Regional Plans.

2.2 Inter Air Navigation Service Providers (ANSP)/States AMHS Migration Status

- 2.2.1 South Africa has managed to migrate the Aeronautical Information Management (AIM) connection from AFTN to AMHS with the following states:

AIRPORT	COUNTRY	INTERFACE	
NAFISAT			
Nairobi	Kenya	AMHS/MTA-P1	
SADC [VSAT II]			
Gaborone	Botswana	AMHS/MTA-P1	

Manzini	Eswatini	AMHS/MTA-P1	<i>To reflect in the AMC on 08/08/24</i>
Plaisance	Mauritius	AMHS/MTA-P1	
Lusaka	Zambia	AMHS/MTA-P1	
Entebbe	Uganda	AMHS/MTA-P1	
<i>Cairo</i>	<i>Egypt</i>	<i>AMHS/MTA-P1</i>	<i>New Connection</i>
OTHER INTERFACE CONNECTIONS			
Canberra	Australia	AMHS/MTA-P1	
SITA	Singapore	AMHS/MTA-P1	
<i>Madrid</i>	<i>Spain</i>	<i>AMHS/MTA-P1</i>	<i>ICAO REDDIG II</i>
<i>Buenos Aires</i>	<i>Argentina</i>	<i>AMHS/MTA-P1</i>	<i>ICAO REDDIG II</i>
<i>Athens</i>	<i>Greece</i>	<i>ICAO REDDIG II</i>	<i>VPN</i>

2.2.2 South Africa is still to migrate the AIM connections from AFTN to AMHS with the following states:

AIRPORT	COUNTRY	INTERFACE	
AFISNET			
Brazzaville	Congo	AFTN/RS-232	U/S since Nov 2022
Antananarivo	Madagascar	AFTN/RS-232	U/S since Nov 2022
CAFSAT			
Dakar	Senegal	AFTN/RS-232	U/S since Nov 2022
Recife	Brazil	AFTN/RS-232	
NAFISAT			
Victoria	Seychelles	AFTN/RS-232	
SADC [VSAT II]			
Antananarivo	Madagascar	AFTN/RS-232	
Luanda	Angola	AFTN/RS-232	
Beira	Mozambique	AFTN/RS-232	
Maputo	Mozambique	AFTN/RS-232	
Harare	Zimbabwe	AFTN/RS-232	
Lilongwe	Malawi	AFTN/RS-232	
Maseru	Lesotho	AFTN/RS-232	
Windhoek	Namibia	AFTN/RS-232	
Kinshasa	DRC	AFTN/TCPIP	
Bujumbura	Burundi	<i>AFTN/TCPIP</i>	
Kigali	Rwanda	AFTN/RS-232	
Dar-Es-Salaam	Tanzania	AFTN/RS-232	
OTHER INTERFACE CONNECTIONS			
Saint Helena	Saint Helena	AFTN/TCPIP	

2.2.3 South Africa is in the process of establishing an AMHS connection with the following states:

AIRPORT	COUNTRY	INTERFACE
SADC [VSAT II]		
Mogadishu	Somalia	N/A
<i>Juba</i>	<i>South Sudan</i>	<i>N/A</i>
<i>Jeddah</i>	<i>Saudi Arabia</i>	<i>N/A</i>

2.3 Inter Air Navigation Service Providers (ANSP) / States Connection challenges/issues.

2.3.1 South Africa experienced no major challenges/issues with the domestic implementation of AFTN/AMHS; however, challenges/issues which impacted the implementation were encountered when required to connect to other ANSPs/States.

2.3.2 Common challenges/issues encountered with inter ANSP/states implementation are as follow:

a) Insufficient training -

The training that is offered by the service provider appointed to install the system does not equip the states technical teams with sufficient information to enable them to maintain the

system after installation. It is also does not equip System operators with sufficient information to enable them to monitor and manage the system after installation.

- b) States readiness -
The states readiness to facilitate interconnection with other ANSPs/States is a major challenge as it determines whether the ANSP/State has all the infrastructure in place to facilitate cross-border communication.
- c) Use of Internet Service Providers (ISPs) -
Using ISPs to facilitate interconnection between states where there's no VSAT is a challenge because ISPs only want one ANSP/State to be responsible for the agreement of the communication line. As a mitigation we have started to explore the implementation of AMHS on site-to-site VPN, and have successfully established a connection with Greece, and we are currently in discussions with Australia to migrate our existing AMHS connection to VPN.
- d) Air Traffic Services Messaging Management Centres (AMC) Status Registration -
States not registered with (AMC) is a challenge as the AMHS transition is complex to manage, and proper coordination between COM Centres is an essential requirement to ensure the overall air traffic service messaging quality of service. The AMC supports AMHS operation, address management and user management. This assists during transitioning from AFTN to AMHS. Some of the information that can be accessed from the AMC that can be very helpful include:
 - **Regional Routing Tables** - contains all routing tables of AFTN, AMHS and CIDIN COM Centres in an ICAO Region (AFI, APAC, EUR/NAT, MID, NAM/CAR or SAM). States can also download routing tables on AIRAC Cycle dates to ensure that their systems are updated with the latest routes.
 - **Regional Network Inventory** - contains information for all COM Centres of the ICAO Regions (AFI, APAC, EUR/NAT, MID, NAM/CAR and SAM). The tables related to a COM Centre are:
 - General Information (Persons and Contacts, COM Applications, Addresses, Capabilities)
 - Connections and its characteristics.
 - **COM Charts per ICAO Region** - summarise the connectivity within a given ICAO Region and to other ICAO Regions.
- e) States Representative contact information -
States contact details not up to date on the AIPs for communication centre manager, supervisor, senior manager, operations and details of the operating hours.
- f) Engagement Platforms -
There are limited platforms to engage on AFTN/AMHS discussion that will promote the AMHS migration in the region. Participation in the available platforms is also a challenge.
- g) Service restoration taking longer than expected.

3. ACTIONS BY THE MEETING

3.1 The meeting is invited to:

- a) To take note of the status of the Implementation of the AFTN/AMHS in South Africa;
- b) Encourage AFI state members to exchange Aeronautical Information Products;
- c) Encourage AFI state members to update AIPs, share implementation status,

challenges/issues which are encountered during the implementation of AFTN/AMHS with other ANSP/States;

- d) Encourage AFI State members to register and keep their details up to date with the Air Traffic Services Messaging Management Centre (AMC); and
- e) Arrange Training platforms or Webinars to engage on AFTN/AMHS discussion that will promote the AMHS migration in the region and ensure state participation.
- f) Encourage collaboration between states and ICAO Regional office, to assist in AFTN/AMHS challenges and service restoration.

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

That ;

- a) Training platforms or webinars be arranged to assist AFI states in the AMHS migration by 30 June 2025;
- b) States to update contact details on the AIPs; and
- c) States to share implementation status, challenges, and issues which are encountered during the implementation of AFTN/AMHS with other ANSP/States.

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