International Civil Aviation Organization

Fifth Meeting of Aeronautical Telecommunication Network (ATN) Transition Task Force of APANPIRG

Phuket, Thailand, 9 – 13 June 2003

Agenda Item 9: Review ATN implementation activities/issues

INTRODUCTION TO R & D OF AFTN/AMHS GATEWAY BY CAAC

SUMMARY

AFTN/AMHS gateway is one of the key elements in the ATN transition plan and implementation. ATMB (Air Traffic Management Bureau) of China approved a plan of AMHS gateway R&D (Research and Development) in 2001. Prototype of AFTN/AMHS gateway has been finished. ATMB is also carrying out R&D of ATN router and AMHS application.

(Presented by China)

1. Introduction

1.1 In the Aeronautical Telecommunication Network, AMHS is one of the ground-ground applications, which is used for the end-to-end ATS messages exchange between the users. With the implementation of ATN, AMHS will gradually replace the existing AFTN system. AFTN/AMHS gateway is identified in ICAO SARPs, which can be used for the smooth transition from AFTN to AMHS. The gateway is used for the realization of communication during the coexistence of AMHS and AFTN.

1.2 In order to cooperate with ATN transition in ICAO Asian-Pacific Region and implementation the plan, ATMB approved a plan of AMHS gateway research in 2001. The objective of the project is to research the AMHS application and to develop an AFTN/AMHS gateway. The first phase of project is to develop an AFTN/AMHS gateway prototype system.

2. Discussion- project status

2.1 Reference model

Reference model of AFTN/AMHS gateway is as follows:

2.1.1 Interface

2.1.1.1 The interface of system can be divided to external interface and internal interface. External interface includes interface between ATN and AMHS, between ATN and AFTN. Internal interface includes interface between AFTN and MTCU, between ATN and MTCU (Message transfer control unit), between console and gateway.

2.1.1.2 In order to guarantee the active connection and operation of AFTN/AMHS gateway and ATN, ATN module shall run on the OSI protocol stack. X.25 communication protocol should be used for linking AFTN module and AFTN. MTCU runs on the upper layer and response to the message transaction. In our system design, MTCU and MTA modules will run on the same host, which are being direct communication by API and not related to the communication protocol problem. MTCU is connected with AFTN module by X.25 or IP protocol. Their transmittal message format is conforming to the provisions prescribed in paragraph 3.1.2.3.2.5 of ICAO DOC9705 or AFTN module private communication protocol. Connection between the console and gateway is an internal process. We consider that the technical proposals should be simple and reliable. As a practical solution, we adopt the IP protocol for connection between gateway, UA and console.

2.2 Function introduction

2.2.1 MTCU (Message Transfer Control Unit): MTCU is the most important part of AFTN/AMHS gateway, which is in charge of bilateral switching between X.400 and AFTN. In this system, MTCU and MTA are running on the same host that can guarantee the high-efficiency working for message transition and message handling.

2.2.1.1 Address conversion: The correct addresses are required for message transition between AMHS and AFTN. The address conversion by MTCU supports the MF and XF address scheme. This conforms to the provision prescribed in the paragraph 3.1.2.3.3.2 ICAO DOC9705 (Second Edition).

2.2.1.2 Message text and other conversion: Message conversions that have been realized are IPM, IPN, REPORT to AFTN telegram conversion; AFTN telegram to IPM, IPN, REPORT conversion; processing the X.400 PROBE message. Recording the telegram message is required to guarantee the correct conversion among the IPN, REPORT and AFTN telegram.

2.2.1.3 From the AMHS to the AFTN message conversion: it will conform to the specification prescribed in paragraph 3.1.2.3.4 of ICAO DOC 9705 (Second Edition).

2.2.1.4 From the AFTN to the AMHS message conversion: it will conform to the specification prescribed in paragraph 3.1.2.3.5 of ICAO DOC 9705 (Second Edition).

2.2.1.5 Log function: Various information of MTCU needs to be long-term recorded. The recorded content should include message quality and message conversion operation. The log will conform to the specification prescribed in paragraph 3.1.2.3.3.1 of ICAO DOC 9705 (Second Edition).

2.2.2 ATN module: In order to shorten the period of development, the prototype system adopts the Solstice X.400 MTA of SUN as the ATN module to provide the AMHS MTA function.

2.2.3 AFTN module: It adopts the Data & Message Handling System (DMHS) that developed by Aero-Info Technologies Co., Ltd. This system provides X.25 or IP communication protocol and interface which can link to the MTCU. The DMHS controller is able to manage the DMHS system by command line or menu system at the host. The DMHS system can also be controlled and managed by graphical user interface on a remote console.

2.2.4 Console Position: MTA is connecting with console by IP protocol, and is called the API (Application Programming Interface) by RPC (Remote Procedure Call).

-Capable to support manual intervention for the all X.400 message from console;

-Display the receiving and sending column status of MTA message;

-Manage MTA message in receiving and sending column;

-Log the X.400 message and AFTN message

2.2.5 UA (User Agent): Connecting with MTA by IP protocol; call the API by RPC to realize the communication with MTA. UA is a kind of program that interacts with the final users. It adopts the graphical user interface that base on the Windows operation system. The following main functions of UA are provided:

-Receiving and sending X.400 message and AFTN telegram (AFTN over X.400);

-Status monitor of receiving and sending message;

-Store all the receiving and sending message;

-Ordering and retrieving the message according to conditions provided;

-Manage the local address list;

-Generating the probes;

-Configuration of local communication parameters.

3. Experience gained and lessons learned

3.1 MTA is the most important issue in AMHS system. According to our experiment, Solstice X.400 MTA does not fully conform to the specification prescribed in ICAO DOC9705. SUN also has no further development plan and their technical support nearly ceased. For the time being, it would be unrealistic to select commercial platforms for AMHS. Therefore adoption of specially tailored AMHS system can meet the ICAO requirements.

3.2 OSI protocol stack is the core of ATN, but the products are no longer sufficient in the market. Solstice OSI of SUN is still available on sale. Microsoft windows NT4 also supports for TP4/CLNP, but it has been removed in Windows 2000. Another possible choice is open source software NetBSD.

3.3 At present, ATMB is conducting ATN laboratory. In the first phase of the project, R&D of ATN router and ground-ground applications are regarded as the most important work.

4. Action by the meeting

4.1 The meeting is invited to note the information provided in this paper.
