International Civil Aviation Organization
CAR/SAM Regional Planning Implementation Group (GREPECAS)
CNS/ATM Subgroup
Coordination meeting of the ATN ground-ground and ground-air applications project
(Lima, Peru, 19 to 20 May 2010)

Agenda Item 1: **Review of the ATN CAR/SAM planning / implementation activities**

g) IP test procedures

FAA Process for Interoperability Test and Implementation of AMHS Service between the United States of America and Member States of the Caribbean and South American Regions

(Presented by the USA/FAA)

SUMMARY

This paper provides a discussion of the test procedures necessary to establish ATS Message Handling Service traffic between the U.S.A. and member states of the CAR/SAM region.

1. Introduction

1.1 Overview

1.1.1 The Federal Aviation Administration (FAA) of the United States of America has recently made upgrades to its Air Traffic Services (ATS) Message Handling System (AMHS) in Atlanta, GA, to support the Internet Protocol Suite (IPS) and has commenced testing with the United Kingdom. Initial testing with member states of the Caribbean and South American Regions is anticipated in the second half of 2010, thereby upgrading and replacing the existing Aeronautical Fixed Telecommunications Network (AFTN) service. These activities will be part of a larger effort by all major ICAO Regions to implement AMHS. This paper describes the FAA's process for planning and execution of interoperability tests as well as those steps required for implementation.

1.2 References

[1]	EUR Doc 020	EUR AMHS Manual

2. Discussion

2.1 Current Environment

2.1.1 AFTN services are currently used between the U.S.A. and the CAR/SAM Region but all major ICAO Regions have made a commitment to AMHS as the replacement for AFTN. The FAA has been operating an AMHS link between its Salt Lake City National Enterprise Management Center (NEMC) facility and Japan for a number of years. This link is based on an Open Systems Interconnection (OSI) transport. An AMHS system for the Atlanta NEMC was installed in the third quarter of 2009 and has been upgraded to support IPS. Operational AMHS service between the USA and CAR/SAM member states using IPS will primarily be supported by the Atlanta NEMC.

2.2 Proposed FAA-CAR/SAM AMHS Test and Implementation Activities

2.2.1 The FAA anticipates that AMHS test and implementation activities with initial members of the CAR/SAM Region can begin in the second half of 2010. In preparation, plans and schedules must be created to ensure orderly testing and implementation of these connections. Activities will consist of: an MTA-to-MTA interoperability test; a connectivity test of the operational circuit; and finally the cutover of AMHS traffic. These phases are described in detail below.

2.3 MTA-to-MTA Interoperability Test

2.3.1 Test Facility

2.3.1.1 Interoperability testing is conducted using the FAA's AMHS test facility, located at the Williams J Hughes Technical Center in Atlantic City, NJ. This facility can be readily accessed via an internet connection, as the goal of this test is to ensure successful MTA-to-MTA application level operability rather than verifying operational connectivity.

2.3.2 Test Procedures

2.3.2.1 The FAA proposes to use the EUR AMHS Manual [1], authored by the ICAO EUR Aeronautical Fixed Services Group (AFSG), as the basis for AMHS interoperability testing. This document provides a wealth of test cases that can be used in the validation of interoperability between AMHS systems. However, for each implementation, the configuration to be tested as well as the operational environment will determine the extent to which the test cases may be used. As such, the EUR AMHS Manual can be used as the basis for a test suite between systems, and an appropriate subset of tests may be mutually selected in advance. In this manner, the Manual essentially provides a "menu" of test cases, and the creation of a test plan is a simple exercise of selecting appropriate test cases by reference to the Manual.

2.3.2.2 A number of factors must be considered when selecting test cases to be used in an interoperability test. These factors include such items as planned configuration and implementation, available test configurations and resources, and compliance to standards and recommendations. These factors are explained in greater detail below.

2.3.2.2.1 Planned Configuration and Implementation -- The intended network topology must be considered in planning for any interoperability test configuration. For example, the following questions must be addressed:

- Will the connection be point-to-point?
- Will the configuration involve only two end systems, or will a tri-party test be involved?
- Is this an entirely new implementation, or the integration of a new end system(s) into an existing AMHS implementation?

2.3.2.2.2 Available Test Configurations and Resources -- Interoperability test planning must consider the available resources for testing. For example, while the planned operational circuit may be a point-to-point leased connection, time and cost limitations may make this impractical for testing. Other alternatives should be considered including:

- Dialup line
- Public internet
- Others

2.3.2.2.3 Compliance to Standards and Recommendations -- Interoperability test planning must consider the level of standards and recommendations compliance for currently fielded systems because they may be different from those of the new systems to be integrated. This dictates the need to ensure backward compatibility as well as tri-party verification.

2.3.2.3 The interoperability test procedures must additionally reference a table, generated bi-laterally, which provides both the test and implementation AMHS configuration parameters such as: addressing schemes, timers, and Originator/Recipient information.

2.4 Connectivity Test of Operational Circuit

2.4.1 The FAA and the adjacent member must plan for and initiate the procurement of any necessary new telecommunications services well in advance of when the operational service is required.

2.4.2 Circuit Verification

New circuit verification testing is typically done by the telecommunication service provider(s) to ensure the integrity of the physical data path between the respective telecommunication demarcation points. This includes running bit-error rate tests with the circuit in loopback mode.

2.4.3 Network Level Testing

Network level testing verifies the underlying protocol (e.g. IP) over the circuit between adjacent members to ensure that the agreed-upon parameters and routing information are correctly configured. This phase of testing also verifies router protocols such as Border Gateway Protocol (BGP) for those instances where multiple circuits are used between the member states' routers.

2.4.4 Test Traffic

After successful network level testing, the third phase involves the exchange of test messages between the FAA's AMHS and the adjacent member to confirm the operational AMHS configuration and to allow for a period of soak testing of the connection before the cutover of operational traffic.

2.5 Cutover of Operational AMHS traffic

2.5.1 Following the successful completion of connectivity testing, traffic cutover activities can be planned. A detailed cutover plan and schedule, generated bi-laterally, should be created which should take into account such factors as:

- Can both AFTN and AMHS links be active simultaneously?
- Can some initial single destination addresses be identified to provide a limited first live traffic load?

- Can the traffic be logically separated into scalable loads (e.g. traffic between adjacent members, traffic to further connected states)?

Careful planning beforehand can ensure both efficient coordination between members and consider any fallback plans should unanticipated events arise.

3. Conclusion

3.1 Careful planning and consideration of all factors discussed in this paper provide the opportunity for thorough and successful AMHS interoperability testing and traffic cutover between two or more network partners.

4. Suggested Actions

4.1 The Meeting is invited to:

a) Take note of the information presented in this paper;

b) Review the FAA's process for FAA-CAR/SAM AMHS Test and Implementation Activities; and

c) Provide comment or input.

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