International Civil Aviation Organization

AERONAUTICAL TELECOMMUNICATION NETWORK IMPLEMENTATION COORDINATION GROUP – EIGHTH WORKING GROUP MEETING (ATNICG WG/8)

Christchurch New Zealand
28 September – 1 October 2010

Agenda Item 9: Enhanced Services – planning and strategy – Directory service

DISCUSSIONS ON TOPICS RELATED TO DIRECTORY SERVICES

(Presented by Japan)

SUMMARY

The paper provides the review results of the materials on tools, including the ATN Directory Services, for AMHS management. The reviewed materials include documents of the recently presented, offline tools for AMHS management, Directory Services standard and past activity on the task in the region. As concluding remarks, some activities are suggested.

1. Introduction

1.1 At the ATNICG/5 meeting in Kuala Lumpur, Malaysia, 31 May – 4 June 2010, WP10, titled 'Future use of Directory Service' was presented by the United States of America. The paper provides the reasons for implementing an ATN Directory to support AMHS operation and also the reasons for not yet using any ATN Directory. Also it emphasizes the potentials of an ATN Directory, and points out that the European AMC is limited in functionalities as far as the Directory Services are concerned. It is followed by some technical details of the Directory Services.

1.2 In this paper, it is examined the stated reasons in the referred paper, mostly agreeable, and discussed whether jumping to the conclusion for adopting the ATN Directory Services is an appropriate step or not. Incorporated in the paper also are various topics related to the Directory Services.

2. Brief Reviews of Documents

The following four types of documents are reviewed:

- Future use of Directory Service (ATNICG/5-WP10)
- AMHS management
- Directory Services Standards
- Regional activity on the task

2.1 Future use of Directory Service (ATNICG/5-WP10)

Reference

[1] 'Future use of Directory Service', ATNICG/5-WP10, Kuala Lumpur, Malaysia, 31 May – 4 June 2010

The items in the Introduction section of WP10 are reviewed respectively in the following sections.

2.1.1 Primary reasons for implementing an ATN Directory to support AMHS operation

Before examining each reason 'for implementing an ATN Directory to support AMHS operation', it should be noted the assumptions that

- All ANSPs(Air Navigation Service Provider) already actually commissioned the AMHS operations
- All AMHSs implement an ATN Directory.

There are four stated reasons a)-d) for implementing an ATN Directory to support AMHS operations;

a) The ATN Directory may be used to distribute, update and synchronize the address translation data between AFTN and AMHS.

Review Comments:

It should be noted that the (ATN) Directory is passive in nature that each ANSP operating AMHS has to update the directory data on-line, real time or immediately (it should be clear what is meant by 'on-line'), assuming each ANSP operates the AMHS. If it is satisfied then the ATN Directory can provide the up-to-date address translation data. What does it mean by synchronizing the address translation data? The ATN Directory can not provide synchronization, but by AMHS only when the updated data is referred by the AMHS.

If one (ATN) Directory data, which is independent to any other (ATN) Directory data, is updated, then the update causes no problem, for instance, telephone is connected in a way of any-to-any so that a directory update can simply be done without any synchronization. But in some cases, a connection between two specific AMHSs may be established and their directory entries to be updated simultaneously, ignoring the ATN Directory entries for the time being. The consistency between stored directory data, not restricted to the data stored in an ATN Directory, should be maintained. How such an established connection is reflected in the ATN Directory consistently, that is, in a synchronized way? It is not still clear whether such consistency can be maintained by merely using an ATN Directory of a hierarchical structure, considering the use of an ATN Directory in some operational/managerial areas other than address translation, e.g. operational and/or administrative uses mentioned below.

b) To allow lookup and browsing of ATC object entries by operational and administrative staff.

Review Comments

There is a different term; ATC object entries, which may be stored as ATN Directory entries. Do the ATN Directory entries cover the ATC object necessary to lookup and browse? There could be many such entries in the ATN Directory for using various purposes. It should be studied further that the ATN Directory can be effective for such uses, if it is so important.

c) It can support the Public Key Infrastructure required to provide digital signature security to AMHS and other applications

Review Comments

Some mechanisms to assure security can be adopted. Does the ATN Directory require an adoption of any specific security mechanism? By introducing the ATN Directory Services, it may provide insecure AMHS operations, depending on the ATN Directory.

d) It will allow more efficient and timely management of much of the data required to operate the AMHS and the AFTN gateways.

Review Comments

Similar, but not same, comments will be made as the reason b) discussed above.

2.1.2 Reasons as yet not use the AMHS Directory

There are two reasons a) and b) as listed below; although the second half of the second reason b) is not exactly a reason, but the shortcoming not using AMHS Directory (here AMHS Directory seams to be same as ATN Directory).

a) Only a few ANSPs are actually connected using AMHS

Review Comments

The recognized reason seems to be agreeable and correct one. The question is when is the time the ANSPs are ready to use an ATN Directory (or AMHS Directory)? Is it when all ANSPs using AMHS or some critical mass of operating AMHSs? Can an ATN Directory be introduced one by one by each ANSP or all ANSPs have to wait until such a time comes and deploy an ATN Directory at all sites at same time?

In case of deploying AMHS, there are two reasons that the deployment is rather easy:

- There is an existing and similar network AFTN and there is not any drastic change as far as the messaging functionality is concerned;
- The connection between ANSPs is basically bilateral, although it can be any-to-any connection.

Even this is a case in deployment of the AMHS, we have to resolve many issues for transition to the interconnected AMHSs in the region.

In case of deploying an ATN Directory, there are two questions to be answered

- What and how to implement for deploying an ATN Directory. There is no automated facility existing currently, but such a capability has been exercised manually. It should be understood that the ATN Directory functionality fits to the AMHS operational environment;
- What is the use of an ATN Directory? Since an ATN Directory is a passive tool, it is important to identify what is the use and benefit of the tool. Such identifications should include the timing of actually deploying to enjoy such benefit, if any.

Even if we get answers to the questions and decide to deploy an ATN Directory in the A/P region, the time and procedure to do so in the region is another matter.

b) Those ANSPs that have implemented AMHS want to get wider operational experience of the new AMHS technology before committing resources to implement the ATN Directory. However, as the number of interconnected ANSPs rises, the difficulties of management and co-ordination will grow exponentially, and will lead to a much more urgent requirement for support of the ATN Directory Services.

Review Comments

The first half of the recognized reason seems to be agreeable and correct one. The second half of the description emphasizes exactly what we are now in the region, that we do not recognize 'the difficulties of management and co-ordination'. Moreover, we do not recognize formally the differences of management and co-ordination between AFTN and AMHS. Since we have been exercised the management and coordination in the AFTN environment, the possible urgent requirement for support of the ATN Directory Services is naturally unclear to us.

2.1.3 The ATN Directory is a tool that may be configured to support many more ATC operational and administrative tasks. However, the AMHS use of the ATN Directory is the most immediate requirement. Once the ATN directory has been commissioned and set in operation for AMHS, it can be readily extended and used for further, non-AMHS/AFTN applications.

Review Comments

It is required to identify what are 'many more ATC operational and administrative tasks'. Although it is stated that 'the AMHS use of the ATN Directory is the most immediate requirement', considering the comments above, this conclusion should be examined further.

Additional Comment

There is an ATN Air-Ground application, called CM; Context Management. The CM provides same functionality as Directory Services, the reason why the CM is developed independent to the Directory Services is that the (X.500) Directory Services is/was heavy and not suitable for implementing it as an air-borne communication application. The CM specifies the exchanges of address data, for other A/G applications can be able to exchange ATC data. The CM is not implemented in anywhere so far, but it is aligned to other A/G applications, like ADS-C and CPDLC. How such A/G applications or AIDC are expected to be using the extended ATN Directory Services? There must be a need to exchange ATC data between A/G applications and AIDC, how the extended ATN Directory Services can play some roles of these data exchange, apart from the CM?

2.1.4 The Air Traffic Service Messaging Management Center (AMC) has been in operation since 2009. Most of States have access to AMC to support the AMHS operation. The AMC is an "off-line" directory service that uses public internet while the DR is an "on-line" directory that uses ATN Internet. The AMC has addressed addressee's coordination issues and centralized its operation into one center in Europe. However, other DR functions are left open.

Review Comments

The statements above contrast the differences between AMC and DR (assuming ATN Directory), "off-line" against "on-line", and AMC is missing some DR functions. It does not say that DR is missing coordination issues and others.

It is agreeable the AMC is incomplete in some sense. The topic will be discussed in the following section on AMHS management review.

2.2 Review of Materials related to AMHS Management

There are two documents partly related to the AMHS managements, European AMC document and A/P interim AMHS Database. The latter was formally presented to the regional group but never distributed and reviewed, partly because of the transition from ATNTTF to ATNICG, and left in between.

References
[2] ATS Messaging Management Manual Version 5.0 22/05/2009
[3] Proposed Requirements for Interim AMHS Database, June, 2006

2.2.1 European AMC document [2]

There was a training course provided by Eurocontrol and hosted by AreoThai in Bangkok, 25-26, Jan., 2010. There would be no need to repeat the review on the document.

The European AMC provides 'off-line' management of AMHS, in two stages; implementation support functions and operator functions. The European AMC provides more than entering and viewing directory data. There is extensive consistency checking in there.

The shortcoming of the European AMC is that it seems the consistency checking is handled manually and it takes time to complete theses functions. It is desirable to automate such procedures at the AMC.

2.2.2 A/P interim AMHS Database Requirement document

At the last meeting of ATNTTF/7 (ATN Transition Task Force/7), the provision of an offline AMHS repository is proposed. AeroThai developed a prototype, based on the requirement document [3].

The document includes the operational requirements. There are following three appendices:

A1: Mapping from AMHS Naming Registration Form to AMHS Database
A2: Compatibility Analysis between Directory Services and AMHS Database
A3: Possible Implementation of the AMHS Database

where the first and second one are for compatibility, and the third one is for suggesting of implementation.

The reason to develop an interim AMHS Database (it is named to represent the AMHS data in a way to describe as a set of interrelated entries, not just in a hierarchically ordered data structure employed by ATN Directory Services) is that

- The operational and managerial requirements are not clearly understood in the region, hence we need some lessons learning, although we may set some requirements tentatively and try to get some experiences

- We need some explicit tools to experiment of the AMHS management. The ATN Directory Services described in the ATN SARPs can be one of such tools at the end (very future) state of such a provision, but we do not know the ATN Directory Services provide satisfactory facility to be used for the AMHS management.

- Taking into considerations of our status given above, an 'offline' AMHS repository is proposed to facilitate a scheme to populate data related to AMHS management and use for management.

- In future, if the ATN Directory Services are going to be adopted, such an offline tool should provide compatibility to the ATN Directory Services. A case study on compatibility is provided in Appendix A2 in [3].

Although the requirements in the document reflect the 'user needs' (CAA personnel is interviewed), it is not reviewed nor discussed properly.

2.3 Directory Services standard and others

If the ATN Directory Services are the answer, then what is the question? It is important to provide good reasoning leading to deploying ATN Directory Services. Since the ATN Directory Services provide mainly technical part of services, the technology oriented approach, where the technological conclusion is given/fixed, may mislead the whole discussions and studies.

2.3.1 Directory Services

Review Comments

In the section 2 of document [1], the Directory Structure and others are described together with the 'Summary Requirements'.

It should be noticed that the (existing) AMHS has to accommodate the interface, or interfaces to DUA or others within the AMHS to access the Directory Services, if the online capability has to be provided for AMHS management. If the use of ATN Directory Services is isolated from the AMHS operation, it may be said it is 'offline', although the ATN Directory entries are updated like AMC data, but are not incorporated to the AMHS operation online. Since the use of ATN Directory Services is described as isolated from other components in the document [1], it is not clear what is meant by 'online' and the 'online' capability is really needed.

2.3.2 Directory Services SARPs

SV7 of ATN SARPs describes the ATN Directory Services. For one thing, the ATN Directory Services are never implemented. After reviewing the ATN Directory Services SARPs, there are some identified defects or rather it is incomplete as a document, such as some sections left blank. It may not be a major defect since X.500 is a workable document.

The ATN Directory Services SARPs is based on the OSI protocol suite. Since the dual stack is considered in the A/P region, some attentions should be paid in this regard. It may or may **not** be a major issue, only amending the existing document.

Even if any off-the-shelf products are going to be deployed, it should be certain that they are compatible.

2.4 Study on Directory Services in the A/P region

Reference

[5] 'Objective (6) ATN Service Enhancements Task (1) Review the impact of the implementation of Directory Services in the Region', ATNICG WG/3 WP306, Chiang Mai, Thailand, 24-25 January 2008

In the A/P region, there is a task called "Review the impact of the implementation of Directory Services in the Region" within a category of ATN Service Enhancements, where Fiji is the lead. There were some reports on this task, for instance in [5], it is described that

There may be positive impact as well as negative impact of directory implementation. The positive impact would be the benefit implementing directory. The negative impact may include implementation cost. The four items; Use/User of Directory, DSA, Implementation Scheduling and Managing On-going Uses are briefly discussed.

3. Summarized Discussions

After reviewing the existing materials provided in the paper, it seems to be clear that

1) We need to identify the use of Directory Services, (the requirements described in [3] can be a starting point of this activity)

2) If we are able to establish such uses, then we need to investigate the actual Directory Service tool to deploy, including one of the ATN Directory Services compliant.

4. Recommendation

4.1 The members of meeting are invited to review the paper.

– – – – – – – – – – –