



International Civil Aviation Organization

Fourth ATN Transition Task Force Meeting

Mumbai, India, 8 - 12 April 2002

Agenda Item 1: Review of work carried out by Working Group B

FIRST DRAFT ON AMHS ROUTING POLICY PLANNING

(Presented by USA)

Summary

Based upon the development of planning for the implementation of the ATN AMHS within the Asia/Pacific Region, it was agreed that the Region needs to develop routing policies between AMHS Message Transfer Agents. This paper presents a first draft of possible policies for the exchange of AMHS messages.

1 Introduction

1.1 Within the Asia Pacific Region, work is underway to implement the ATN AMHS as a replacement and complement to the AFTN. Already the Region has prepared planning documents on AMHS naming standards as well as drafts on the implementation of AMHS within the Region. One area that needs further refinement is planning documents for the routing of AMHS message between systems within the Region and to systems outside the Region.

1.2 The development of AMHS message routing policies is based on the need for States and AMHS administrators to be able to control the flow of messages into individual AMHS systems.

2 Background

2.1 The ATN AMHS is designed according to the X.400 email standards. It is further complemented by the history that ICAO has with the AFTN. As a X.400-based system, the ATN AMHS is specified in such a way that messages can be transferred from the sender to the recipient by passing reliably through intermediate ATN AMHS systems.

2.2 The sender's ATN AMHS system, when it first receives a newly submitted message, must determine the ATN AMHS system that will receive the AMHS message. This may be: the destination ATN AMHS, a relay ATN AMHS, or AFTN.

2.3 If one looks at the Internet and its SMTP-based email system as an example, it becomes clear that routing policies need to be developed for the successful exchange of messages between senders and recipients. First, it is possible for any AMHS system to send a message directly to the destination AMHS system if it has the appropriate NSAP and TSEL of the destination system.

2.4 This is due to the fact that ATN routing should provide a path between any two ATN systems. Second, it is logical that some, if not most, ATN operators will choose to manage their systems in a way that limits its use of bandwidth and the amount of information it must maintain. Third, systems will most likely be configured to take advantage of logical cooperation between States and Organizations to minimize costs and complexity. Of particular concern is the need of ATN system operators to be able to control what systems are able to connect with its system and to protect the integrity of its systems through access control.

3 ATN AMHS Routing

3.1 The ATN AMHS is not defined with routing protocols that dynamically pass routing information amongst the cooperating ATN AMHS systems. Rather, the “routing tables” maintained by the ATN AMHS are static and are typically established through manual configuration by system operators.

3.2 The ability of ATN AMHS systems to dynamically route AMHS messages is based on the implementation and sophistication of the algorithms and is not based on anything present in the SARPs or X.400 standards.

3.3 Routing is performed by matching the X.400 O/R address with the routing information maintained by the MTA. The choice of which MTA to send the message affects whether direct delivery or relaying is required.

4 Routing and Security

4.1 Routing can be performed by providing each MTA with sufficient information to make it possible for an MTA to send every AMHS message directly to its destination. In other words, AMHS messages would always go directly from the sender to the recipient MTA.

4.2 Routing can also be performed by providing each MTA with the addresses of only a limited number of other MTAs. In this case, an AMHS message addressed to one of the limited MTAs would be routed just like the first case; but a message addresses to any other MTA would need to be relayed.

4.3 The choice of which method of routing is to be used, is a decision by the operators of the MTAs. In the first case, MTAs must be configured to accept Bind Requests from any MTA (as indicated by the MTA-name parameter). This implies that all incoming Bind Requests will be accepted and traffic will be accepted. In the second case, an MTA may compare the MTA-name against a list of MTAs from which it will accept connections, and therefore messages.

4.4 It is therefore a policy decision of MTA operators as to which method it will employ for receiving ATN AMHS messages. (Note that, the policy that an MTA implements for message reception must be reflected in the sending policies of all other MTAs.)

4.5 The choice of routing policy is often based upon two issues, the major issue being security, the other being traffic engineering. In the case security, an MTA configured to accept all incoming Bind Requests, regardless of the source system, is open to both malicious attacks and traffic abuse. A malicious attacker, may launch a Denial of Service (DoS) by sending many Bind Requests (and associated large amounts of data) to a MTA in order to overwhelm it. Since it is likely that both NSAPs and TSAPs will be published, it would be easy to attack such a system.

4.6 Similarly, if traffic is being accepted from all MTAs, a system must be engineered to provide for larger number of incoming connections, potentially larger traffic loads, and therefore increase the system complexity.

5 MTA Routing Within The Asia Pacific Region

5.1 Using AFTN as a model, a routing policy can be specified that limits the number of “hops” a message must make, but also does not open MTAs to DoS attacks. The policy is based upon adjacent MTAs and limits the acceptance of Bind Request by any MTA.

5.2 Just like the routing architecture, the MTA routing is based on backbone MTAs and edge MTAs. A backbone MTA is similar to a major AFTN switching center that is routing traffic to other Regions and between other Regional edge MTAs. An edge MTA is one that typically serves a State or small group of States and is not a major relying center.

Backbone MTAs

5.3 Backbone MTAs will be configured with direct communications with all other backbone MTAs and all edge MTAs that it is willing to serve as a relay. Edge MTAs will be configured with direct communications to at least one backbone MTA and any edge MTAs for which it negotiates bi-lateral exchange agreements. Any MTA operator may make bi-lateral agreements with any other MTA operator to create a direct AMHS message delivery path.

Routing Algorithm

5.4 A source MTA will be required to maintain a routing table that maps the O/R addresses to one of the MTAs that accepts connections from the source MTA. The source MTA must also maintain the name of the MTA for use in the Bind Request, and if required by the destination MTA, the password. These parameters along with its agreed MTA name must be used when attempting a connection with the next MTA.

AMHS System Interconnection

5.5 Within the Asia/Pacific Region, routing of AMHS messages will follow the following:

1. Edge-MTAs will route their AMHS messages to one of the following:
 - to the backbone MTA that is designated its responsible relay MTA,
 - to the destination edge-MTA if the destination has agreed to accept incoming connections from that source MTA
2. Backbone-MTAs will route AMHS message to one of the following:
 - to another backbone-MTA or
 - to the destination edge-MTA.

This routing algorithm will limit the number of MTAs that can access a local machine and provide robust multiple routing by using alternate backbone-MTA routing based on system availability.

6 Recommendation

6.1 Members of the meeting are invited to review and provide comments on the AMHS routing architecture as presented above.