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North American, Central American and Caribbean Office

WORKING PAPER

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Third Meeting of Rapporteurs of the North American, Central American and Caribbean Working Group (NACC/WG/RAP/03)

(ICAO NACC Regional Office, from 24 to 27 March 2025)

Agenda Item 5: Update of the NACC/WG Work Programme

OPMET DATA DISSEMINATION TRANSITION FROM AFTN/AMHS TO SWIM

(Presented by the COMM/TF Rapporteur)

EXECUTIVE SUMMARY

This document illustrates the operational meteorological (OPMET) data dissemination phased transition from Aeronautical Fixed Telecommunication Network/Aeronautical Message Handling System (AFTN/AMHS) to System Wide Information Management (SWIM), from technical infrastructure point of view, as part of the Aeronautical Meteorological (MET) Information provision.

Action:	Suggested actions are presented in Section 4
Strategic Objectives:	• Safety • Air Navigation Capacity and Efficiency • Security & Facilitation • Economic Development of Air Transport • Environmental Protection
References:	• ICAO Guidelines for the Implementation of OPMET Data Exchange Using IWXXM; Fourth Edition, Nov, 2020 • Roadmap for Aeronautical Meteorological (MET) Information in System-Wide Information Management (SWIM). April 2021 V2.3 [1] • Doc 10039, Manual on System Wide Information Management (SWIM) Concept. ICAO 2015. [2] • EUR AMHS Manual v14.0, Appendix H– Application/Service oriented AMHS Profiles. [3] • Second Meeting of Rapporteurs of the North American, Central American and Caribbean Working Group (NACC/WG/RAP/2), 28 to 31 March 2023

1. Introduction

1.1. The introduction of IWXXM as an international standard format for the exchange of meteorological information represented the start of a significant change from the provision and exchange of textual OPMET data towards a digital environment, in support of the ICAO Global Air Navigation Plan (GANP) and a transition towards a SWIM environment.

1.2. Prior to 2019, a mixed system of AFTN and AMHS communications was utilized for the exchange of MET information in Traditional Alphanumeric Codes (TAC) format.

1.3. Communication protocols for the exchange of MET information include the Aeronautical Message Handling System (AMHS) with File Transfer Body Part (FTBP), which is used in the existing environment, and the Advanced Message Queuing Protocol (AMQP) / Hyper Text Transfer Protocol (HTTP), intended for the future SWIM environment.

1.4. The establishment of AMHS-SWIM Gateway supports a seamless transition from AMHS to SWIM.

2. Discussion

2.1. There are several components of the MET-SWIM transition: physical network connectivity, communication protocols, information exchange services and data types exchanged.

2.2. Caribbean Air Navigation Services Network (CANSNET) will be the MEVA III Network evolution that will support emerging ANS communication requirements. It is a core Multi-Protocol Label Switching (MPLS) terrestrial network supporting voice and data telecommunication services, with differing telecommunication access technologies best suited to each CANSNET member's environment. Both voice and data information would be exchanged over Internet Protocol (IP), with redundant network access links to increase the network availability and provide greater bandwidth, in support of demands created by new data exchange and provision technologies, such as System-Wide Information Management (SWIM) and the Aeronautical message handling system (AMHS) extended service level to support the dissemination of OPMET data in accordance with the ICAO Weather Information Exchange Model (IWXXM).

2.3. Communications protocols include AFTN, AMHS Basic, AMHS File Transfer Body Part (FTBP), AMQP and HTTP in various ASBU Blocks.

	Block 0 **2013-2018**	**Block 1** **2019-2024**	**Block 2** **2025-2030**	**Block 3 and Beyond** **>2031**
Communication Protocols	AFTN AMHS Basic	AFTN AMHS Basic AMHS FTBP AMQP/HTTP (optional)	AMHS FTBP AMQP/HTTP	AMQP/HTTP

2.4. AFTN is only applicable to traditional alphanumeric code (TAC), and AMHS is applicable to the exchange of MET information in TAC format where "Basic" is noted.

2.5. AMHS is based on ITU-T X.400 messaging standards. As such, AMHS withdraw the restrictions and limitations imposed by AFTN. In order to ensure unambiguous interpretation of messages upon reception, and to facilitate their origination, *the AMHS Profile Information to Support IWXXM Exchange* [3] was defined. It established a detailed specification of X.400 and AMHS parameters to be adopted for conveyance of such messages, including those associated with the AMHS FTBP.

2.6. Currently, AMHS FTBP has been adopted to exchange MET information in IWXXM format. However, in a full SWIM environment, States are expected to implement AMQP/HTTP to exchange MET information through information services. Where mutually agreed, States may bypass the implementation of AMHS and instead implement AMQP/HTTP for SWIM-enabled exchange. [1]

2.7. For the exchange of MET information in IWXXM format in Block 1 and beyond, AMHS FTBP and AMQP/HTTP are applicable. AMQP/HTTP is denoted as “optional” in Block 1 as the early adoption of SWIM communications prior to Block 2 was encouraged. [1]

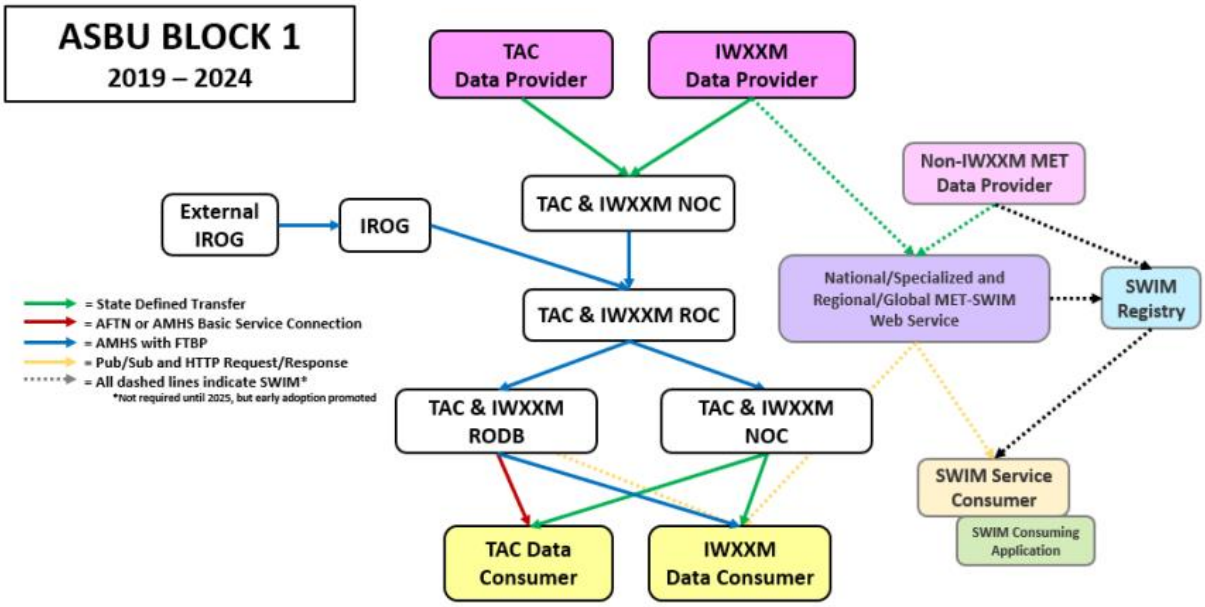


Fig. 1 MET-SWIM in Block 1 (2019-2024)

2.8. Regional OPMET Centre (ROCs), Regional OPMET Databanks (RODBs) and others should commence and complete SWIM technology adoption in block 2, noting that IWXXM will become the primary format for meteorological information exchange in within Block 2 as TAC format will no longer be a Standard in Annex 3. Thus, meteorological information in IWXXM format will continue to flow from MET data providers to NOCs, ROCs and RODBs over AMHS with FTBP or AMQP and HTTP (SWIM), and IWXXM data consumers will obtain this information from NOCs using publish/subscribe and HTTP request/response transfers.

2.9. Figure 2 shows the architecture for MET SWIM in Block 2, where MET data providers are producing meteorological information in IWXXM format and continuing dissemination through NOCs, ROCs and RODBs as in Block 1. However, MET data providers are also using publish/subscribe connections to exchange MET information with National / Specialized and Regional / Global MET SWIM services. Both the data providers and MET-SWIM services register with the SWIM registry, from which SWIM consuming applications retrieve information for service consumers to use.

2.10. IWXXM format will continue as Standard in subsequent Amendments to Annex 3. The removal of TAC format as a Standard and Recommended Practice (SARP) in Annex 3 is planned to coincide with a future Amendment to Annex 3 that is applicable within Block 2 (2025-2030). [1]

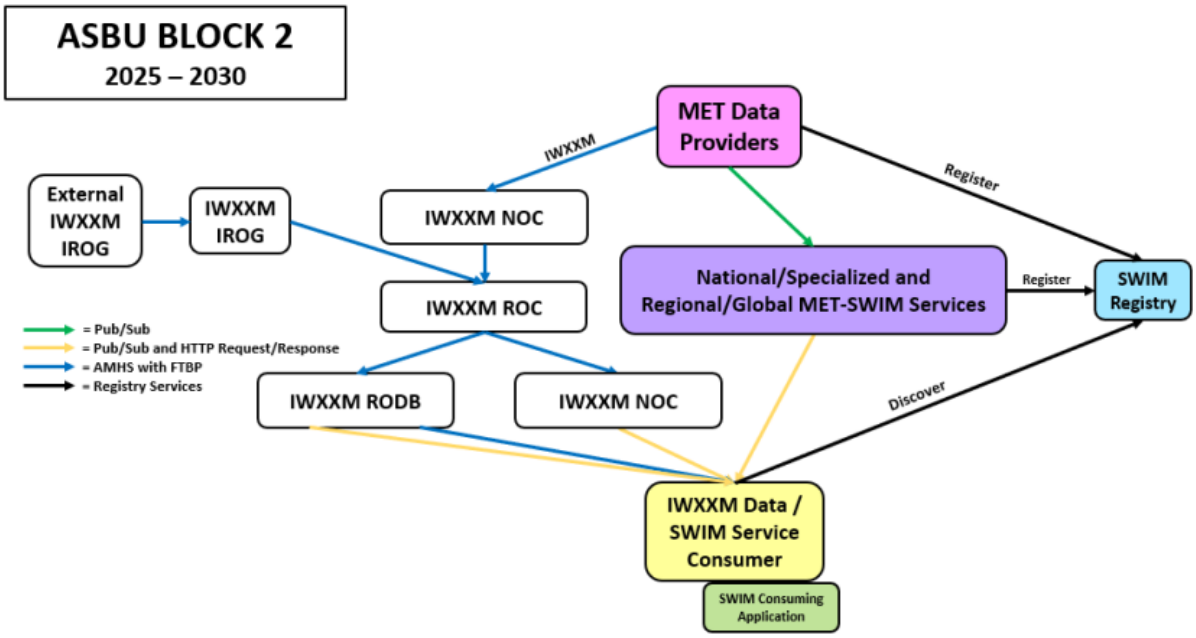
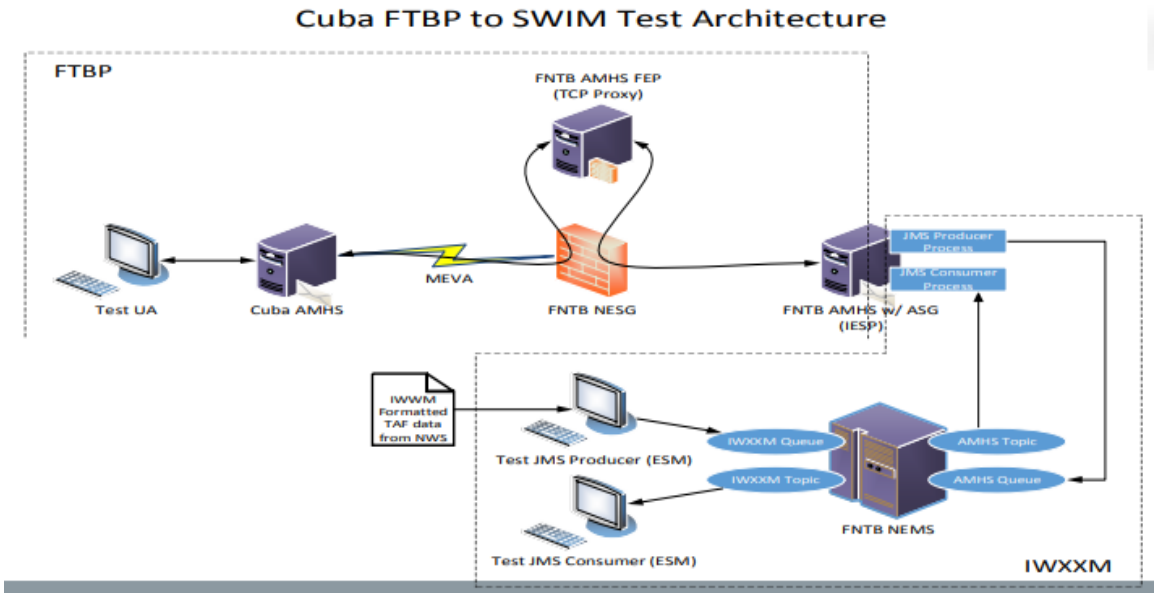


Fig. 2 MET-SWIM in Block 2 (2025-2030)

2.11. Given the large number of member States having different levels of needs and sophistication, different technologies and ATM services are expected. A few States or regions may use SWIM extensively in the near future. Others will continue to use legacy systems. Interoperability is needed, whether using existing legacy systems or planning a transition for the long term. This is made possible via specialized gateways for messaging and a staged transition. [2]

2.12. MET SWIM services have a straightforward mapping with existing AMHS messages that support IWXXM exchange, so allowing the definition and implementation of the corresponding gateways between SWIM and AFTN/AMHS.

2.13. Phase 3 interoperability test of IWXXM messages over AMHS between Cuba and the United States, involved the Federal Aviation Administration (FAA) AMHS-to-SWIM Gateway (ASG). In this test environment, AMHS-to-SWIM Gateway (ASG) consumed XML data from the United States SWIM system, generated and compressed an AMHS FTBP, and sent this FTBP in an AMHS message to the AMHS MTA for transfer to Cuba; also received message from AMHS, downloaded and decompressed FTBP and published XML data to SWIM.



2.14. Taking into account the AMHS implementation level in the CAR region, presented in Annex A, is possible to widely disseminate IWXXM OPMET data over AFS towards SWIM environments, upon meeting some technical conditions to support NOCs:

- AMHS center able to manage X400 messages with a FTBP
- IWXXM OPMET data production
- interoperability for the OPMET IWXXM data exchange

3. Conclusions

3.1. To date, progress toward availability of IWXXM and associated exchange has been slow. Actions need to be taken in the CAR region in order to speed up the IWXXM data dissemination in preparation for the plan to remove TAC as a Standard.

3.2. In addition, having the OPMET data encoded according to the MET exchange model could be a viable starting point for the gradual provision of OPMET IWXXM data to the SWIM environments in service by using AMHS-SWIM gateways that allow their consumption.

4. Recommended Actions

4.1. The Meeting is kindly invited to:

a) review the information presented in this Working Paper
b) any other matters it deems appropriate

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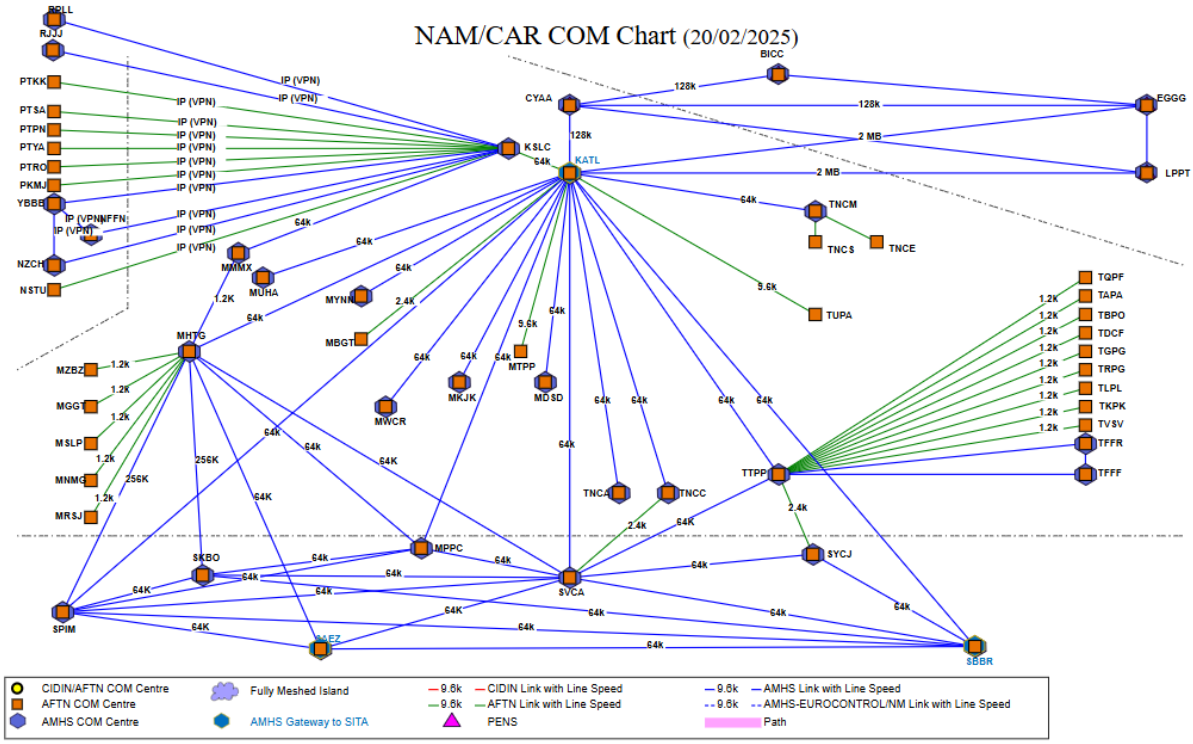
APPENDIX A



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