International Civil Aviation Organization

SIXTEENTH MEETING OF THE COMMUNICATIONS/NAVIGATION/SURVEILLANCE AND METEOROLOGY SUB-GROUP (CNS/MET SG/16) OF APANPIRG

Agenda Item 3: **Aeronautical Fixed Service (AFS)**

3) Discuss AIDC ICD issue and other AFS related issues

Agenda Item 12: **Implementation of the issuance of OPMET (TAF, METAR, SPECI) Exchanges**

6) implementation of XML

TRANSIT OF XML-BASED OPMET DATA OVER AMHS

(Presented by the United States of America)

SUMMARY

This information paper discusses the transit of Extensible Markup Language (XML)-based OPMET messages over Air Traffic Message Handling System (AMHS), and by extension, over Aeronautical Fixed Telecommunication Network (AFTN).

This paper relates to –

Strategic Objectives:
A: Safety - *Enhance global civil aviation safety*
C: Environmental Protection and Sustainable Development of Air Transport - *Foster harmonized and economically viable development of international civil aviation that does not unduly harm the environment*

Global Plan Initiatives:
GPI-22 Communication infrastructure

1. INTRODUCTION

1.1 This paper discusses the transmission of XML-based OPMET messages over AMHS and AFTN. It is presumed that when the bandwidth becomes readily available with the ground network expansion to support AMHS and other planned Air Traffic Control (ATC) related data, future OPMET messages and other ATC related data can be encoded using (XML). It is essential to determine the

parameters for the entry of this type of data into the AFTN/AMHS network, as well as investigate the impact of transit of data through this network. The results of this initial effort can assist in determining the capability of AFTN/AMHS for transmission of XML-based OPMET messages and provide feedback to respective World Meteorological Organization (WMO) and ICAO regarding this available capability.

2. DISCUSSION

2.1 In the coming years, it is expected that the traditional alphanumeric coded METAR/TAF reports will be replaced by XML encoding. As ICAO and WMO migrate to XML, investigation and testing must be performed in order to determine the feasibility of exchanging this data using the current AFTN and AMHS messaging systems. The AFTN system is used worldwide to exchange messages such as flight and weather data, and AMHS is the next generation of that technology, offering significant implementation advantages. The migration of AFTN to AMHS is a lengthy, multi-year process, and while AMHS is being introduced into the network, both technologies are required to co-exist and allow for the exchange of data using AFTN-to-AMHS gateways.

2.2 The FAA has completed the XML over AMHS testing with Civil Aviation Authority (CAA) of Hong Kong, China and CAA of Singapore.

2.3 The FAA, the United Kingdom's National Air Traffic Services (NATS), and CAA of Singapore, as requested by ICAO Regional office, have planned to carry out a test to distribute XML based OPMET message over operational AMHS. The test is planned for September 2012.

3.0 CONSIDERATIONS

3.1 AFTN LIMITATIONS

3.1.1 Initial testing has already been conducted of XML-encoded data over both AFTN and AMHS networks, and as expected, several limitations associated with AFTN which would impact the transmission of this data, have been documented. As an example, the following have been noted:

- An AFTN system used for disseminating XML-encoded data should support the full IA-5 character set, in order to avoid the rejection of some characters;
- An AFTN system must be capable of configuration for line length > 69 chars; and
- AFTN messages have a size limitation of 1800 characters.

3.1.2 The consequence of these limitations are discussed below as they apply to the use of AFTN and AMHS systems for direct receipt of XML messages, as well as the interaction of AFTN and AMHS within gateways.

3.2 AMHS LIMITATIONS

3.2.1 As indicated above, AMHS provides technological improvements over AFTN. In particular, limitations associated with AFTN as described in the previous section do not apply to data passed by AMHS, due to the increased flexibility associated with AMHS messaging.

3.3 OPMET DATA SOURCES

3.3.1 Data originating from OPMET data sources, such as from Regional OPMET Data Banks, must enter the network via an access point accepting either AFTN or AMHS data. The examples of differences for AFTN and AMHS, noted above, clearly demonstrate that the receiving stations will dictate the size and type of data that may be sent from that data source. Clearly, the availability of AMHS as a receiving station allows XML-encoded data with minimal limitation, while an AFTN receiving station restricts, for instance, the size of the message that may be sent. Also, such use of AFTN to receive these messages assumes the support of the full IA-5 character set, as noted above. This support is not universally provided at this time. Therefore, the use of AFTN as a receiving or transit station in such configurations must be evaluated on a case-by-case basis.

3.4 AFTN/AMHS GATEWAYS

3.4.1 As AFTN and AMHS are required to co-exist for an indeterminate amount of time, AFTN/AMHS gateways will provide the necessary format and character conversion required for these systems to operate in parallel. This becomes a factor when considering the flexibility offered by AMHS, as any message sent by AMHS may very well transit through an AFTN system at some point. ICAO Doc. 9705 states that an AMHS gateway is expected to perform some conversion of messages before passing to AFTN in order to account for AFTN limitations. For example, the following is expected of the AMHS gateway:

- Convert all non-Annex 10 ASCII characters to "?" before passing to AFTN, if required by lack of support for full IA-5 character set;
- Part messages of greater than 1800 characters before passing to AFTN;
- Conversion of each IA5IRV character, if it is in lower case, into the equivalent upper case character; and
- Folding of any line longer than 69 characters.

3.4.2 Based upon these examples, one can see where the original message may not be exactly equal to the final received message, depending upon the type of system at the origin or terminating station, as well as the types of systems through which the message would transit.

4 CONCLUSION

4.1 The use of current AFTN and AMHS messaging systems for the exchange of XML-based OPMET data, although not without issues, is clearly a feasible endeavor. The factors discussed above, while not all-inclusive, suggest that careful planning and attention to configuration can offer the opportunity for success. This paper was presented in the Asia/Pacific OPMET Management Task Force 9 held in Bangkok, Thailand 21-23 March 2011. In this meeting, it was recommended the OPMET data user community provide operational requirements, including message length and frequency, to the Asia/Pacific Aeronautical Telecommunication Network Implementation Planning Group (ATNICG) for implementation planning.

5. ACTION BY THE MEETING

5.1 The meeting is invited to note the above issues and discuss accordingly.

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