INTERNATIONAL CIVIL AVIATION ORGANIZATION

REPORT OF THE FIRST MEETING OF THE MIDANPIRG INTERNET PROTOCOL SUITE WORKING GROUP

IPS WG/1

(Cairo, 12 –14 May 2009)

The views expressed in this Report should be taken as those of the MIDANPIRG Internet Protocol Suite Working Group and not of the Organization. This Report will, however, be submitted to the MIDANPIRG and any formal action taken will be included in the Report of the MIDANPIRG.

Approved by the Meeting

TABLE OF CONTENTS

PART I: HISTORY OF THE MEETING

IPS WG/1
History of the Meeting

PART I - HISTORY OF THE MEETING

1. PLACE AND DURATION

1.1 The First Meeting of the MIDANPIRG Internet Protocol Suite Working Group (IPS WG/1) was held at ICAO Middle East Regional Office, Cairo, 12 – 14 May 2009.

2. OPENING

Mr. Jehad Faqir ICAO Deputy Regional Director, opened the meeting by welcoming all the delegates to ICAO MID Regional Office and to Cairo, highlighting the important topics that the meeting will address especially the development of the MID Region ATN Plan based on Internet Protocol Suite for which the SARPS are included recently incorporated in Annex 10. Mr. Faqir also indicated that communication technology is advancing at an extremely rapid rate, as new products and services are constantly being offered to the public with unprecedented capabilities, performance and capacity with at ever decreasing costs. Finally Mr. Faqir wished the meeting fruitful results and expected that implementation issues to be addressed in details.

3. ATTENDANCE

3.1 The meeting was attended by a total of fifteen (15) participants, which included delegates from eight (8) States. The list of participants is as at **Attachment A** to the report.

4. OFFICERS AND SECRETARIAT

4.1 The Rapporteur of the meeting was Mr. Mohamed Ali Saleh, Head of Aeronautical Communication, Civil Aviation Affairs, from Bahrain. Mr. Raza Ali Gulam, Regional Officer, Communications Navigation and Surveillance (CNS) from the ICAO Middle East Cairo Office, acted as the Secretary of the meeting.

5. LANGUAGE

5.1 The discussions were conducted in English. Documentation was issued in English.

6. AGENDA

6.1 The following Agenda was adopted:

Agenda Item 1: Adoption of the Provisional Agenda

Agenda Item 2: Introduction of the IPS

Agenda Item 3: Outcome of MIDANPIRG/11

Agenda Item 4: Development of the Regional Plans

Agenda Item 5: Future Work Programme

Agenda Item 6: Any other business

7. CONCLUSIONS AND DECISIONS – DEFINITION

7.1 The Sub-Group records its actions in the form of Draft Conclusions and Draft Decisions for further action and adoption by the MIDANPIRG as its Conclusions and Decisions with the following significance:

a) **Conclusions** deal with matters which, in accordance with the Group's terms of reference, merit directly the attention of States on which further action will be initiated by ICAO in accordance with established procedures; and

b) **Decisions** deal with matters of concern only to the MIDANPIRG and its contributory bodies.

7.2 In the same context, the Sub-Group can record its actions in the form of Conclusions and Decisions where no further action is required by the MIDANPIRG or already authorized by MIDANPIRG.

8. LIST OF DRAFT CONCLUSIONS AND DECISIONS

DRAFT CONCLUSION 1/1: MID ATN COMPATIBILITIES

DRAFT CONCLUSION 1/2: AMHS ADDRESS COORDINATION IN MID REGION

DRAFT CONCLUSION 1/3: REGISTRATION TO AMC

DRAFT CONCLUSION 1/4: POSTING OF AMHS PLANS IN AMC

DRAFT DECISION 1/5: MID REGION ATN PLANNING AND IMPLEMENTATION DOCUMENT

DRAFT CONCLUSION 1/6: USE OF PUBLIC INTERNET IN MID REGION

DRAFT DECISION 1/7: TERMS OF REFERENCE OF THE IPS WORKING GROUP

PART II: REPORT ON AGENDA ITEMS

PART II: REPORT ON AGENDA ITEMS

REPORT ON AGENDA ITEM 1: ADOPTION OF THE PROVISIONAL AGENDA

1.1 The meeting reviewed and adopted the provisional agenda as at paragraph 6 of the history of the meeting.

1.2 The meeting supported the CNS Sub-Group nomination that Mr. Mohamed Ali Saleh, Head Aeronautical Communication, Civil Aviation Affair, Bahrain, acts as the Rapporteur of the Working Group.

IPS WG/1
Report on Agenda Item 2

REPORT ON AGENDA ITEM 2: INTRODUCTION TO IPS

2.1 The meeting noted that in 2003, the Air Navigation Commission merged the Aeronautical Mobile Communication Panel (AMCP) and the Aeronautical Telecommunication Network Panel into the Aeronautical Communications Panel (ACP). At AMCP/8 (2003) proposals for working arrangements and task related to the Aeronautical Telecommunication Network (ATN) to be undertaken by ACP were developed. The commission agreed, in response to these proposal to request ACP to "consider the use of TCP/IP protocols in certain geographical areas and its use in the ATN". The ACP undertook this task and reported in 2005 at the first meeting of the ACP Working Group of the Whole meeting (WGW/01) the feasibility of using TCP/IP protocols (or the Internet Protocol Suite (IPS).

2.2 The meeting received an update on the latest developments within the global ICAO framework related to the work programme of the IPS Working Group. Amendment 83 affected Volumes 1 and 3 of Annex 10 stemmed from the work undertaken in the various ICAO Panels, and this Amendment is applicable as of 20 November 2008. The Amendment, among other issues, introduced Internet Protocol Suite (IPS) technology to the Aeronautical Telecommunication Network (ATN).

2.3 The meeting noted that Manual for the ATN using IPS Standards and Protocols (Doc 9896) had been approved by the ICAO Secretary General and submitted for publication. An unedited advance version of the Manual can be downloaded at http://www.icao.int/anb/panels/acp and has been published at ICAO-NET website.

2.4 The meeting was provided with a briefing on the ICAO ACP activities undertaken in 2008 and its work plan for 2009, where the work of the WG-M, among other issues, was concentrated on the transfer of relevant material from Doc 9705 to Doc 9880 and it is expected that Doc 9705 withdrawn by the end of 2009.

2.5 The meeting noted that Internet and World Wide Web (WWW) terms today are familiar to millions of people all over the world. Organizations depend heavily on applications enabled by the Internet, such as electronic mail and web access. The Transmission Control Protocol/Internet Protocol (TCP/IP) suite is the engine for the Internet and the networks worldwide. Its simplicity and power has led to becoming the single network protocol of choice all over the world.

2.6 TCP/IP was designed to build an interconnection of networks (referred to as an *internetwork*, or *internet*) that was expected to provide universal communication services over heterogeneous physical networks. The main benefit of such an internet work was the enabling of communication between hosts on different networks, perhaps separated by large geographical area. TCP/IP today provides communication services that run between programming interface of a physical network and user applications. It enables a common interface for these applications, independent of the underlying physical network.

2.7 The meeting noted the different IP versions and in particular, the fourth revision in the development of Internet Protocol Suite which became the first version of the protocol to be widely deployed.

2.8 The meeting also noted that originally in IPv4, five classes of networks were defined these, are classes (A, B, C, D and E). Most of the address blocks of Class A and B have already been allocated, limited number of class C blocks only are available.

2.9 The meeting was informed about the Internet Engineering Task Force (IETF) that set up a working group on *Address Lifetime Expectations (ALE)* with the express purpose of providing estimates of when exhaustion of the IP will become an intractable problem. Their final estimates (reported in the ALE working group minutes for December 1994) were that IP address space would be exhausted at some point between 2005 and 2011.

2.10 The meeting further noted that, IETF also established an IPng (IP next generation) working group to make recommendations for the IP Next Generation Protocol. Eventually, the specifications for Internet Protocol, Version 6 (IPv6) were produced in RFC 2460. In addition to a much larger address space (2^{128}), the specifications also support additional features like mechanism for auto-configuration of network interfaces, encapsulation of itself and other protocols, built in authentication and encryption etc.

2.11 The meeting noted that complete implementation of IPv6, however is going to take time and there will be a very long period when both the protocols that is IPv4 and IPv6 are going to co-exist. In this regard a number of mechanisms have been suggested for the interoperability of the two versions of IP protocols and these mechanisms can be divided into three main categories:

Dual Stack: permits the usage of IPv4 and IPv6 to co-exist on the same devices & networks
Tunneling: permits the transportation of IPv6 traffic over the existing IPv4 infrastructure and
Translation: permits IPv6 only nodes to communication with the IPv4 only nodes

These methods can and are likely to be used in combination for facilitating migration to IPv6 environment in small steps. The migration could start with a subnet or even may be at the level of a single host.

2.12 With regard to the implementation of the IPS based ATN the meeting was of the view that careful attention is given to current implementations of AFTN, CIDIN and ISO/OSI based ATN. Provisions for continuation of CIDIN, AFTN and ISO/OSI are being developed to secure that implementation of the ATN will take place on the basis of regionally agreed requirements. These requirements are to be established on the need within the region or within Contracting States, to implement features the IPS based ATN offers.

2.13 Based on the above, and noting MIDANPIRG/10 and MIDANPIRG/11 outcomes, the meeting reiterated that the MID ATN will be IPS based ATN. Consequently, the Working Group agreed to the following Draft Conclusion:

DRAFT CONCLUSION 1/1: MID ATN COMPATIBILITIES

That,

a) MID ATN will be IPS based and will maintain compatibility with AFTN, CIDIN and ISO/OSI based implementation and in close coordination with adjacent region; and
b) phase out of any protocol will be based in close coordination within MID Region and with the adjacent Region.

REPORT ON AGENDA ITEM 3: OUTCOME OF MIDANPIRG/11

3.1 The meeting was supportive of the goal of ICAO that the IPS based ATN to be implemented on a global basis, where achieving this goal, careful attention has to be given to the current implementations of AFTN, CIDIN and ISO/OSI based ATN. Hence provisions for continuation of CIDIN, AFTN and ISO/OSI are being developed to secure the implementation of the ATN that will take place on the basis of regionally agreed requirements.

3.2 The meeting in recalled MIDANPIRG/10 and MIDANPIRG/11 directives, that MID ATN network will be IPS based ATN being easy expandable (scalable), more reliable, easier interconnection, flexible, de facto industry standard, IPS standards open and freely available and that a large variety of equipment and software of the shelf available and at low cost.

3.3 In this context the meeting agreed that MID ATN network will be catering for the System Wide Information Management (SWIM), where SWIM will enable increased common situational awareness and deliver the right information to the right place at the right time.

3.4 The meeting also recalled ICAO Forum on Integration and Harmonization of NextGen (Next Generation) and SESAR (the Single European Sky ATM Research Programme) into the Global ATM Framework which was held in Montreal from 8 to 10 September 2008.

3.5 The meeting recalled that the forum goal was to facilitate understanding of the integration and harmonization of NextGen and SESAR, the two major ATM programmes initiated by the United States and Europe, respectively, to meet the specific requirements of these regions. Global harmonization was emphasized and to be within the context of a global ATM system to ensure interoperability, to maximize utilization of available and emerging technologies.

3.6 The meeting noted that both the SESAR and NextGen programmes are well underway along with improvements planned by other States; the forum highlighted, the importance for the harmonization of the global air traffic management system, all are consistent with the ICAO Global Air Navigation Plan.

3.7 The meeting noted that ICAO has already provided the framework in the form of the Global Air Traffic Management Operational Concept and the Global Air Navigation Plan, ICAO is playing its part to enable the implementation of the future programmes with timely development of the necessary SARPs.

3.8 Considering the above, the meeting was apprised that MIDANPIRG/11 established IPS Working Group to facilitate the implementation of ATN in the MID Region, and it also defined the Terms of Reference and Work Programme of the IPS Working Group.

3.9 The meeting was presented with the MID ANP FASID (Doc 9708) specifically CNS section part of IV, of MID ANP FASID, paying attention to the ATN part. The meeting agreed that participants will provide the necessary updates to this important planning document so that it will be current and could be used by MID States, other Regions and Stakeholder.

3.10 The meeting noted that tasks assigned by MIDANPIRG/11 to the IPS WG, require extensive work, consequently the meeting agreed to form within the meeting four individual Task Groups in order to progress the work in timely manner.

3.11 The four Task Groups that we formed by the meeting are (FASID Task Group, AMHS Task Group, MID ATN Planning Task Group and MID Internet Usage Task Group); and the responsibilities assigned by the meeting to each of the Task Groups were as follows:

- FASID Task Group: develop amendment proposal to update MID FASID
- AMHS Task Group: develop MID AMHS implementation guidance
- MID ATN Planning Task Group: Complete the development of MID ATN Planning document and develop MID ATN/IPS implementation strategy.
- Internet Usage Task Group: develop MID Region Public Internet usage Strategy and Guidance

3.12 The FASID Task Group reviewed MID ANP FASID (Doc 9708) specially the CNS section part IV, paying attention to the ATN part and the agreed that connectivity data for AFTN/CIDIN/AMHS, On-Line Data Interchange (OLDI), which is functionally equivalent to Air Traffic Services (ATS) Inter-Facility Data Communication (AIDC), and ATS direct speech in the ICAO MID Region needs to be updated in MID FASID.

3.13 The FASID Task Group was of the view that periodical connectivity data collection and publication in the MID ANP FASID was a human resource extensive task and would need to be supported by electronic tools, e.g. centralized database. In this context the meeting was made aware that AFTN/CIDIN/AMHS international connectivity information was maintained in ICAO EUR by Eurocontrol in the AMC, and phase 2 functionality will be added for producing a report in a specified tabular form, appropriate for publication in the EUR FASID, the same procedure could be implemented in MID Region.

3.14 The meeting was also informed about the web-based Flight Message Transport Protocol (FMTP) and ATM Ground Voice Network (AGVN) database inventories, developed by Eurocontrol. These inventories enabled collection and maintenance of OLDI and ATS direct speech connectivity data from Eurocontrol member States.

3.15 Based on the above, the meeting agreed that means and ways to be explored for the introduction of such tool in the MID Region. However, the meeting agreed that MID States need to provide updates to ICAO MID Regional Office concerning Part IV of the MID ANP FASID to enable the ICAO MID Regional Office to prepare the appropriate amendment proposal for circulation and necessary approvals.

3.16 The meeting was informed about the electronic Air Navigation Plan (e-ANP) which will enable the central databases required. Accordingly, the meeting agreed that, the MID Region should benefit from this development and agreed that focal points be assigned in the MID Sates to provide and update all necessary information of the MID ANP FASID Part IV and to start with the ATN detail update, as and when the e-ANP becomes ready for operation.

REPORT ON AGENDA ITEM 4: DEVELOPMENT OF THE REGIONAL PLANS

4.1 The meeting received presentation in which it was highlighted that, Global Operational Outcomes are improvements to the Air Navigation System that are on the critical path towards the Global Operational Concept and result in a direct performance enhancement, and through which differences that are obstacles to global interoperability are resolved. Global Operational Outcomes are designed to measure the effectiveness of the transition strategy and may be used to verify consistent and harmonized progress/commitment by all stakeholders.

4.2 Furthermore, the presentation also highlighted Regional Operational Outcomes being improvements to the Air Navigation System that are required to evolve the air navigation system in support of the Global Operational Outcomes, and in keeping with operating environments and priorities specific to a regional level.

4.3 Taking the above into consideration, the meeting reviewed the Performance Framework Forms related to the work programme of the Working Group which were endorsed by MIDANPIRG/11 and used them as guidance for the development of the regional ATN plans.

4.4 In this context and in order to develop the MID Regional ATN plan, the meeting was updated on Amendment 83 to Annex 10 that had become applicable as of 20 November 2008, which among other issues, introduced Internet Protocol Suite (IPS) technology to the Aeronautical Telecommunication Network (ATN).

4.5 The meeting noted Conclusion 10/64 emanated from MIDANPIRG/10, and was appraised of the IPS based ATN being easy expandable (scaleable), more reliable, easier interconnection, flexible, de facto industry standard, IPS standards open and freely available and that a large variety of equipment and software are available of the shelf and at low cost.

4.6 Bahrain updated the meeting on their new IP network and the recently updated message switching systems. The new IP network provided a common infrastructure to share services and resources on the local network. The new message switching system is based purely on IP which provided flexibility and enhanced services for the local messaging users. The system is still supporting AFTN, CIDIN and AMHS for international links or local legacy systems. The new messaging system provided as well gateways to other communication systems like Email, FAX, SITA and GTS.

4.7 Egypt provided verbal briefing on the new switching system (AFTN/CIDIN/AMHS) and the international circuit that are currently operational at Cairo Communication Centre, where the meeting noted that all circuits that Egypt operates are high speed digital links except the link with Syria which is under progress for upgrading. Furthermore, the meeting was advised that the links with Amman and Jeddah are using routers for both data and voice on the same links. Two new circuits with Riyad and Athens are also digital and used for voice only.

4.8 Iran provided a presentation to the meeting on their AFTN switch where it is capable to use the public internet using FTP application. Preparation are undergoing for migration to AMHS for which and international request for tender been announced. Tehran-Karachi AFTN circuit was upgraded to 9.6Kbps digital lease lines, and follow-up on the Baghdad AFTN circuit using VSAT will be carried out.

4.9 Libya presented their AFTN Centre and the number of connections it handles. In this regard, it was noted that the AFTN Centre was upgraded in 2004 with a new switch capable of handling AFTN/CIDIN/AMHS. The meeting was further updated that for the AMHS functionality the switch requires upgrading.

4.10 Saudi Arabia provide a presentation on the National ANS Network (NAN) which will provide single communication infrastructure supporting the exchange of operational data between GACA sites and conveying operational voice between GACA ACCs, airports towers and remote controlled Air Ground Stations. NAN is composed of five nodes and a number of remote sites and will include network management center located in the maintenance engineering department which will supervise all active devices.

4.11 Syria has started the upgrade of the circuits with adjacent States that will be expected to be ready within two months. Furthermore a study is underway for the installation and implementation of AMHS system by MID 2010.

4.12 Jordan also updated the meeting indicating that their switching system was upgraded with capabilities for AFTN/AMHS and testing is going on with Egypt, also the AFTN circuits with Iraq and Syria are being under discussions and Jordan side are ready and waiting for Iraq and Syria.

4.13 The meeting recalled ICAO State letter SP 54/1-03/39, dated 30 May 2003, in which ICAO sought input from States and interested international organizations, to allow ICAO to establish the AMHS Management Domains and Addressing Information Register. The register has been established and available on the ICAO-Net, at the following URL: www.icaonet.int/anb/panels/acp/amhs/amhs.cfm.

4.14 The meeting noted that transition from AFTN to the AMHS is under way and continuing at a good pace globally and in MID Region. Furthermore, for the orderly operation of the AMHS on a global scale, it is necessary to coordinate and synchronize the allocation of AMHS addresses. In response to this, ICAO will utilize the European ATS Messaging Management Center (AMC), and in cooperation with the European Organization for the Safety of Air Navigation (EUROCONTROL), which established procedures for the coordination and synchronization of AMHS addresses in the short-to medium-term.

4.15 The meeting was informed that the procedures for AMHS address coordination through AMC were outlined in State Letter AN 7/49.1-09/34 at **Appendix 4A** to the report on Agenda Item 4.

4.16 The meeting noted that in order to use the AMC it is necessary for the users to be trained before they are actually allowed to enter data in the AMC (http://www.eurocontrol.int/amc). In response to this requirement EUROCONTROL will organize, two-days training session 3 to 4 June 2009 (free of charge) to all registered users. The training session will be held at the EUROCONTROL Institute of Air Navigation Services (IANS), located in Luxembourg.

4.17 The meeting was of the view that the training session schedule is very soon and MID States will not have enough time to attend this training, as in addition to other travel issues, the issue of obtaining appropriate entry visa should also be considered. Consequently the meeting requested ICAO MID Regional Office to coordinate with EUROCONTROL for the conduct of a training session for the MID Region to allow the maximum number of States to participate and agreed to the following Draft Conclusion:

DRAFT CONCLUSION 1/2: AMHS ADDRESS COORDINATION IN MID REGION

That MID States,

a) use the EUROCONTROL AMC and follow the procedures as outlined in SL 7/49.1-09/34;

b) operating international Communication centre, with the intention of implementing AMHS should engage into the AMHS address coordination process without delay; and

c) support ICAO MID Regional Office by attending the AMC training which will be organized for the MID Region.

4.18 The meeting noted that for the long-term, a truly global method of AMHS address management is required, in which ICAO HQ should be responsible for this global management and also ICAO MID Region take necessary measures to establish MID management centre.

4.19 The meeting reviewed attachment B of State Letter AN 7/49.1-09/34 specifically related to registration procedure and noted that the current situation is that every individual State can request an account which is putting burden on the AMC administrator and concerned ICAO MID Regional Office since the concerned Regional Officer needs to verify the credential of individuals in the States which is time consuming and not properly documented.

4.20 Based on the above the meeting developed the procedure as at **Appendix 4B** to the report on Agenda Item 4 and developed the following Draft Conclusion:

DRAFT CONCLUSION 1/3: REGISTRATION TO AMC

That,

*a) ICAO MID Regional Office communicates the procedure developed by IPS WG to the concerned at ICAO HQ and EUROCONTROL for the modification of the registration procedure for MID Region as outlined in **Appendix 4B** to the report on Agenda Item 4; and*

b) MID States designate three users to AMC and send their details to ICAO MID Regional Office as soon as possible..

4.21 The AMHS Task Group reviewed Docs 9793, Doc 9705 and Doc 9880 and other ICAO Regions guidance documents, in order to develop MID AMHS regional implementation guidance, and was of the view that MID AMHS Documentation should be based on ICAO documents. The AMHS Task Group agreed to prepare draft outline for MID AMHS documentation which is to be integrated in the "MID ATN planning and implementation document".

4.22 The meeting noted EUR Region AMHS Implementation Plan and was informed that these plans are produced by the AMC based on the plans posted by States. Consequently, the meeting agreed that MID States post their AMSH implementation plan on the AMC, and accordingly, developed the following Draft Conclusion:

DRAFT CONCLUSION 1/4: POSTING OF AMHS PLANS IN AMC

That, MID States are encouraged to post their AMHS implementation plans on the European ATS Messages Manager Centre (AMC).

4.23 The meeting noted that ICAO focus towards developing performance based SARPs, giving more strength to outside Standards-making organizations and utilizing their work within the ICAO framework, thus avoiding duplication of work and reducing the overall activity of panels and to refocus more on implementation of Standards and less on Standards-making.

4.24 The meeting further noted that the IPS WG was established to foster the implementation of ATN in the MID Region, since ATN activities have been ongoing since some years. In this regards the MID Region developed the MID Regional ATN Planning Document which was reviewed by the different Task Groups established.

4.25 Noting the above objectives of the IPS WG, the meeting received update on the reference documentation for the AMHS system, the ATN network and the ATSMHS which are contained in the following documents:

- Annex 10, Vol. III, Chapter 3, General description of the AMHS system and the ATSMHS service; including Amendment 83 to Annex 10 – *Aeronautical Telecommunications*, Vol. III, Parts I and III, applicable on 20 November 2008, introduces the Internet Protocol Suite (IPS) technology in ATN;
- Doc 9705 – Manual of Technical Provisions for the Aeronautical Telecommunication Network;
- Doc 9739 – Comprehensive Aeronautical Telecommunication Network Manual;
- Doc 9880 – Manual on Detailed Technical Specifications of the ATN/OSI; and
- Doc 9896 – Manual for the ATN using IPS standards and protocols.

4.26 The meeting also noted the various documents developed by other ICAO region for the implementation of ATN and noted that the MID Region adopted IPS based ATN.

4.27 The meeting was of the view that, existing X25 based data networking has become obsolete and is no longer supported by some suppliers. States and their Air Navigation Service Providers (ANSP) will therefore be obliged to migrate their national networks and associated international connectivity to IP for both economic and service support reasons.

4.28 The meeting noted that in Europe a Pan European Network (PEN) has been initiated by EUROCONTROL. PEN will be implemented in Europe to meet the ATM requirements for a cost-effective, international communications network with the ability to support existing as well as future services. In its initial form, PEN is planned as a ground-ground IP network serving data communications between ANSPs and between ANSPs and EUROCONTROL. The meeting further noted that voice services will be integrated when the relevant SARPS are developed in the ACP.

4.29 The meeting further noted that PEN access points distributed over Europe and some neighboring States, some of which are in the MID Region, and that the most important purpose of the PEN project is to rationalize on the two existing backbones for Central Flow Management Unit (CFMU) and European AIS Database (EAD), and to set up an IP backbone service for all European ANSP's so that a single common IP backbone can serve current and future ANSP's communication needs.

4.30 The meeting was of the view that interoperability between ANSP systems is becoming more and more important, since the adoption of Flight Management Transfer Protocol (FMTP) in place of OLDI. FMTP aligns with the use of Internet Protocols (IP) as the industry standard for data exchange. This approach will extend to apply to other ANSP data, such as messaging and radar.

4.31 The meeting noted that there are no central application in MID Region like in Europe, however, the bi-lateral communications between neighbouring MID States are indeed very similar to Europe [Flight plan, OLDI, ATC Ground-Ground (G-G) voice].

4.32 The meeting further noted that some MID States have opted for integrated IP based national network. Sharing this experience will be of benefit to the region, mainly if the MID Region consider the possibility of establishing a common MID IP Network for which specification will have to be developed.

4.33 Based on the above, the meeting was of the view that development of the common MID network specification is out of the scope of the Working Group and agreed that, each member of the IPS WG will check the feasibility within their States, and when tasked by MIDANPIRG this task could be taken further. It has been emphasized that common MID Regional IP network is of utmost requirement and will be needed for smooth ATN network operations, and it will be a phase within the implementation of the System Wide Information Management (SWIM) in the MID region, which is considered as enabler to promote information-based ATM integration, as envisioned in ICAO Global Air Traffic Management Operational Concept.

4.34 The ATN Planning Task Group reviewed thoroughly the "MID ATN Planning Document" and other regions document, and made considerable updates to it which includes updates of important details for supporting the (G-G) ATN implementation. Furthermore, the meeting agreed that the document to be reviewed again by IPS WG/2 and when mature, ICAO MID Regional Office to circulates the document to all MID States for comments and adoption.

4.35 The "ATN Planning Task Group" also developed MID Region Strategy for the implementation of ATN, and was of the view that it is to be attached to "MID ATN Planning Document" and to rename the Document as the "MID Region ATN Planning and Implementation Document" integrating the ATN plan, ATN Implementation Strategy, and work developed by all Task Groups of which the first draft is at **Appendix 4C** to the report on agenda item 4. The meeting also agreed that IPS WG/2 is to complete the development of this new document. Accordingly, the meeting developed following Draft Conclusion:

DRAFT DECISION 1/5: MID REGION ATN PLANNING AND IMPLEMENTATION DOCUMENT

*That, MID ATN Planning document be amended as at **Appendix 4C** to the report on Agenda Item 4 and renamed "MID Region ATN planning and Implementation Document". and IPS WG complete its development.*

4.36 The Internet Usage Task Group, noted the different application for the public internet usage in the MID States and based on ICAO Doc 9855 - Guidelines on the Use of the Public Internet for Aeronautical Applications, and documents from other ICAO Regions. The Internet Usage Task Group concluded the following:

- Using the public internet should be limited for low Traffic and remote location within the State.
- No public Internet usage between International COM Centre.
- Proper security measures to be taken for the use of public internet.
- Inventory on the usage of public internet in MID States is required for documentation and further research and development.
- Based on the research other uses could be added for the public internet usage.

4.37 The Internet Usage Task Group developed the draft MID Region Public Internet usage strategy and guidance document as at A**ppendix 4D** to report on Agenda Item 4, which was reviewed and adopted by the IPS Working Group. The meeting was of the view that this Strategy to be reviewed by IPS WG/2 meeting and that ICAO MID Regional Office to circulate the document to all MID States for their comments.

4.38 The meeting was of the view that all MID States have to provide the necessary information on the inventory of the public internet usage in their State as this will be a considerable information for the common agreement on the Public Internet usage. Consequently, the meeting agreed that a survey to be circulate to all MID States and request for urgent replies. Accordingly, the meeting developed the following Draft Conclusion:

DRAFT CONCLUSION 1/6: USE OF PUBLIC INTERNET IN MID REGION

That MID States,

*a) are encouraged to follow the guidance **Appendix 4D** to the report on Agenda Item 4, when using the public internet for critical aeronautical communication; and*

b) urgently provide the inventory on the public internet usage in their States to the ICAO MID Regional Office.

4.39 The meeting agreed that the development of the MID IP Network and the security issues of the network and specially the public internet require special expertise, Consequently, the meeting agreed that invitation to be extended to other organizations that can support the work of the group as necessary.

4.40 The meeting encouraged research on the messaging application, in this regard Bahrain and Iran showed interest to set test-beds and provide the results to all States of the MID Region.

International Civil Aviation Organization | Organisation de l'aviation civile internationale | Organización de Aviación Civil Internacional | Международная организация гражданской авиации | منظمة الطيران المدني الدولي | 国际民用航空组织

Tel.: +1 (514) 954-8219 ext. 6712

Ref.: AN 7/49.1-09/34

14 April 2009

Subject: Management and update of air traffic services (ATS) message handling system (AMHS) address information

Action required: Register a COM Centre representative to become a user of the ATS messaging management centre (AMC) using the procedures outlined in Attachment B

Sir/Madam,

1. I have the honour to invite your attention to a recent development regarding the global management of the emerging air traffic services (ATS) message handling system (AMHS). The methods and procedures outlined in this letter will become important to those involved in the planning and operation of your message switching systems.

2. The transition from the ageing aeronautical fixed telecommunication network (AFTN) to the AMHS is under way and continuing at a good pace. For the orderly operation of the AMHS on a global scale, it is necessary to coordinate and synchronize the allocation of AMHS addresses. In response to this, ICAO, in cooperation with the European Organisation for the Safety of Air Navigation (EUROCONTROL), has established procedures for the coordination and synchronization of AMHS addresses in the short- to medium-term.

3. Before discussing the procedures, I would like to provide you with the background to this development. State letter SP 54/1-03/39, dated 30 May 2003, sought input from States and interested international organizations, to allow ICAO to establish the AMHS Management Domains and Addressing Information Register. This register has now been established and is now available on the ICAO-Net, at the following URL: *www.icaonet.int/anb/panels/acp/amhs/amhs.cfm*.

4. With the register established, a means of address coordination was necessary. At the forty-ninth meeting of the European Air Navigation Planning Group (EANPG), two conclusions were reached which dealt with the following:

999 University Street
Montréal, Quebec
Canada H3C 5H7

Tel.: +1 514-954-8219
Fax: +1 514-954-6077

E-mail: icaohq@icao.int
www.icao.int

Conclusion 49/23 – AMHS Address Coordination

That ICAO be invited to utilize the European ATS Messaging Management Centre facility at the earliest opportunity, in support of the initial AMHS implementation and based on the proposed draft AMHS address coordination procedures between the ICAO AMHS MD Register and the ATS Messaging Management Centre.

Conclusion 49/24 – AMHS Messaging Management Centre Users

That ICAO be invited to address States outside the ICAO EUR Region to register with the ATS Messaging Management Centre as external COM centre operators, as soon as possible.

5. This State letter is a response to the EANPG conclusions above. In the short- to medium-term, ICAO will utilize the European ATS Messaging Management Centre (AMC), provided by EUROCONTROL, to coordinate the allocation and management of AMHS addresses. All States are therefore invited to designate representatives to register as AMC users using the procedure described in Attachment B.

6. The procedures for AMHS address coordination through the AMC are given in Attachment A. Users need to be trained before they are actually allowed to enter data in the AMC *(http://www.eurocontrol.int/amc)*. A two-day training session will be delivered from 3 to 4 June 2009 (free of charge) to all registered users. The training session will be held at the EUROCONTROL Institute of Air Navigation Services (IANS), located in Luxembourg.

7. All States and/or ANSPs, operating international COM Centres, with the intention of implementing AMHS in the foreseeable future, should engage themselves into the AMHS address coordination process without delay.

8. For the long-term, a truly global method of AMHS address management will be required. Staff within the CNS/AIRS Section of the Air Navigation Bureau will take the necessary action to develop appropriate recommendations for the establishment of management centres in the ICAO Regions and also the cooperation between such centres.

Accept, Sir/Madam, the assurances of my highest consideration.

Taïeb Chérif
Secretary General

Enclosures:

A — Proposed short-term procedures for global AMHS address coordination
B — Registration procedure

ATTACHMENT A to State letter AN 7/49.1-09/34

PROPOSED SHORT-TERM PROCEDURES FOR GLOBAL AMHS ADDRESS COORDINATION
(Based on Appendix O to the EANPG/49 Report)

1. INTRODUCTION

1.1 This paper was developed by the air traffic services (ATS) message handling system (AMHS) Inter-Regional Coordination Team (in short, the IRC Team) formed to address inter-regional air traffic services (ATS) message handling system (AMHS) issues under coordination by the ICAO European and North Atlantic Office (Paris) (EUR/NAT) Office, with the endorsement of the European Air Navigation Planning Group (EANPG).

1.2 The IRC Team action plan included, as part of the definition of short-term working arrangements for the global use of the ATS messaging management centre (AMC) for the AMHS Management Domain (MD) Register, draft procedures to be developed for global AMHS address management in the short term using AMC[1].

1.3 The AMC is a concept defined in the *ATS Messaging Management Manual* (ICAO EUR Doc 021), for the off-line management of the integrated, heterogeneous messaging environment made of the aeronautical fixed telecommunication network (AFTN), common ICAO data interchange network (CIDIN) and AMHS. The concept describes the management organization and includes a set of functions and procedures which are implemented in AMC systems to deliver services to AMC users in ANSPs, and particularly in their international communications (COM) centres.

1.4 This paper provides the proposed procedures. The overall goal of these procedures is to ensure for the short-term that the global AMHS address management is performed in a consistent manner, both from an operational viewpoint and from an official (institutional) viewpoint.

1.5 For the medium and longer term a task force will be set up by the Air Navigation Bureau to develop appropriate recommendations regarding the future evolution of AMHS address management, including the potential establishment of management centres in ICAO Regions, if needed. This task force should be composed of representatives of ICAO Contracting States in various regions.

2. BACKGROUND ON GLOBAL AMHS ADDRESS MANAGEMENT IN THE SHORT-TERM USING AMC

2.1 The approach for global AMHS address management in the short-term is the following:

a) for operational purposes, there is an agreement to use the AMC in the short-term by the European (EUR) and the Asia/Pacific (ASIA/PAC) Regions, as well as by the United States Federal Aviation Administration (FAA). Other regions which have not discussed AMHS management so far should be encouraged to use the AMC as soon as they start studying AMHS implementation; and

[1] More information is available at http://www.eurocontrol.int/amc/

b) for institutional aspects, ICAO intends to publish, on its web site, an official version of the register.

2.2 Furthermore, the official ICAO Register and the operational AMC contain the same data and must be periodically aligned.

2.3 The working arrangements proposed in this paper are designed for a global AMHS address management using AMC. This implies that **the use of AMC should be strongly recommended to every ICAO Contracting State worldwide, as soon as there is an AMHS project or implementation in that State**. The procedures rely upon the fact that all States be involved in AMHS, i.e. all States which may declare changes in AMHS addressing are AMC users.

2.4 The basis for these procedures should be that AMC is used operationally and that ICAO Headquarters publishes the AMHS MD Register officially on its website using AMC data.

3. SCOPE OF ENVISAGED AMHS ADDRESS CHANGES

3.1 The possible changes in AMHS addresses which need to be managed as part of the AMHS address management are classified in two categories and include the following modifications:

a) Major changes (should not be frequent):

1) Modification[2] of PRMD-name,

2) Change of addressing scheme, among those defined in ICAO Docs 9705/9880, from "XF" to "CAAS" or vice-versa (less likely to happen);

b) Minor changes (should be more frequent):

1) Modifications in CAAS table (associations between location indicator – "OU" address attribute value and "O" address attribute value).

3.2 Major changes have either an institutional impact or a major operational impact.

3.3 Minor changes have only an operational impact, which may be much more limited, depending on the magnitude of changes which may be roughly assessed on the basis of:

a) the number of location indicators impacted by the change; and/or

b) the frequency of messages to/from users in the locations of which the location indicators are impacted.

3.4 Exceptionally, a minor change may have an institutional impact. However this should be very rare and as no specific procedure is defined for this such situations will be handled case by case on an ad hoc basis.

[2] The term "modification" should be understood here in a general way, meaning addition, modification or deletion.

4. ASSUMPTIONS RELATED TO THE PROCEDURES

4.1 Official interactions

4.1.1 Major changes, due to their institutional impact or major operational impact, must be subject to official interactions between the States and ICAO. These interactions are assumed to be based on the exchange of written documents by fax or letter. Pro formas for such documents are provided in Attachment A to this letter.

4.2 Systems

4.2.1 In the short-term, only two systems are available to contribute to AMHS address management, as mentioned above:

a) the AMC implemented by EUROCONTROL under the aegis of the ICAO EUR Office (Paris), for all operational purposes, following an EANPG/45 conclusion; and

b) the ICAO AMHS MD Register, for official purposes. This system is loaded with AMC data to ensure consistency with the operational status of the AMHS network.

4.3 Participants

4.3.1 The procedures rely upon the fact that all States/ANSPs involved in AMHS participate in AMC activity. Participants to the procedures are expected to be:

a) States, both as the potential initiators of changes in AMHS addressing and as implementers of AMHS systems. The notion of "State" therefore includes:

   1) the people in charge of official declarations, for major changes;

   2) Cooperating COM Centre (CCC) Operators[3] in charge of operational management of AMHS. They use AMC data to configure their message switches and AFTN/AMHS gateways;

   3) Other AMC users, such as AMHS project managers, engineers involved in AMHS projects, COM Centre personnel, etc. (several AMC user categories are defined for them, including "AMF-I User[4]" and "Read-only user");

b) ICAO Regional Offices as a possible interface for the States in each ICAO Region. The regional office is represented by the CNS Officer;

c) ICAO Headquarters, represented by the Air Navigation Bureau and more specifically (if needed) by its Communications, Navigation and Surveillance/Aeronautical Information Resource Services Section (CNS/AIRS) Section;

d) AMC Operators, responsible for overall operation of the AMC and of associated procedures.

---

[3] In the current AMC terminology, the term CCC is limited to Europe, and External COM Centre is used for States outside Europe. This distinction should disappear, and the terminology/documentation should be updated, when global use of AMC is started based on these procedures.

[4] The term "AMF-I User" denotes an AMC user specifically involved in AMHS Off-Line Management – Implementation Support functions, on behalf of his/her State or ANSP, e.g. the project leader for AMHS implementation.

5. PROCEDURE FOR MAJOR CHANGES

5.1 A simplified diagram of the proposed procedure for major changes is provided in Figure 1. The main stages are as follows:

1. an accredited person in the considered State declares the change to ICAO, using a standard written pro forma – "ICAO" in this case means the regional office for the ICAO Region where the State is located. The pro forma includes the applicability date of the change (an AIRAC date);

2. the CNS Officer in the regional office, in coordination with ICAO Headquarters as appropriate[5], validates the acceptability of the declared change from an official and institutional viewpoint;

3. after validation, the CNS Officer forwards the declaration of change to the AMC operator, using appropriate means such as fax, e-mail, etc. (different from data entry in AMC);

4. the AMC operator enters data in the AMC based on the input received from the regional office, at the appropriate time considering the applicability date of the change and using the AMC operational procedures;

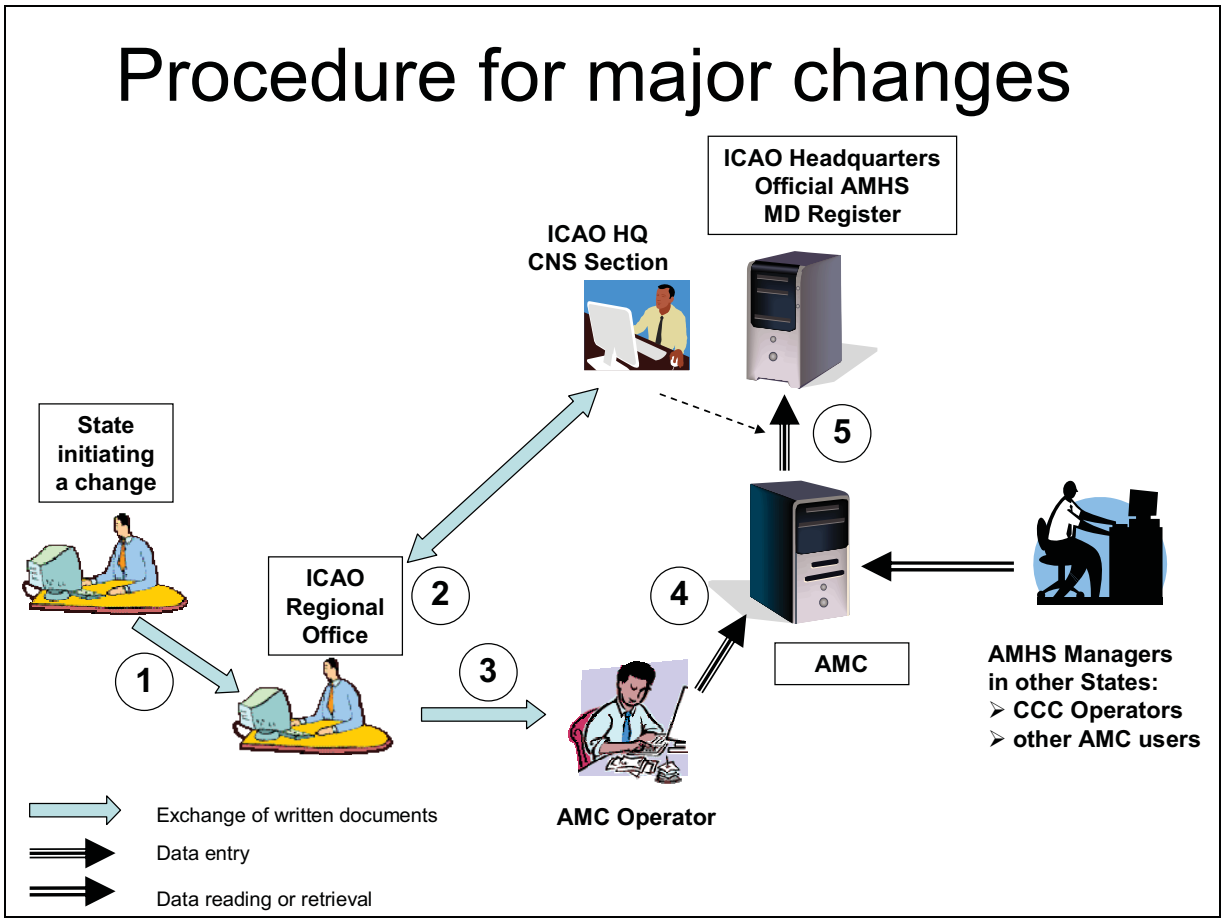
5. at the date of applicability, i.e. at each AIRAC cycle date, the ICAO Headquarters CNS/AIRS Section retrieves an AMHS address management export file from the AMC and uploads it to the ICAO Official AMHS MD Register.

5.2 Steps 3 to 5 are performed as part of the normal AMC operation. This means that, in parallel with this process, standard AMC procedures are followed by the AMC operator and by AMHS managers in other States. The CCC operators exploit the AMC data reflecting the change, together with other AMHS management data, to update their systems.

5.3 At each stage, coordination may take place, if needed, between the different parties involved to ensure the correctness of the proposed change.

[5] e.g. to ensure global uniqueness of a requested PRMD-name with respect to other requests under consideration in other regions.

Figure 1: Procedure to handle major AMHS address changes



6. PROCEDURE FOR MINOR CHANGES

6.1 A simplified diagram of the proposed procedure for minor changes is provided in Figure 2. The main stages are as follows:

1. the CCC operator in the considered State enters data corresponding to the intended change in the AMC, using the standard AMC operational procedures, taking into account the applicability date of the change (an AIRAC date);

2. the AMC operator performs the standard AMC operational procedures, such that the status of changed data is passed to “operational” at the applicability date;

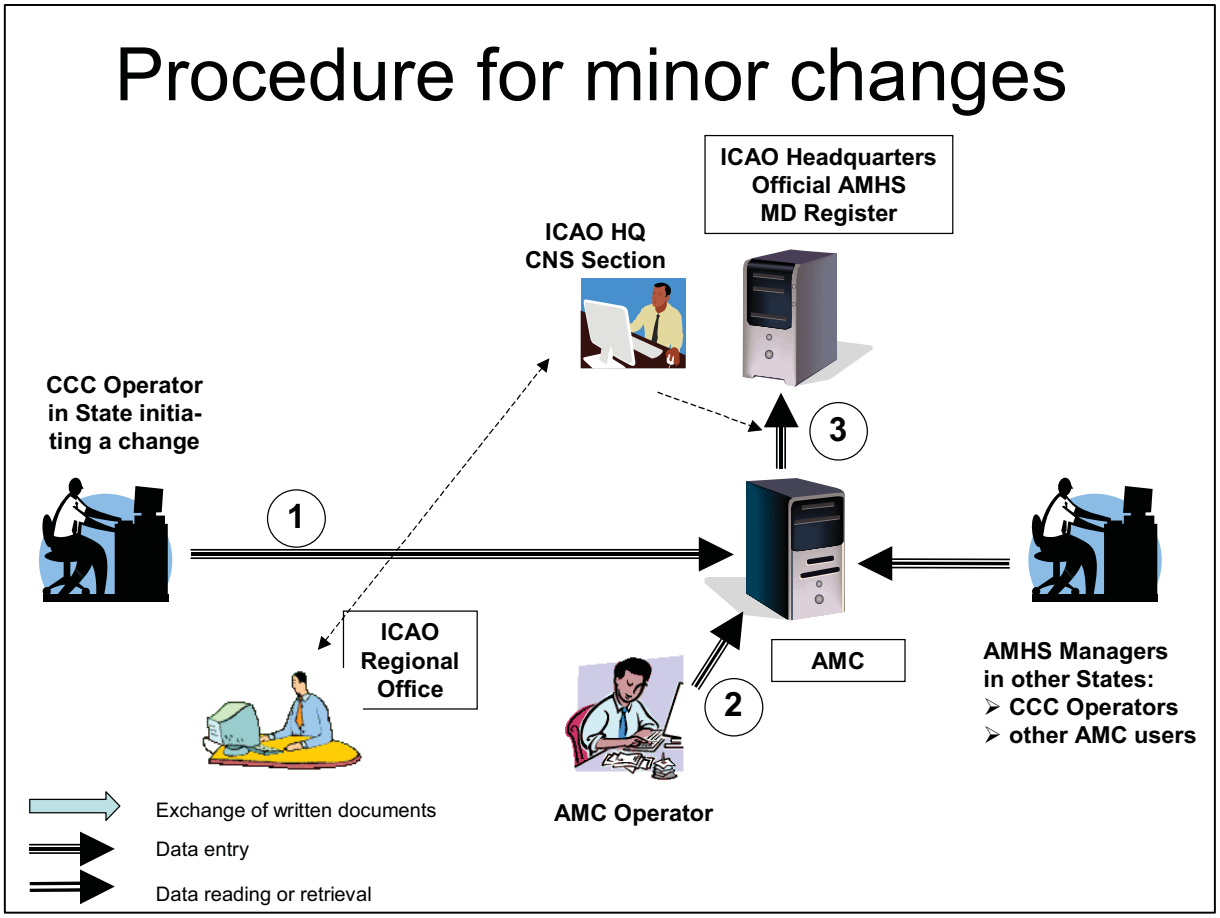
3. at the date of applicability, i.e. at each AIRAC cycle date, the ICAO HQ CNS/AIRS Section retrieves an AMHS address management export file from the AMC and uploads it to the ICAO Official AMHS MD Register (this is identical to stage 5 in the procedure for major changes).

6.2 This is performed as part of normal AMC operation. This means that in parallel with this process, standard AMC procedures are followed by the CCC operators and other AMC users to exploit

the AMC data reflecting the change, together with other AMHS management data, to update their systems.

6.3 At each stage, coordination may take place if needed between the different parties involved, and with the CNS Officer in the regional office if needed[6], to ensure the correctness of the proposed change.

Figure 2: Procedure to handle minor AMHS address changes



[6] The regional office needs to be involved only in exceptional cases, such as institutional impact of a minor change.

Part 1: Modification of PRMD-name Registration

State: ……

Nationality letters: ……

PRMD-name registered before modification: .....

Please consider the following options in case of modification:

Option A: the PRMD-name to be the following reserved identifier.

Option B: the PRMD-name to be modified as proposed below, after validation by the Secretariat.

Option C: the PRMD-name to remain unchanged (only the addressing scheme is modified, see Part 2).

Please specify your choice (A, B or C): ☐

If choice is B, please specify the proposed PRMD-name identifier:

P =

Proposed applicability date for the modification (an AIRAC date): ……

Name of organization managing the AMHS MD (if applicable): ……

The contact point: ……

Postal/electronic mail address and telephone/fax number: ……

Additional comments:

Part 2: Modification of declaration of addressing scheme

State: ……

Nationality letters: ……

PRMD-name registered before modification: .....

Addressing scheme declared before modification: .....

Please select one of the following options in case of modification:

Choice A: AMHS user addresses to be allocated by application of the (recommended) CAAS addressing scheme in the AMHS MD operated in the above State.

Choice B: AMHS user addresses to be allocated by application of the (default) XF addressing scheme in the AMHS MD operated in the above State.

Choice C: the addressing scheme to remain unchanged (only the PRMD-name is modified, see Part 1).

Please specify your choice (A, B or C):

If choice is A (CAAS), please fill in the following table for all location indicators found in Doc 7910 under the above nationality letters.

Organization-name for the group of locations	**location indicators**

(table to be expanded as appropriate)

Proposed applicability date for the modification (an AIRAC date): ……

Name of organization managing the AMHS MD (if applicable): ……

The contact point: ……

Postal/electronic mail address and telephone/fax number: ……

— — — — — — — —

ATTACHMENT B to State letter AN 7/49.1-09/34

REGISTRATION PROCEDURE
(based on *ATS Messaging Management Manual*, section 2.5.2.4)

1. In order to carry out the procedures described in Attachment A, each State/ANSP should designate an AMC User associated to its COM Centre. A second person may also be designated as a back-up.

2. The AMC User has to register using the following link:

https://extranet.eurocontrol.int/http:/chow.mis.eurocontrol.be:8095/elsh_live/elsh/registerNewUserForApplication.do?eurocontrolresourceid=amc_users

3. Once this is performed, the user accreditation procedure defined in section 2.5.2 of the *ATS Messaging Management Manual* will start.

4. After the accreditation of the user, an AMC account will be created by EUROCONTROL AMC Support Team and details of the account will be sent to the users. Training of the user will also be planned at this stage.

5. After training, the user can start accessing the AMC using http://www.eurocontrol.int/amc/.

— END —

IPS WG/1
Appendix 4B to the Report on Agenda Item 4

Modified REGISTRATION PROCEDURE for MID Region to access AMC

(Based on IPS Working Group agreement)

The following procedure is to be used by MID States for registering users to access the European ATS Message Management center (AMC)

1. In order to carry out the procedures described in Attachment A, of State letter AN 7/49.1-09/34 each MID State/ANSP should designate three AMC Users associated to its COM Centre. One engineer, one operator and Manager of the Com Center.

2. The MID State/ANSP send the details of the above three designated users to ICAO MID Regional Office.

3. The MID State/ANSP send the above three designated users to attend the AMC training as soon as possible.

4. ICAO MID Regional Office to send the details of MID States/ANSP designated users to AMC focal point.

5. The EUROCONTROL AMC Support Team create AMC accounts for all MID users as per the ICAO MID regional Office request.

6. The EUROCONTROL AMC Support Team send account details to designated users.

7. Users start accessing start accessing the AMC using http://www.eurocontrol.int/amc/.

8. If any designated user of the MID State/ANSP change his post and no longer requires access to AMC the concerned States send details to cease this particular account to ICAO MID Regional office who in turn notify Eurocontrol to stop the account.

9. Creation of new account should follow step 1-7

IPS WG/1
Appendix 4C to the Report on Agenda Item 4

MID REGIONAL ATN PLANNING AND IMPLEMENTATION DOCUMENT

Document Reference:	MIDANPIRG IPS/ WG
Author:	ATN Planning and IPS WG
Revision Number:	Draft Version 01 / 2009
Date:	June 2009

EXECUTIVE SUMMARY

This transition plan provides technical guidance on the transition from the ground infrastructure support of the Aeronautical Fixed Telecommunication Network (AFTN) and the Common ICAO Data Interchange Network (CIDIN) services to the Aeronautical Telecommunication Network (ATN) for the Middle East Region.

The Middle East ATN Ground Transition Plan outlines the requirements to increase bandwidth and upgrade protocols for those trunks that will support the main data flow of traffic through the Middle East Region. The plan also provides target dates in which these trunks and implementation of BBISs and BISs will need to occur to ensure a smooth transition of the ATN within the region, taking into account proper interface with adjacent regions.

This document explain the plan on the ATN ground transition activities applicable to the Middle East Region. The ATN Transition Plan includes information about the implementation of Regional ATN Routing Architecture as presented in this document and development of naming and addressing plan.

This document is also updated with other ATN related material useful for the ATN implementation such as

- MID ATN IP based Strategy
- MID AMHS implementation
- MID AMHS testing
-

This document is live document which will keep developing and other parts will be added to the document also will be amended as and when deemed necessary as appropiate upon approval of the appropiate MIDANPIRG subsidiary bodies. In that respect comments from States will be appreciated and could be addressed through the appropiate MIDANPIRG subsidiary body.

Any references to this manual should be interpreted as also referring to Annex 10 and misinterpretation Annex 10 and the relevant ICAO documents will supersede this documents .

CHAPTER ONE

ATN Transition Plan

Table of Contents

1. INTRODUCTION

This chapter presents a plan on the ATN ground activities applicable to the Middle East Region. It provides also information on the ground infrastructures required to support the ATN and to take into consideration progressively the ATN air-to-ground requirements of the Region.

1.1 Objective

1.2 Scope

The scope of the chapter one includes:

- A brief description of the current ground infrastructure and upgrade plans based on AFTN/CIDIN;
- The types of ATN applications that will be used over the ground infrastructure;
- The types of trunks that will need to be upgraded to cater for ATN traffic; and
- A proposed implementation schedule on how the ATN should be transitioned within the region.

1.3 References

Reference 1 Annex 10
Reference 2 Manual of Technical Provisions for the ATN (Doc 9705-AN/956) Second Edition 1999
Reference 3 Comprehensive Aeronautical Telecommunication Network (ATN) Manual (Doc 9739-AN/961) First Edition 2000
Reference 4 Middle East AFTN/CIDIN Routing Directory
Reference 5 ICAO Location Indicators – Document 7910
Reference 6 Middle East CNS Facilities and Services Implementation Document (FASID) – Doc. 9880
Reference 7 ASIA/PAC Regional Aeronautical Telecommunication Network (ATN) Planning Document
Reference 8 ASIA/PAC ATN Strategy
Reference 9 Europe ATN
Reference 10 9896 manual for the ATN using IPS standard protocols

2. CURRENT GROUND INFRASTRUCTURE AND UPGRADE PLANS

2.1 The present ground-ground data communications system in the Middle Region comprises AFTN circuits and centers (tributary and main) that allow the exchange of ATS and other operational messages.

2.2 Five States of the Region already implemented the Common ICAO Data Interchange Network (CIDIN) as an upgrade of the low speed AFTN circuits to improve the efficiency and reliability of message exchange. These CIDIN circuits are operating at 9600Bps and the remaining circuits at 50 Bps to 300 Bps, using asynchronous protocols.

2.3 The detail of international circuits operating within the Region and between neighboring regions. is documented in Table CNS 1A of the ICAO MID CNS Facilities and Services Implementation Document (FASID).

2.4 The current AFTN topology in the Region shows that the majority of circuits will not be suitable to be used for the ATN without some form of upgrade. In later stage, it will be necessary to identify those circuits that need to be upgraded in both bandwidth and protocols.

2.5 With regard to bandwidth requirements, it is assumed that 64Kbps or higher shall be used for Intra-regional connections while 64Kbps (based on agrrement with other region) or higher speed could be preferred for Inter-Regional connections when full ATN is implemented.

2.6 It is important to note that some States have already started the establishment of a communication infrastructure that would serve the ATN. There have been implementations of high speed point-to-point digital links operating at 64KBPS and carrying voice and data traffic.

2.7 In respect to the upgrade of protocols, it is expected that they will be implemented on a bilateral arrangements between States according to the preferred protocols: TCP/IP prefaraberly v.6. **Frame Relay or Asynchronous Transfer Mode (ATM) or any other protocol that will be included in the ICAO Standards in future.**

2.8 It can happen that due to different planning activities, ~~by States, which~~ not all States within the Region will be migrating to the ATN at the same time. Therefore, there will be a need to maintain the existing AFTN circuits to operate in parallel with any new implementation of high-speed links to meet ATN requirements.

3. ATN END SYSTEM APPLICATIONS

3.1 According to the Manual of Technical Provisions for ATN (Doc. 9705- AN/956) and Comprehensive Aeronautical Telecommunication Network (ATN) Manual (Doc 9739-AN/961), there are currently six end system applications. The table below lists these applications and provides a brief summary of their functions:

Applications	Functions
Context Management (CM)	An ATN application that provides a logon service allowing initial aircraft introduction into the ATN and provides also a directory of all other data link applications on the aircraft.
Automatic Dependent Surveillance (ADS)	An ATN application that provides data from the aircraft to the ATS unit(s) for surveillance purpose.
Controller Pilot Data Link Communication (CPDLC)	An ATN application that provides a means of ATC data communication between controlling, receiving or downstream ATS units and the aircraft, using air-ground and ground-ground sub-networks.
Flight Information Service (FIS)	An ATN application that provides to aircraft information and advice those are useful for the safe and efficient conduct of flight.
ATS Message Handling Service (ATSMHS)	**A set of computing and communication resources that are implemented by ATS organizations to provide the ATS message service.**
ATS Inter-facility Data Communication (AIDC)	**An ATN application dedicated to exchanges between ATS units of ATC information in support of flight notification, flight coordination, transfer of control, transfer of communication, transfer of surveillance data and transfer of general data.**
On-Line Date Interchange (OLDI)	**An application used for the exchange of flight data for the purpose of notification, co-ordination and transfer of flights between Air Traffic Control Units.**

4. ATN TRAFFIC

4.1 Ground-Ground Traffic

4.1.1 ATS Message Handling System (AMHS)

4.1.1.1 With the introduction of AMHS as the replacement for AFTN/CIDIN, a number of AFTN circuit links between centers will need to be upgraded to cater for the increase of traffic load generated by AMHS overheads. Analysis carried out in other Regions showed that there will be significant overheads generated by AMHS for a typical message of about 250 bytes. As the message size increases the amount of overheads generated becomes less significant to the size of the body of the message. In transitioning from AFTN/CIDIN to AMHS, States will have to anticipate this increase in bandwidth to accommodate AMHS traffic so as to maintain current or better performance of traffic delivery.

4.1.2 ATS Interfacility Data Communication (AIDC)

4.1.2.1 It is also important to note that there will also be an increase in other forms of data traffic due to implementation of other ATN applications such as the ATS Inter-facility Data Communication (AIDC) application. AIDC will generally be used by Flight Data Processors (FDP) to communicate between each other, which are normally established in each Fight Information Region (FIR). It can therefore be expected that data generated by this application will increase bandwidth requirements on those links that are required to pass this information between FIRs.

4.1.2.2 States will need to ensure that not only are the links that are established between States are capable of transferring data in a timely manner but also for those links that provide an alternate path for the applications to use in times of disruption to the primary links.

4.2 Air-Ground Traffic

4.2.1 With the implementation of the air-ground applications it is important to ensure that transit response times are kept to a minimum level so as not to affect the overall response time that it takes for traffic such as ADS reports and CPDLC messages to be delivered to their final destination. This again reflects the need to ensure that critical ground links within the Region are capable of handling this information efficiently.

4.2.2 Another important factor with air-ground traffic is the generation of routing information that is caused by aircraft that will move between various ATN routing domains. To maintain this information in a defined area requires a minimum number of backbone routers to be implemented which protects the majority of all other ATN routers from being flooded with routing information.

5. ATN ROUTING ARCHITECTURE

5.1 The ATN infrastructure can be divided into two main areas to support both the air-ground and ground-ground applications that will operate over the ATN.

5.2 For air-ground support the ATN needs to support an ATN Routing Backbone network so that routing information about where an aircraft is can be maintained by this backbone. As aircraft move through various coverage media and FIR boundaries the ATN Routing Backbone will be notified of the changing routing data for each mobile aircraft in the region. The type of ATN Routing Backbone architecture for the Middle East Region is documented in the Middle East ATN Routing Architecture Plan (Reference) and is summarized in Figure 5-1 of this document.

5.3 It is anticipated that the trunks used for the ATN Routing Backbone will also be used to carry ground-ground application data such as the AMHS. This of course depends upon the routing policies set up between each router, which determine which links are to be used for the different classes of traffic that can be expected to transverse the network.

5.4

5.5 **Figure 5-1** shows the proposed ATN Routing Backbone for the Middle East Region. The ATN Router Backbone tries to use existing trunks that have already been established between the nominated States who will operate the backbone that is currently used for the AFTN. Virtually these trunks will need to be upgraded to cater for the increase in traffic load that will be handled by the ATN. Further details about these trunks are documented in Section 6.

5.6 To improve the resilience and redundancy aspects of the ATN routing backbone, it is proposed that additional trunks be incorporated to ensure minimal disruption to the air-ground applications. This effectively ensures that the Middle East Region can function on its own without support from other regions relaying information on behalf of a failed router or trunk service within the Middle East Region. These additional trunks have been shown as dashed lines in Figure 5-1. Also shown are the inter-regional connections between the Middle Region and its neighboring Regions. Additional inter-regional connections are also proposed and are further documented in Section 6.

5.7 It is important to also note that costs will increase due to implementing higher bandwidth links. Therefore the region should review its requirements in having to use point to point circuits every where when a number of strategically placed links may suffice with alternate dial up on demand capabilities being deployed between key sites. This may help to offset the costs and still provide for an efficient ground-ground network for the ATN.

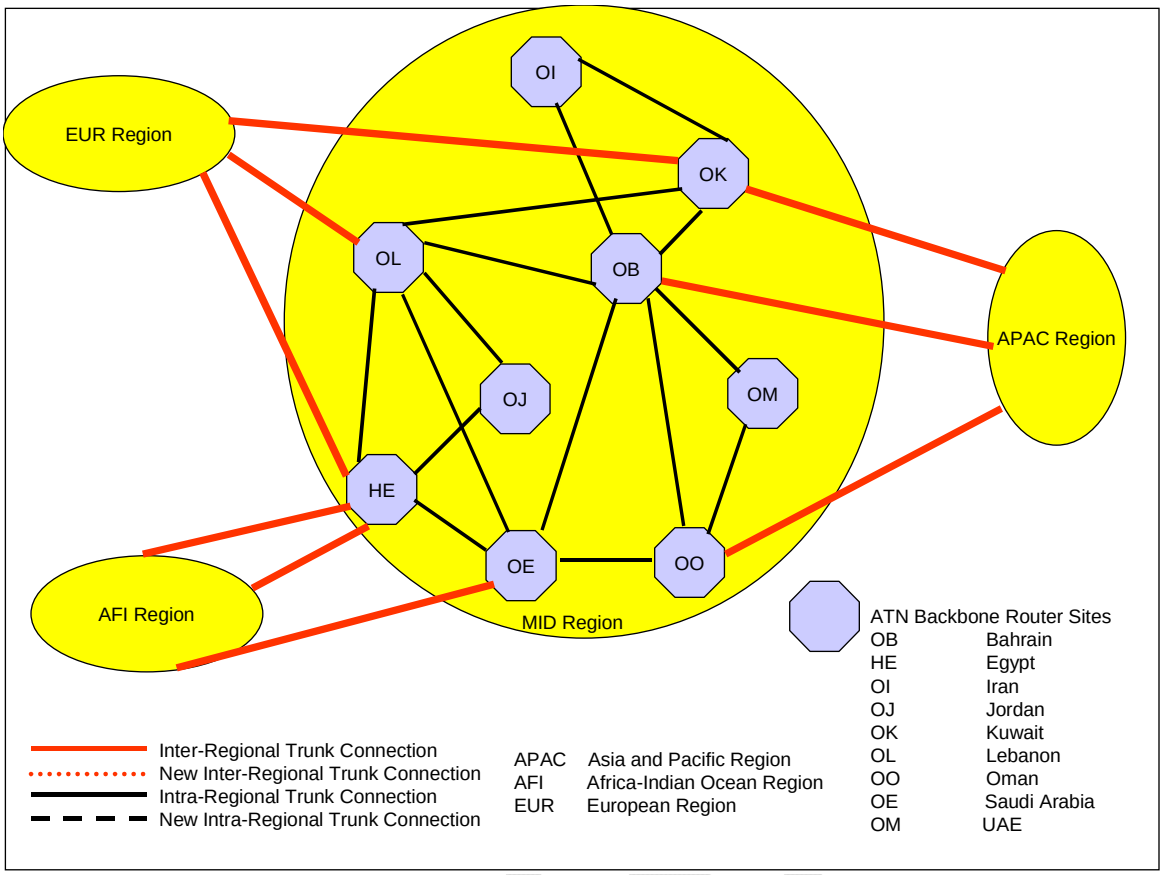


Figure 5-1 MID ATN Backbone Routing Architecture

6. ATN BACKBONE TRUNKS

6.1 Table 6-1 provides a list of existing or proposed upgrading of AFTN/CIDIN circuits that have been selected for the transition to the ATN routing backbone. Also provided in the table are proposed additional new trunks that should be considered to provide the necessary redundancy and backup services for the ATN for the region.

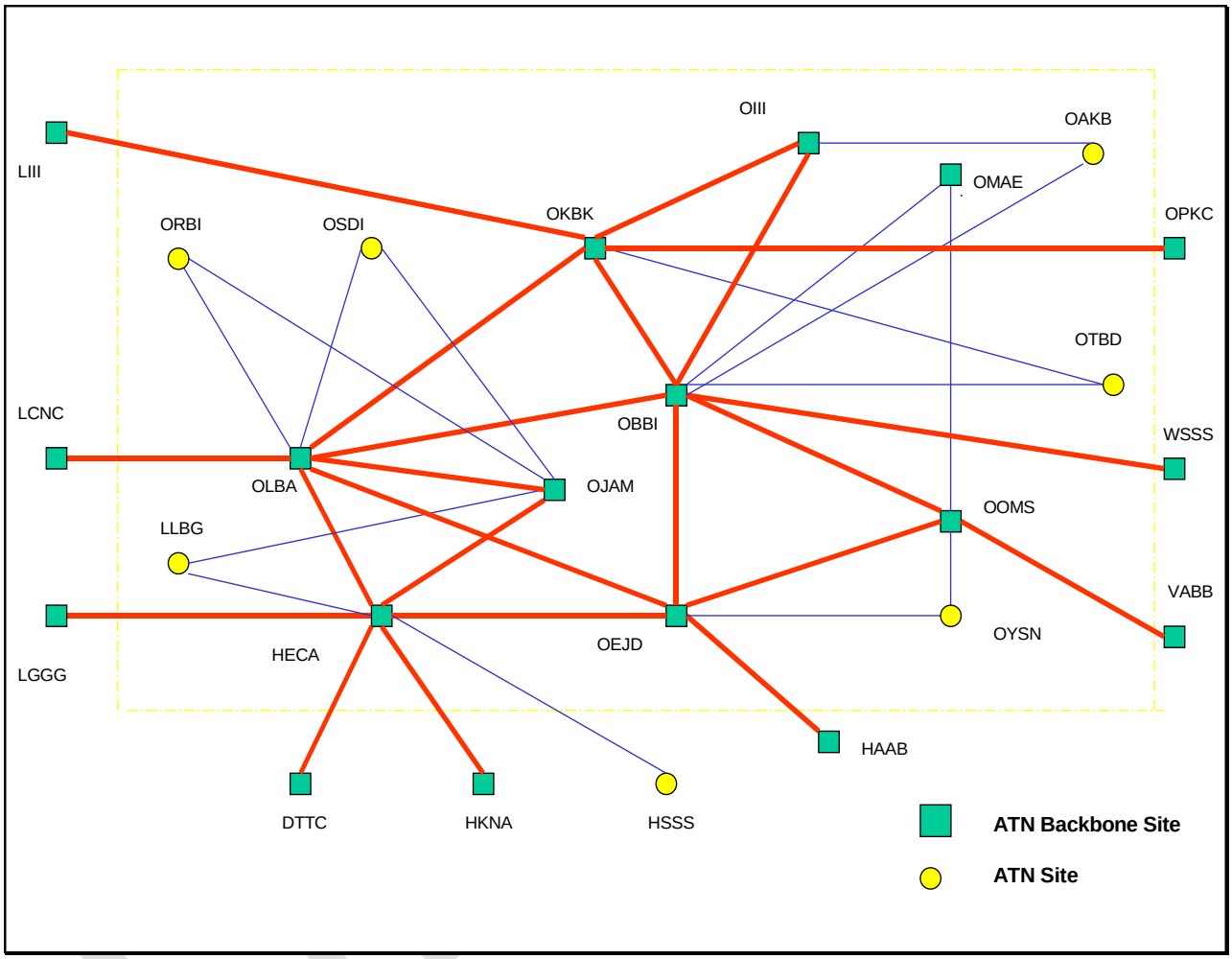
6.2 As part of the transition from AFTN to the ATN, the existing link capacity, especially those using CIDIN Protocol must be able to handle both AFTN and ATN for those States who do not intent to migrate to AMHS straight away. It is assumed that States that have been nominated to provide the ATN backbone routing environment will do so in a timely manner so as to allow those States who are ready to start their implementation programs can do so without too much restriction within the region. Where a nominated State cannot provide the ATN backbone then an alternative arrangement should be put in place for another State, who is willing to provide the service.

Table 6.1 AFTN Circuit Upgrade and Backbone BIS Implementation

Nominated State	ATN Backbone Connection		Target Date Of Implementation		Trunk Type	Comments
	Speed	Protocol	Circuit	BBIS		
Bahrain				2009		
Singapore	19200 bps	X.25	2009		Inter-Regional	Upgrade of circuit
Egypt				2009		
Greece	64000bps	TBD	2009		Inter-Regional	Upgrade of circuit
Kenya	19200 bps	TBD	2009		Inter-Regional	Upgrade of circuit
Tunisia	19200 bps	TBD	2009		Inter-Regional	Upgrade of circuit
Kuwait				2009	Inter-Regional	
Italy (check EUR)	19200 bps	TBD	2009			Upgrade of circuit
Pakistan (check ASIA/PAC)	64000bps	TBD	2009		Inter-Regional	Upgrade of circuit
Lebanon				2009	Inter-Regional	
Cyprus	64000bps	TBD	2009			Upgrade of circuit
Oman				2009	Inter-Regional	
Mumbai	64000bps	X.25	2009			Upgrade of circuit
Saudi Arabia				2009	Inter-Regional	
Ethiopia	64000bps	xxxx				Circuit is upgraded

7. INTERCONNECTION OF ATN ROUTERS

7.1 This section describes the interconnection requirements for ATN routers for the Middle East Region. Table 7-1 shows a pictorial view of the interconnection between various States in the Region.



Libya to be added as ATN site (HECA – HLLL)

Figure 7-1 MID ATN Router Interconnection
(This needs to be updated based on the proposed additional intra-regional trunk)

7.2 It is proposed that all existing AFTN circuits are upgraded as soon as practicable to CIDIN or other modern protocols that are compatible with the ATN Lower Layers. In doing so, these links would be sized to cater for both AFTN and ATN. This would allow the region to set-up a sub-network that could support current operational requirements for AFTN and to allow trials and operation services of the ATN to be implemented at minimal cost to the region.

7.3 Further details have been provided in Table 7-1, which lists all international connections between countries and their proposed bandwidth requirements and implementation dates.

MID Region BIS Routing Interconnections

Backbone State	ATN Interconnection		Target Date Of Implementation		Connection Type	Comments
	Speed	Protocol	Circuit	BIS		
Bahrain				2010		
Abu Dhabi	64Kbps	TBD	2003	2010	Intra-Regional	Circuit upgraded
Beirut	9600bps	TBD	2000	2010	Intra-Regional	Circuit upgraded
Doha	64Kbps	TBD	2003	2010	Intra-Regional	Circuit upgraded
Jeddah	64Kbps	TBD	2004	2010	Intra-Regional	Circuit upgraded
Kabul	9600bps	TBD	2005	2010	Intra-Regional	Upgrade of circuit required Upgrade of BIS required
Kuwait	64Kbps	TBD	2004	2010	Intra-Regional	Circuit upgraded
Muscat	9600bps	TBD	2005	2010	Intra-Regional	Upgrade of circuit required Upgrade of BIS required
Tehran	9600bps	TBD	2005	2010	Intra-Regional	Upgrade of circuit required Upgrade of BIS required
Egypt				2007		
Amman	64Kbps	TBD	2005	2007	Intra-Regional	Egype to update
Ben Gurion	9600bps	TBD	2005	2007	Intra-Regional	Upgrade of circuit required
Beirut	9600bps	TBD	2000	2007	Intra-Regional	Circuit upgraded
Jeddah	9600bps	TBD	2003	2007	Intra-Regional	Circuit upgraded
Iran				2007		
Bahrain	9600bps	TBD	2004	2007	Intra-Regional	Upgrade of circuit required
Kuwait	9600bps	TBD	2005	2007	Intra-Regional	Circuit upgraded
Jordan						
Baghdad	9600bps	TBD	2005	2007	Intra-Regional	Upgrade of circuit required
Ben Gurion	9600bps	TBD	2003	2007	Intra-Regional	Circuit upgraded
Beirut	9600bps	TBD	2005	2007	Intra-Regional	Upgrade of circuit required
Cairo	9600bps	TBD	2005	2007	Intra-Regional	Upgrade of circuit required
Damascus	9600bps	TBD	2005	2007	Intra-Regional	Upgrade of circuit required
Kuwait				2007		
Baghdad	9600bps	TBD	2005	2007	Intra-Regional	Upgrade of circuit required
Bahrain	64Kbps	TBD	2005	2007	Intra-Regional	Circuit upgraded
Beirut	9600bps	TBD	2005	2007	Intra-Regional	Upgrade of circuit required
Tehran	9600bps	TBD	2005	2007	Intra-Regional	Upgrade of circuit required
Lebanon				2007		
Amman	9600bps	TBD	2005	2007	Intra-Regional	Upgrade of circuit required
Baghdad	9600bps	TBD	2005	2007	Intra-Regional	Upgrade of circuit required
Bahrain	9600bps	TBD	2000	2007	Intra-Regional	Circuit upgraded

Backbone State	ATN Interconnection		Target Date Of Implementation		Connection Type	Comments
	Speed	Protocol	Circuit	BIS		
Cairo	9600bps	TBD	2000	2007	Intra-Regional	Circuit upgraded
Damascus	9600bps	TBD	2005	2007	Intra-Regional	Upgrade of circuit required
Kuwait	9600bps	TBD	2005	2007	Intra-Regional	Upgrade of circuit required
Jeddah	9600bps	TBD	2004	2007	Intra-Regional	Upgrade of circuit required
Oman				2007		
Abu Dhabi	9600bps	TBD	2005	2007	Intra-Regional	Upgrade of circuit required
Bahrain	9600bps	TBD	2005	2007	Intra-Regional	Upgrade of circuit required
Jeddah	9600bps	TBD	2005	2007	Intra-Regional	Upgrade of circuit required
Sana'a	9600bps	TBD	2005	2007	Intra-Regional	Upgrade of circuit required
Saudi Arabia				2007		
Bahrain	64Kbps	TBD	2007	2007	Intra-Regional	Circuit upgraded
Beirut	9600bps	TBD	2004	2007	Intra-Regional	Upgrade of circuit required
Cairo	9600bps	TBD	2003	2007	Intra-Regional	Circuit upgraded
Muscat	9600bps	TBD	2005	2007	Intra-Regional	Upgrade of circuit required
Sana'a	9600bps	TBD	2005	2007	Intra-Regional	Upgrade of circuit required
UAE				2007		
Bahrain	9600bps	TBD	2003	2007	Intra-Regional	Circuit upgraded
Muscat	9600bps	TBD	2005	2007	Intra-Regional	Upgrade of circuit required

Table 7 - 1 – MID Region BIS Routing Interconnections

Note: Speed requirements are an indication only and may vary between sites to meet different performance requirements for the type of ATN services and applications that are operating over each link.

8. TRANSITION ACTIVITIES

It is recommended that there will be three phases in the implementation of the ATN infrastructure.

- Phase 1, Upgrade of existing sub network infrastructures to support the Backbone BISs (BBISs);
- Phase 2, Implementation of the ATN Regional BBISs; and
- Phase 3, Implementation of supporting ATN BISs.

8.1 Phase 1

8.1.1 This phase consists of upgrading existing AFTN circuits where possible that will support the introduction of the ATN Backbone BISs. Table 6-1 identifies those circuits that will need to be upgraded in both bandwidth and protocols.

8.1.2 In regards to bandwidth requirements, Table 6-1 proposes a preferred speed that will be required when full ATN is implemented. However, lower speeds may be introduced in the initial implementation phases between some locations by bilateral arrangements between States.

States will be expected to monitor the performance of these links and increase bandwidth requirements as traffic load increases.

8.1.3 Where new circuits have been identified these will only need to be introduced on a case-by-case basis as BBISs are implemented.

8.1.4 In respect to the upgrade of protocols between States, it is recommend that any efficient Wide Area Network protocols is implemented in ATN routers such as Frame Relay and Asynchronous Transfer Mode (ATM). This implementation of these protocols will be done on a bilateral arrangement between States.

8.2 **Phase 2**

8.2.1 Phase 2 consists of implementing the Backbone BISs (BBISs) that will support the MID Region. The BBISs are important to the success of the ATN implementation program for the region and will need to be reviewed regularly to determine if contingency arrangements should be put in place where nominated States fail to provide the infrastructure in a timely manner.

Note: Implementation of Inter-Regional BBIS connections between MID Region and neighboring regions will also need to be determined and encouraged during this phase.

8.3 **Phase 3**

8.3.1 Phase 3 is the implementation of all other BISs that will connect to the Backbone BISs.

Further information including initial target dates for the upgrade of the sub-network links and protocols and implementation of the BISs for each State can be found in the table CNS 1B – ATN Router Plan of the FASID. Refinement of the target dates will continue to be updated as States start to develop their implementation programs and can provide feedback to the ICAO MID Regional Office.

CHAPTER TWO

Routing Architecture Plan

Table of Contents

EXECUTIVE SUMMARY

This document provides technical guidance on the Planning and Implementation of the transition to the Aeronautical Telecommunication Network (ATN) for the ground data communications of the ICAO MID Region.

The material presented here is technical in nature. The ATN Transition Plan includes information about the implementation of Regional ATN Routing Architecture as presented in this document.

The routing architecture is based upon the need for a ground-ground infrastructure to eventually replace the existing AFTN/CIDIN infrastructure. For this reason, the routing architecture uses the existing AFTN/CIDIN infrastructure as a guideline for the positioning of ATN equipment.

The routing architecture is designed primarily for the ground-ground environment. It is intended that this architecture will also be suitable as the routing architecture for the introduction of the air-ground communication requirements.

1. INTRODUCTION

This initial plan provides technical guidance on the routing architecture for the Middle East Region.

1.1 Terms used

1.1.1 ***Aeronautical Fixed Telecommunication Network (AFTN)***: a low-speed network providing the majority of ground-ground data communication services within the ICAO realm. This term is defined in ICAO Annex 10.

1.1.2 ***Boundary Intermediate Systems (BIS)***: a router that supports IDRP and routes PDUs to more than one routing domain. This term is defined in ICAO Doc. 9705-AN/956 and 9739-AN/961.

1.1.3 ***Backbone Boundary Intermediate Systems (BBIS)***: a router that primarily routes PDUs between routing domains and does not support End Systems.

Note: This definition is similar to that found in ICAO Doc. 9705 and is meant to be consistent with that definition. This definition is made on the assumption that this version of the routing architecture is limited to the ground-ground infrastructure.

1.1.4 ***Common ICAO Data Interchange Network (CIDIN)***: a part of the aeronautical fixed service which uses bit-oriented procedures and packet switching techniques.

1.1.5 ***End Boundary Intermediate Systems (EBIS)***: a router that primarily routes PDUs between routing domains and connected End Systems.

1.1.6 ***End Systems (ES)***: an ATN system that supports one or more applications and that is a source and/or destination for PDUs.

1.1.7 ***Inter Regional Boundary Intermediate Systems (IRBIS):*** a router that routes PDUs between systems (both End Systems and Boundary Intermediate Systems) within the Region with routers outside of the Region. These routers are the entry points into the Region and exit points from the Region for PDUs.

1.1.8 ***Network Service Access Point (NSAP)*** address: a 20-octet value that uniquely identifies an interface between the Transport Layer and the Network Layer. In the ATN it provides the address of transport entity providing ATN Internet services.

1.2 Acronyms used

AFTN - Aeronautical Fixed Telecommunication Network
BIS - Boundary Intermediate Systems
BBIS - Backbone Boundary Intermediate Systems
CIDIN - Common ICAO Data Interchange Network
CLNP - Connectionless Network Protocol
EBIS - End Boundary Intermediate Systems
ES - End System
IDRP - Inter-Domain Routing Protocol
IS - Intermediate System
PDU - Protocol Data Unit

2. ROUTING DOMAIN FUNDZAMENTALS

The ATN consists of a set of End-Systems (ESs) and a set of Intermediate Systems (ISs). ESs are the source and destination of all data and are where the applications reside. ISs are better known as routers and relay PDUs from one system to another.

The ISs and ESs are organized into *Routing Domains*. Routing Domains are used to define sets of systems (that typically operate together) into clusters. These clusters have two major properties:

- they are controlled by a single organization, and
- a significant amount of the traffic is internal to the cluster.

The single most important characteristic is that they are controlled by a single organization. This characteristic is manifested in technical terms by mutual trust between all routers in a routing domain. Routing protocols are based on the fact that the information exchanged between *intra*-domain routers can be trusted. No special reliability or trust is required to accept information about advertised routes.

The second characteristic, most traffic is internal to a routing domain, is more an artifact of proper network engineering. Routing domains are established through the NSAP addressing conventions established for the ATN in Doc. 9705, Sub-Volume 5. All systems with NSAP addresses defined with the same address prefix are by definition in the same routing domain.

2.1 Intra-Domain Routing

2.1.1 Intra-domain routing is the routing of PDUs from the source to destination where both are in the same domain. Intra-domain routing implies one or more ISs capable of routing PDUs across the domain. Examples of intra-domain routing would be CLNP-capable routers exchanging PDUs between two Local Area Networks.

2.1.2 Since the ATN is specified across State boundaries, there are no SARPs developed for intra-domain routing. The choice and configuration of internal routers is a local matter.

2.2 Inter-Domain Routing

2.2.1 The central definition of routing in the ATN is concerned with inter-domain routing. This is a particularly difficult problem since by the very nature of inter-domain routing; the information received cannot be fully trusted.

2.2.2 Inter-domain routing is based upon the mutual distrust of the received routing information. First, reliability mechanisms must be built-in to ensure the reliable transfer of the information. Second, the received information must be filtered to ensure that it meets the suitability constraints of the received system (in other words, can it be believed).

2.2.3 After receiving the routing information, the inter-domain router must build routing tables based upon its internal policy about routing its data.

2.3 Types of Routing Domains

2.3.1 There are two basic types of routing domains: end routing domains, and transit routing domains. An end routing domain routes PDUs to and from end-systems within its routing domain. Figure 1 shows an end routing domain.

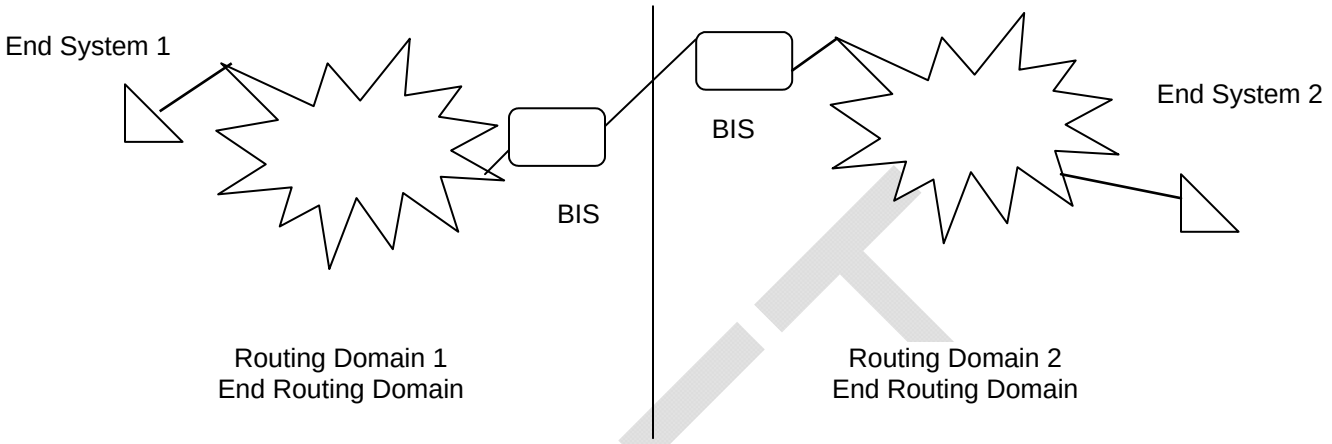


Figure 1 – End Routing Domains

A transit routing domain routes PDUs between two or more routing domains, and may as an option also act as an end routing domain. An example of a transit domain is where a set of backbone routers is configured in their own routing domain with all of the end systems in end routing domains attached to the backbone.

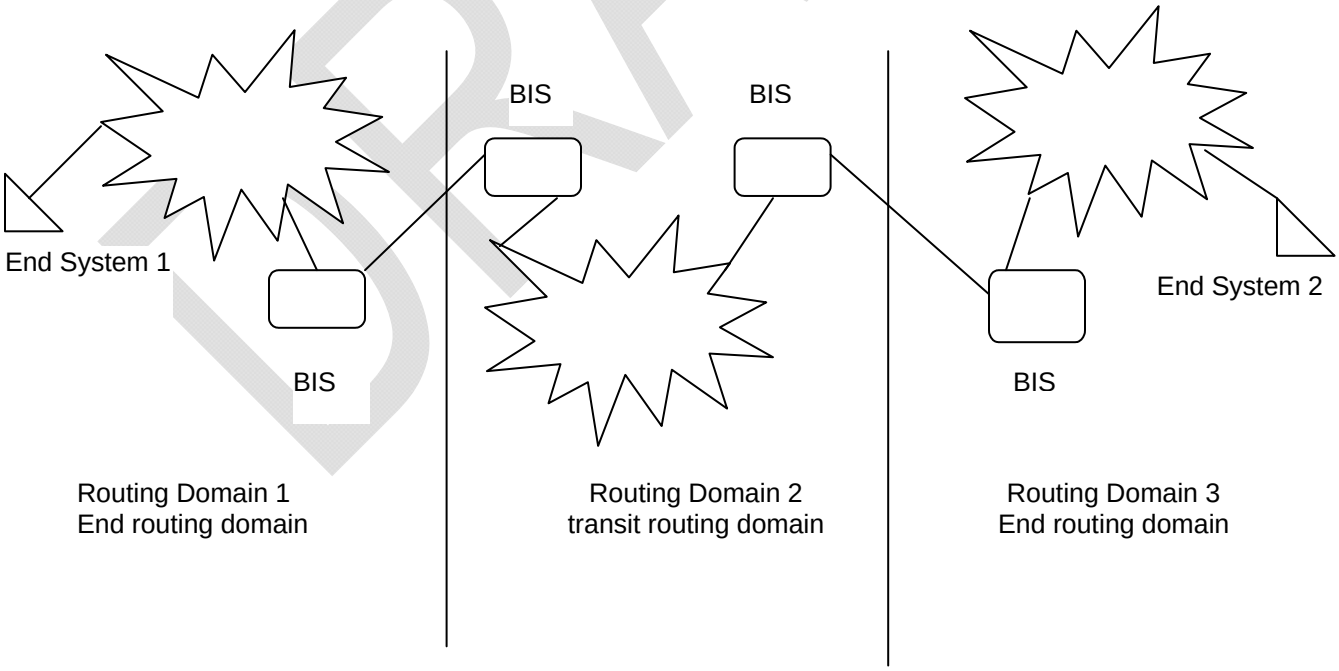


Figure 2 – Transit Routing Domains

Note: A transit routing domain may or may not be part of the backbone. A transit routing domain may consist of BISs none of which are backbone routers.

2.4 Routing Domain Construction

2.4.1 Based on the above, a routing domain consists of at least one inter-domain router.

Note: There must be at least one BIS. There is no requirement for any other equipment.
Routing domains are elements of the physical structure of the ATN.

3. ROUTER FUNDAMENTALS

All routers discussed within this document are ICAO Doc. 9705 and 9739 compliant Boundary Intermediate Systems (BISs).

NOTE: INDIVIDUAL STATES MAY ELECT TO USE OTHER ROUTERS THAT DO NOT COMPLY WITH THE ATN IDRP REQUIREMENTS AS FOUND IN ICAO DOC. 9705 WITHIN THE LIMITS OF THEIR OWN STATES. THESE ROUTER ARE INTERNAL STATE ISSUES AND OUTSIDE THE SCOPE OF THIS DOCUMENT.

3.1 Boundary Intermediate System Overview

3.1.1 Boundary Intermediate Systems comprise the interfaces between networks, and in particular, between different routing domains. The term “Boundary Intermediate System” can often be replaced with the more common term “router”.

3.1.2 An important consideration in developing the routing architecture is the different roles that routers take within the ATN environment.

3.2 Router Types

There will be two primary types of BISs employed within the Region:

- Backbone BISs (BBISs), and
- End BISs (EBISs).

Note: A third type of BIS is supported within this routing architecture but since its use is subject primarily to bi-lateral agreements between States and Organizations, it is not fully described here. This third type of BIS is non-BBIS that acts as a transit router between two RDs but is not part of the Regional backbone.

3.2.1 Backbone BISs

3.2.1.1 A BBIS is a router that primarily routes PDUs between routing domains. These routers are typically higher performance routers that aid in the efficient flow of data between domains. BBISs may have End-Systems connected to them, but often are limited to only router-to-router connections.

3.2.1.2 Within the context of the MID Region, BBISs can be further subdivided into Regional BBISs, and Inter-Regional BBISs. Regional BBISs are backbone routers that only connect to routers within the Region. Inter-regional Backbone BBISs are those backbone routers that connect to BBISs in other Regions.

Note: A single, high-performance router may act as both a Regional BBIS and an Inter-Regional BBIS based upon meeting the requirements for performance and reliability.
Note: For completeness of the routing architecture, it must be mentioned that the routers out-side of the Region to which Inter-Regional Backbone BISs attach are, in fact, Inter-Regional Backbone BISs in the other Region.

Note: The interconnections of backbone BISs typically require higher capacity communication lines based on the consolidation of traffic through those backbone routers. Even though the architecture takes into account existing AFTN infrastructure facilities, the need to upgrade the communication facilities as traffic through the backbone increases may be necessary.

Note: It is possible for some States to provide transit routing from its routing domain(s) to the routing domains of other States using BISs that are not backbone routers. For the purposes of this routing architecture, it is not possible to distinguish between these transit routing domain routers and BBISs.

3.2.2 END BISs

3.2.2.1 End BISs are connected to one or more BBISs and provide routing services to a single routing domain. Further, End BISs do not act as a transit router for passing PDUs between other routing domains.

4. MID REGION ROUTING ARCHITECTURE

The MID Region routing architecture is based upon several concepts:

1. From a routing domain point of view, the Region can be considered an "autonomous" area, that is, there is a difference between routers located within the Region and outside the Region.
2. Routing domains and confederations of routing domains may be applied to areas within the Region.
3. States will make their own implementation and transition decisions.

The routing architecture can be divided into several distinct parts:

- the definition of the backbone routing structure for passing information between routing domains within the Region;
- the definition of the routing structure between routing domains not on the backbone;
- the definition of the routing structure for use in end-routing domains; and
- the definition of the routing structure for passing information from this Region to other Regions.

The first component is the definition of the backbone routing structure that supports the exchange of data within the Region. This part defines the interconnection of the major communication facilities in the Region and how they cooperate to link all of the systems in the Region.

The second component is the definition of the structure that allows end routing domains to exchange data across the backbone to another end routing domain. This part defines how the end routing domains connect through the backbone.

The third component defines the routing structure that is used within an end routing domain. This part defines how the individual routing domains may be used to pass data.

The fourth part is needed to define how data will be routed between the systems within the Region with those systems outside the Region. More importantly, the structure describes how all-global ATN systems are accessible from systems in the Region.

4.1 MID Region Backbone

4.1.1 Regional Backbone

4.1.1.1 The definition of a Regional Backbone is based upon the efficiencies that may be realized by concentrating ATN traffic at major communication centers and using the economy of scale in passing this information between major communication centers.

4.1.1.2 The rationale for defining Regional Backbone sites is based upon existing major AFTN center sites and on the flow of both AFTN traffic and possible future air-ground ATN traffic.

4.1.1.3 Within the Region there do exist main AFTN communication centers that can be used to simplify the definition of backbone architecture.

4.1.1.4 However, it must be understood that the expected growth in communication traffic over the ATN could quickly exceed the capabilities of the existing communication infrastructure. Planning for the increased traffic loads will be needed as soon as ATN traffic begins to flow.

4.1.1.5 The architecture and communication requirements define a routing plan that incorporates alternate routing and communication paths so that no single router or communication failure can isolate major parts of the Region.

4.1.1.6 The nine (9) BBIS sites defined in Table 4.1-1 are based on the expected traffic flows. A current AFTN center site identified as a potential backbone router site. This site is listed first and in bold text as follows:

ATN Backbone router site	State
1	**BAHRAIN (Bahrain)**
2	**EGYPT (Cairo)**
3	**IRAN (Tehran)**
4	**JORDAN (Amman)**
5	**KUWAIT (Kuwait)**
6	**LEBANON (Beirut)**
7	**OMAN (Muscat)**
8	**SAUDI ARABIA (Jeddah)**
9	**UAE (Abu Dhabi)**

Table 4.1-1 – Definition of MID Region Backbone Sites

4.1.1.7 At each ATN Backbone router site, there should be at least one BBIS. States committing to operate backbone routers are presented in the table above.

4.1.1.8 Summarizing the information presented above, the MID Region Backbone network will consist of at least one BBIS router at each of the backbone sites identified above. The actual location of the routers will be based upon implementation schedules and the choices of States.

4.1.2 Backbone Router Requirements

The definition of BBIS and the location of these routers may be affected by the requirements for backbone routers. A backbone router must meet several performance and reliability requirements:

- Availability,
- Reliability,
- Capacity, and
- Alternative routing

4.1.2.1 Availability

A backbone router must provide a high-level of availability (24 hours a day, 7 days a week).

4.1.2.2 Reliability

A backbone router must be a very reliable system that may require either redundant hardware or more than one router per site.

4.1.2.3 Capacity

As a communication concentrator site, backbone routers must be capable of supporting significantly more traffic than other ATN routers.

4.1.2.4 Alternative Routing

Based upon the need for continuity of service, backbone routers will require multiple communication links with a minimum of two and preferably three or more other backbone routers to guarantee alternate routing paths in case of link or router failure.

4.1.3 Routing Policies

4.1.3.1 States providing Regional BBISs must be capable of supporting routing policies that allow for Regional transit traffic and for dynamic re-routing of traffic based upon loading or link/router failures.

4.2 Inter-Regional Backbone

The second component of the MID Region Routing Architecture is the definition and potential location of Inter-Regional Backbone Routers. The manner in which this architecture was developed was to ensure that the use of the existing communication infrastructure is possible to the greatest degree. The use of the existing communication infrastructure should reduce the overall cost of transitioning to the ATN.

As already indicated, the Inter-Regional BBISs provide communication from routers within the MID Region to routers in other regions. These Inter-Regional BBISs provide vital communications across regions and therefore need to have redundant communication paths and high availability. (Note: This can be accomplished through multiple routers at different locations.)

Based upon the current AFTN circuit environment, the following States have been identified as potential sites for Inter-Regional BBISs. The States currently have circuits with States outside of the MID Region are found in Table 4.2-1 below.

State	Neighboring Region	Current circuit
Bahrain	Asia-Pac	upgraded
Egypt	Africa Europe	To be upgraded Circuit upgraded
Kuwait	Asia-Pac Europe	to be upgraded No updated information
Lebanon	Europe	Circuit upgraded
Oman	Asia-Pac	No updated information
Saudi Arabia	Africa	Asmara Circuit upgraded Adis ababa (no updated information)

Table 4.2-1 Table of Circuits with other ICAO Regions

For the transition to the ATN, connectivity to the other Regions should be a priority. This is especially important as other Regions begin the transition to the ATN and begin deploying ATN BISs.

4.2.1 Long Term Implementation

4.2.1.1 The transition to a fully implemented ATN requires that connectivity amongst the IACO Regions be robust. That is, there is the need to ensure alternate paths and reliable communication. Table 4.2-1 presents a minimal Inter-Regional Backbone that provides a minimum of 2 circuits to other ICAO Regions that communicate directly with the MID Region. For the long-term implementation of ATN, it would be advisable to have 3 circuits to each Region. The addition of circuits to Africa should be considered.
Note: Information is needed on States Plan in implementing ATN.

4.2.2 Initial Implementation

4.2.2.1 The initial implementation of the ATN, outside of the MID Region, will most likely be in ASIA/PAC and Europe. Therefore, initial transition planning may focus on those locations.
Note: Information is needed on States Plan in implementing ATN.

4.2.2.2 For connecting to other Regions, there should be a minimum of two (2) Inter-Regional BBISs. The location of these Inter-Regional BBISs may be located at the centers where the AFTN/CIDIN centers already exist.

Note: The locations presented above are examples of possible router sites. The selection of actual locations will be based on implementation schedules and circuit availabilities.

Note: For additional reliability, a third Inter-Regional BBIS would be preferred.

4.2.2.3 For connecting to Africa, an Inter-Regional BBISs may be located at the location of the existing AFTN centers: Cairo or Jeddah. However, this router would not be needed until such time as ATN traffic is destined for that Region and the location of the router would be determined at that time.

Note: Future work is still required for the definition of policy descriptions for the backbone architecture.

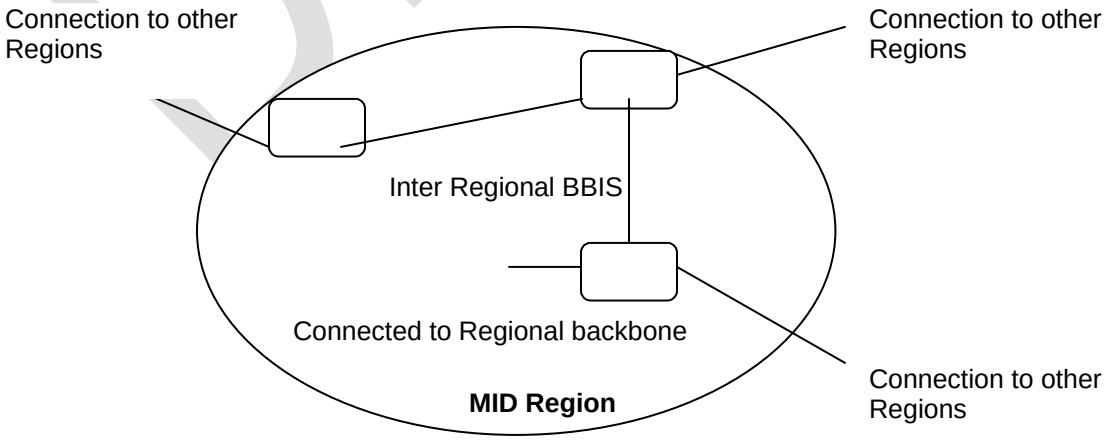


Figure 3 – Inter-Regional Backbone Routers

4.2.3 Transition Issues

4.2.3.1 The transition issues relating to the regional routing architecture is described in the ATN Transition Plan.

4.3 End BISs

4.3.1 It is assumed that naming and addressing (and routing domain definition) will be done on a Regional basis. Further, that for areas within the Region that may utilize an End BIS serving more than one State, the naming structure will be based on the Regional NSAP format defined in Doc. 9880 9705. Further, States may choose to either implement the Regional (or Sub-Regional) NSAP format or the State NSAP format based on whether it installs a BIS.

5. ROUTING DOMAINS

5.1 Each State is expected to have one or more routing domains. Where a State chooses not to implement an ATN BIS, it may choose to incorporate its systems into a routing domain of another State.

5.2 The MID Regional ATN Backbone will consist of routers from the selected States. Each of these routers will be part of its State's routing domain.

Note: This means that the backbone will not be configured with its own routing domain. Routing to the backbone and between backbone routers will be controlled through IDRP routing policies.

5.3 Each State will be responsible for the designation of routing policies for its End Systems and End BISs. Individual States will also be responsible for establishing routing policies for routing to its designated BBIS.
The use of routing confederations is for further study.

6. ATN TRANSITION

Based upon the previous sections, the implementation of the ATN within the MID Region may require considerable planning for the transition of the AFTN/CIDIN.

6.1 Initial Regional Implementations

6.1.1 The very beginning of ATN implementation will be bilateral testing between States. for this scenario, each State will need at a minimum:

- an ATN router,
- a means for managing the router,
- an ATN application, and
- a circuit connecting the States.

6.1.2 States involved in bilateral ATN trials should consider the use of the trial infrastructure in expanding the ATN throughout the Region.

6.1.3 The below should provide the creterias required for testing:

Rashid and Mahmood Ramadan to provide the full testing creteria.
Mohamed Ali to provide the OLDI testing creteria

6.2 Regional ATN Implementation

6.2.1 At a certain time, sufficient bilateral trials will be underway to permit a Region-wide ATN network based upon the plan presented above. As each State implements the ATN applications and network infrastructure, it will be added to the Regional infrastructure according to this plan.

CHAPTER THREE

AMHS Naming Plan

Table of Contents

Executive Summary

This document provides technical guidance on the naming convention for the transition of ground Aeronautical Fixed Telecommunication Network (AFTN) services to the ATS Message Handling System (AMHS) within the MID region.

Based upon the ATN SARPs as published in ICAO Annex 10 and ICAO Doc. 9880 9705 (Reference 1), the Regions are advised to develop naming and addressing plans. These Regional Plans may be used to guide States in the assignment and registration of addresses and names to be used for the Aeronautical Telecommunication Network (ATN).

At its first meeting, the IPS working group formed four Task groups :
FASID Task group
AMHS Task group
ATN documentation task group
Internet usage task group

This document presents the draft from other region which the ATN task group shall update.

This document presents recommendations for the naming convention for assigning AMHS users within the Region.

1. Introduction

This document presents the naming assignment conventions for allocating Originator/Recipient (O/R) names to be used for the ATS Message Handling System (AMHS) in the MID Region.

The information contained in this document is drawn from a number of developments from the third meeting of the ATN Panel and planning activities in Europe.

1.1 Objectives

The objective of the document is to provide guidance in the naming convention to be used for the AMHS in the MID Region.

1.2 Scope

The scope of the document includes:

- . Describing the attributes of the AMHS address format, and
- . Recommending the values for the relevant attributes that are to be used in the AMHS address.

The MID Regional ATN AMHS naming convention presented here will comply with the relevant formats as specified in ICAO Doc. 9705 (Reference 1). The MID Regional ATN AMHS Naming Plan defines the method for assigning values to each of the relevant attributes of the AMHS address. States within the Region may choose to assign their AMHS addresses based upon the recommendations found here.

1.3 References

Reference 1 Manual of Technical Provisions for the ATN (Doc 9880 9705-AN/956) First Edition 1998.

Reference 2 ICAO Location Indicators – Document 7910/94

1.4 Abbreviations

The following abbreviations are used in this document:

ADMD	Administration Management Domain
AFTN	Aeronautical Fixed Telecommunication Network
AMHS	ATS Message Handling System
MIDANPIRG	Middle East Air Navigation Planning and Implementation Regional Group
ATN	Aeronautical Telecommunication Network
ATNTTF	ICAO ATN Transition Task Force
ATS	Air Traffic Service
ATSO	Air Traffic Service Organizations
ICAO	International Civil Aviation Organization
ITU-T	International Telecommunication Union Telecommunication Standardization Sector
MHS	Message Handling Service

MTA	Message Transfer Agent
O/R	Originator/Recipient
PRMD	Private Management Domain
SARP	Standards and Recommended Practices

2. AMHS NAMING CONVENTION

To ensure continuity and compatibility with other AMHS naming conventions developed by other regions, it is proposed that the MID Region's AMHS naming convention should be based upon coordnation using the Europe ATS message Management Center AMC .

2.1 MF-Addressing Format

ICAO Document 9705 (Reference 1) states that the AMHS shall be composed of AMHS Management Domains. These AMHS Management Domains may elect to operate as either an Administration Management Domain (ADMD) or a Private Management domain (PRMD), depending on the national telecommunications regulation in force in the country where it operates and on its relationships with other Management Domains. Each AMHS user within an AMHS Management Domain is assigned an Originator/Recipient (O/R) name, which is also referred to as a MF-address. The attributes of a MF-address are described in the table below.

Table 2.1-1 MF-Address Attributes

Attribute	Notation	Comment
Country-name	C	
AFMD	A	
PRMD	P	
Organization-name	O	
Organizational Unit name	OUN	n = 1 -4
Common name		
Personal name	S G I GQ	Surname Given name Initials Generation Qualifier
Domain-defined-attributes	DDA	(DDA type) = (DDA Value), up to 4 attributes

It is recommended that States who are about to start their AMHS implementation programs should use the MF-Address format structure.

[1] *SPACE (Study and Planning of AMHS Communications in Europe) is a project supported by the European Commission and is the combined efforts of the participating countries and organizations from EUROCONTROL, France, Germany, Spain and the United Kingdom.*

2.2 XF-Addressing Scheme

In addition to the MF-address, the ATN SARPs have defined an XF-address format. ICAO Document 9705 (Reference 1) stipulates that the XF-address of a direct or indirect AMHS user shall be composed exclusively of the following:

2.2.1 An AMHS Management Domain,

2.2.2 An organization-name attribute set to the 4-character value “AFTN” and encoded as a Printable String,

2.2.3 An organizational-unit-names attribute, which comprises the 8-character alphabetical value of the AFTN address indicator of the user, encoded as a Printable String.

It is recommended that States who have already started implementing the XF-Address format can do so but should consider migrating to the MF-Address format as soon as is practical.

2.3 Naming Convention For MF-Address Format

At the third ATN Panel meeting it was recommended that ICAO register with the ITU-T the ADMD name “ICAO” as an international ADMD under the “XX” country code. It was also recommended that ICAO establishes and maintains a register of PRMDs allocated by air traffic service providers according to the “XX” + “ICAO” address structure. The management of this register would be established and maintained in the same way as the Location Indicators (Doc 7910) and Designators for Aircraft Operating Agencies, Aeronautical Authorities and Services (Doc 8585).

The Air Navigation Commission on the 1st of June 2000 approved these recommendations. It is therefore recommended that the MID region accept the format for the allocation of the first two attributes used in the O/R name.

It has been proposed in the ATN Panel working groups that a common naming convention be used worldwide to help stream line the addressing scheme and to ensure compatibility and consistency with other neighboring regions. This scheme would be based on the work that has been ongoing in Europe. It was also stressed that if States have not already started their implementation programs for AMHS that when planning to do so that they should adopt the MF-Address format over the XF-Address format.

It is therefore recommended for the MID region to adopt the proposed worldwide MF-Address format, which uses the following attributes to define the O/R name during the transition phase from AFTN to AMHS:

1. Country-name;
2. ADMD;
3. PRMD;
4. Organization-name;
5. Organizational-unit-name 1; and
6. Common Name.

2.3.1 Country Name

The country name is a mandatory requirement and shall consist of the two alphanumeric ISO 3166 Country Code “XX” encoded as a Printable String. ICAO has been requested by the ATN Panel to use the country code “XX” as this is a special code registered by the ITU-T for the purpose of allocation to international organizations, which do not reside within any particular country.

2.3.2 ADMD

The administrative domain is a mandatory requirement and shall consist of the Printable String “ICAO”. ICAO has registered “ICAO” as the ADMD with the ITU-T. By providing the “ICAO” ADMD will allow the addressing schemes to be independent of any constraints that may be

imposed by management domains in the global MHS or national regulations that may vary from region to region.

2.3.3 PRMD

The private management domain is an optional requirement but recommended to be implemented by States in the MID Region as part of the worldwide MF-Address format scheme.

The contents of this field can contain the ICAO Country Indicator specified by ICAO Document 9710 [Reference 2] or the name of the Air Traffic Service Organization (ATSO) that has been registered with ICAO. Where an ATSO has not yet assigned their PRMD then a default value will be allocated, which will use either one, two or three letters of the ICAO Country Indicator specified in ICAO Document 9710 [Reference 2]. This has been chosen for its simplistic and non-ambiguous format, which is already managed by ICAO. Hence providing an easier management role for ICAO who will be responsible for maintaining the register of all PRMDs allocated under the ADMD of “ICAO”.

2.3.4 Organization Name

The organization name is used for defining the local or national geographical routing information. This information is to be assigned by the ATSO and for example can be based on the ICAO location indicator as specified in ICAO Document 9710 or some other value determined by an ATSO and published with ICAO. Figure 2.3.4-1 provides a pictorial view of how the organization name can be used in relation with the lower attribute structure.

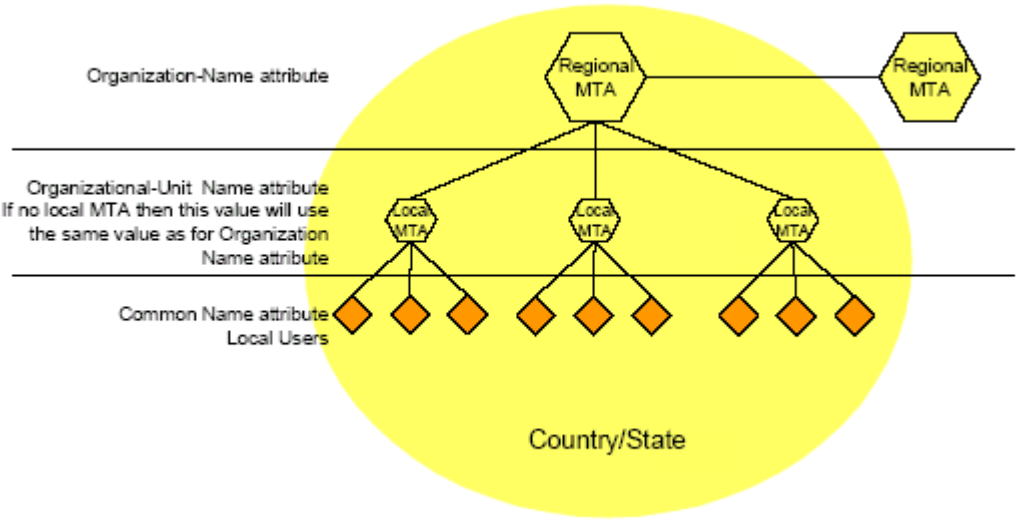


Figure 2.3.4-1 Lower Attribute Structure

2.3.5 Organizational Unit Name OU1

Each State or organization is allocated a unique ATS message organizational name. As all States are familiar with the ICAO four character location indicator defined in ICAO document 7910

(Reference 2), it is proposed that the organization unit name 1 use the location indicator to identify the Message Transfer Agent (MTA) site, encoded as a Printable String.

Note: The MTA site may be the MTA name of the server. However there are security issues that need to be addressed to ensure that this arrangement does not cause any unnecessary concerns with service providers that allow the MTA name to be broadcast in this fashion.

2.3.6 Common Name

It is proposed that during the AFTN transition to AMHS that the common name attribute be used to contain the 8-character alphabetical value of the AFTN address indicator of the user, encoded as a Printable String.

Possible example of an O/R address is shown in Table 2.3.6-1.

Table 2.3.6-1 Example of a MF-Address AMHS Naming Convention

Attribute	Assign By	Value	Comment
Country-name (C)	ITU-T	XX	International Organization
ADMD (A)	ICAO	ICAO	ICAO Responsibility to register
PRMD (P)	ATSO	e.g.	ATSO registered private domain
Organization name (O)	ATSO	e.g. AEROTHAI	Local/national geographical information, which can be based on ICAO Location Indictors (Doc 7910)
Organizational-Unit name (OU1)	ATSO	e.g. BB	ICAO Location Indicator (Doc 7910)
Common Name (CN)	ATSO	e.g. VTBBYFYX	AFTN indicator address

MID Region example

2.4 Naming Convention For XF-Address Format

The attributes to be used for the XF-Address format is as described in ICAO Document 9705 [Reference 1] and presented below as follows:

1. Country-name;
2. ADMD;
3. PRMD;
4. Organization-name; and
5. Organizational-unit-name 1.

2.4.1 Country Name

As proposed in 2.3.1.

2.4.2 ADMD

As proposed in 2.3.2.

2.4.3 PRMD

As proposed in 2.3.4.

2.4.4 Organization Name

This field has already been defined by ICAO Document 9705. The value of this field contains the encoded printable string “AFTN”.

2.4.5 Organizational Unit Name OU1

The organizational unit name 1 attribute is used to contain the 8-character alphabetical value of the AFTN address indicator of the user, encoded as a Printable String.

Possible example of an O/R address is shown in Table 2.4-1.

Table 2.4.5-1 Example of a XF-Address AMHS Naming Convention

Attribute	Assigned By	Value	Comment
Country-name (C)	ITU-T	XX	International Organization
ADMD (P)	ICAO	ICAO	ICAO Responsibility to register
PRMD (P)	ATSO	e.g. Australia	ICAO Country Indicator or ATSO registered private domain with ICAO.
Organization-name	ATSO	**AFTN**	AFTN name
Organization-Unit Name (OUI)	ATSO	e.g. YBBBYFYX	AFTN indicator address

2.5 General Use of X.400 O/R Addresses

Note: The address format of X.400 O/R address attributes for sending general nonoperational AMHS traffic is a local matter for States to implement if they wish to do so and no further advice is given in this plan.

3. Conclusions

The MID Region ATN AMHS Naming Plan aligns itself with the global AMHS naming scheme as proposed by the ATN Panel working groups. Also to maintain compatibility with in the region it is proposed that the MF-Address format should be adopted where a State has not yet started its AMHS implementation program. This will ensure compatibility with the proposed global AMHS naming scheme.

4. Recommendations

The following recommendations are:

1. That until a formal registration authority is set up within ICAO that the MID region should maintain a local register within the region for registering all PRMDs
2. 2. That if the plan is accepted that it is maintained and formally published for wide distribution within the MID region.
3. The members of the third meeting of APANPIRG/ATNTTF are invited to review and comment on the MID Region ATN AMHS Naming Plan as presented above.

CHAPTER FOUR

NSAP Addressing Plan

1. NSAP Addressing Plan

Introduction
The MID Regional ATN Addressing Plan provides guidance to the States within the Region in assigning NSAP addresses to their ATN systems. The Plan addresses the need for consistency within the Region for address assignment.

To find a suitable ATN addressing convention that would be acceptable for use in the MID region requires a routing architecture that minimizes routing updates and over heads within the ground ATN infrastructure for both ground-ground and air-ground services and applications.

The ATN addressing convention must allow for an addressing scheme that is:

- Practical - to provide autonomous administration of ATN addresses for States and Organizations, and
- Flexible - to allow for future expansion and/or routing re-configuration of the ground ATN infrastructure with minimal re-assigning of ATN addresses.

The recommendations proposed in the MID Regional ATN Addressing Plan take advantage of the work performed by the European ACCESS1 Project (Reference 3).

1 ACCESS (ATN Compliant Communications European Strategy Study) is a project funded by the European Commission and jointly produced by the following companies and administrations: National Air Traffic Services (NATS), Deutsche Flugsicherung (DFS) and Service Technique de la Navigation Aerienne (STNA).

2. NSAP Address Format

The NSAP address format is defined in ICAO Doc. 9705 (Reference 1), Sub-Volume 5. The format is based upon the requirements specified in the base standard (ISO/IEC 8348) and incorporates the specific ATN requirements for addressing both ground and mobile systems.

The structure of the Network Service Access Point (NSAP) address is depicted in Figure 5.

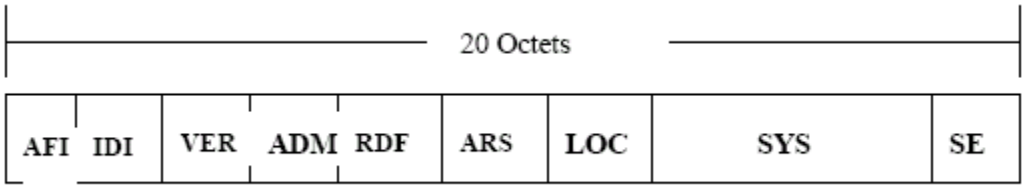


Figure 5 NSAP Address Format

The NSAP address structure contains 9 fields, which are described in Table 4.2-1.

Field Name	Field Description	Size	Syntax	Number of Characters/ Digits	Field Encoding
AFI	Authority and format Identifier	1 Octet	Decimal	2 Digits	BDC
IDI	Initial domain Identifier	2 Octets	Decimal	4 Digits	BCD
VER	Version	1 Octet	Hex	2 Digits	Binary
ADM	Administration Identifier	3 Octets	Alpha or Hex/Alpha	3 Characters 2 Digits/ 2 Characters	IA-5 Binary/ IA-5
RDF	Routing Domain Format	1 Octet	Hex	2 Digits	Binary
ARS	Administration Region Selector	3 Octets	Hex	6 Digits	Binary
LOC	Location	2 Octets	Hex	4 Digits	Binary
SYS	System Identifier	6 Octets	Hex	12 Digits	Binary
SEL	NSAP Selector	1 Octet	Hex	2 Digits	Binary

Table 4.2-1 - Encoding Rules for the ATN NSAP

3 Recommendations For NSAP Address Fields Assignments

3.1 The AFI and IDI Fields

The ATN Internet SARPs (Reference 1) require allocation of the following values:

- Decimal for the AFI field to indicate the type of NSAP being used. This value has been assigned the character sequence “47”.

- Decimal for the IDI field to designate ICAO. This value has been assigned the character sequence “0027”.

As recommended in Reference 1, ATN NSAP addresses and NETs will be written as the character sequence “470027+” where the “+” is used to separate the Binary Coded Decimal (BCD) fields from subsequent Hexadecimal fields.

Hence the AFI and IDI fields will be set to 470027 for fixed ATSC systems/domains and for mobile ATSC systems/domains.

3.2 The VER Field

The VER field is used to partition the ATN Network Addressing domain into a number of sub-ordinate Addressing Domains.

The values currently specified in Reference 1 for the VER field are summarized in Table 3.2-1.

VER Field Value	Network Addressing Domain	Common NSAP Address Prefix for Domain	Value to be used by States of MID region
[0000 0001]	Fixed AINSC	470027+01	
[0100 0001]	Mobile AINSC	470027+41	
[1000 0001]	Fixed ATSC	470027+81	470027+81 (ATSO Iss and Ess)
[1100 0001]	Mobile ATSC	470027+C1	470027+C1 (General Aviation)

Table 3.2-1 - Defined Values for the VER Field

3.3 The ADM Field

The ADM field is used to further partition the ATN Network Addressing Domain. The field designates a single State or Organization. Depending on what the VER field is set to will determine what values should be used in the ADM field.

When the VER field is set to "81" (Fixed ATSC), the ATN SARPs permits two possible ways for encoding the ADM field.

The first method recommends that the State's three character alphanumeric ISO country code is used, as defined in ISO 3166. States may choose this method, however it will provide less flexibility than the second method for the addressing of regional entities (e.g. regional RDCs or regional organizations that are not country specific).

The second method that is recommended for use in the MID region is to use the first octet of the field to define the ICAO region. This would permit the reduction of the routing information that would otherwise be generated. It is recommended that the remaining two octets of the field will further identify the country, RDCs and the regional organizations that are not country specific as follows:

- For the identification of a country, it is recommended that States use the ICAO two letter location indicator (Reference 4) instead of the two character alphanumeric ISO 3166 country code. The structure of the ICAO two letter location indicator allows for a more efficient identification of a location. For example, indicators starting with the same letter "V" designate several countries in the same local region (e.g. Thailand, Sri Lanka, India, Cambodia etc.). The second letter will actually define the specific country within this local region (e.g. "VT" for Thailand, "VC" for Sri Lanka etc.). Where a country has several ICAO two letter location indicators allocated to it, the assigning authority of the ADM field will be responsible in determining the preferred location indicator to represent that country. For example, the indicators "VA", "VI", "VO", "VE" are assigned to India and one of these indicators will be selected to represent India. The encoding of the ICAO two letter location indicators will be upper case alphanumeric values.

- For regional organizations that are not country specific, it is recommended to allocate a lower case alphanumeric value so as there will be no conflict with the ICAO two letter location indicators.

- For the addressing of RDCs (e.g. Island RDCs, Backbone RDCs), in particular for those that are not country specific, it is recommended to allocate codes with the most significant bit set to 1 in the second octet. Valid values would be in the hexadecimal range [8000 – FFFF].

ICAO MID Regional group would be the allocation authority of the ADM field.

In summary, the values allocated for the ADM field is indicated in Table 3.3-1.

VER Field Network Addressing Domain	**ADM Field Values**
Fixed AINSC	Derived from the set of three-character alphanumeric characters representing an IATA airline or an Aeronautical Stakeholder Designator.
Mobile AINSC	Derived from the set of three-character alphanumeric characters representing an IATA airline or an Aeronautical Stakeholder Designator.
Fixed ATSC	To allow for efficient routing information to be exchanged, it is proposed that the ICAO Regional code be used in the first octet of the ADM field followed by the ICAO two-letter location indicator for countries. The Regional codes are shown below. Regional Codes: [1000 0000] Africa [1000 0001] Asia [1000 0010] Caribbean [1000 0011] Europe [1000 0100] Middle East [1000 0101] North America [1000 0110] North Atlantic [1000 0111] Pacific [1000 1000] South America For example Thailand would be represented by the following hexadecimal sequence: 815654. Table 4.3.3-2 provides further examples for a selected number of countries. Where a two letter country code is not applicable, the following rules would apply: ICAO would assign lower case alphanumeric characters using a two letter value to organizations that wish to be based in a particular region. For example, if an organization is to be based in the Pacific region and wanted to be represented by the characters 'sa', this would be represented by the following hexadecimal sequence: 877361 ICAO would assign regional codes for RDCs where a country

	code or organization code is not applicable. Values would be assigned with the most significant bit set to 1 in the second octet. For example a RDC established in the Pacific region would be represented by the following hexadecimal sequence: 878100.
Mobile ATSC	As for Fixed ATSC

Table 3.3-1 - Defined Values for the ADM Field

Fixed or Mobile MID ATSC Addressing Domain	Hexadecimal Code of the ADM Field	Comment
Australia	875942	Pacific Region + 'YB'
China	815A42	Asia Region + 'ZB'
India	815649	Asia region + 'VI'
Fiji	874E46	Pacific Region + 'NF'
Japan	81524A	Asia Region + 'RJ'
New Zealand	874E5A	Pacific Region + 'NZ'
Singapore	815753	Asia Region + 'WS'
Thailand	815654	Asia Region + 'VT'
Viet Nam	815656	Asia Region + 'VV'

Table 3.3-2 – Example of Proposed ADM Value Assignment for Selected Asia/Pacific Entities

3.4 The RDF Field

The RDF field is historical and is not used. Therefore the RDF field shall be set to [0000 0000].

3.5 The ARS Field

The ARS field is used to:

- Distinguish Routing Domains operated by the same State or Organization (in Fixed Network Addressing domains); and
- Identify the aircraft on which the addressed system is located (in Mobile Network Addressing Domains).

Each State or Organization identified in the ADM field will be responsible for assigning the values for the ARS field.

In accordance with the SARPs, for a Mobile Network Addressing Domain, the 24-bit ICAO Aircraft Identifier is inserted in the ARS field. However, no specific values have been specified for Fixed Network Addressing Domains.

The ARS field shall be assigned in a manner that simplifies the routing of data and makes provision for any potential lower level organizational units that could, in the future, operate an ATN Routing Domain.

The MID Regional ATN Addressing Plan recommends the ARS field be decomposed into three subfields as shown in Figure 4.3.5-1: Network ID, Network Group ID and Domain ID.

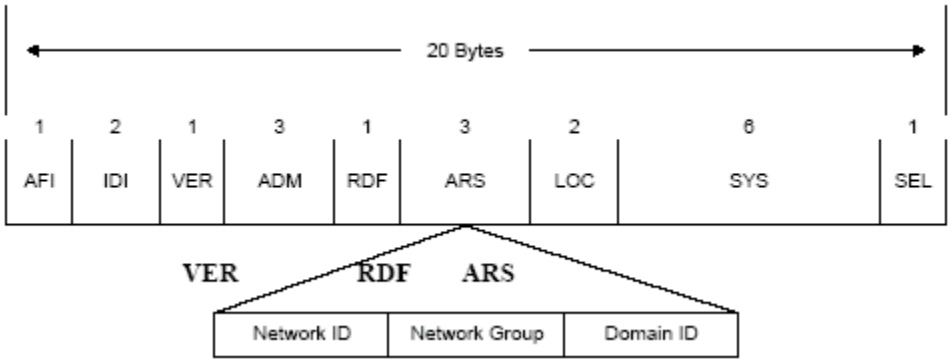


Figure 4.3.5-1 Proposed ARS Field Format

3.5.1 Network ID

Potential future operators of an ATN Routing Domain could be:

- A national Air Traffic Service Organization(s) (ATSO);
- A national military organization;
- A national meteorological organization; and
- An airport operator.

At present it is assumed that military organizations and meteorological organizations will not start up their own ATN Routing Domains and will be located within a national ATSO ATN Routing Domain. The same may apply to airport operators.

However in planning for the long term it is deemed necessary that provision is made available for these future possibilities.

In allowing for this possible expansion, it is recommended that the different ranges of values for the Network ID subfield be allocated to the different national organizations as follows:

- Hexadecimal values [00 – 1F] of the first octet of the ARS field be reserved for the addressing of domains and systems operated by the national ATSO.
- Hexadecimal values [20 – 3F] of the first octet of the ARS field be reserved for the addressing of domains and systems operated by the national military organization.
- Hexadecimal values [40 – 5F] of the first octet of the ARS field be reserved for the addressing of domains and systems operated by the national airport operators. (Note: this range matches the ASCII range of alphabetical upper case characters).
- Hexadecimal values [60 – 7F] of the first octet of the ARS field is reserved for the addressing of domains and systems operated by the national meteorological organization.
- Hexadecimal values [80 – FF] are reserved.

A national organization would then be able to register one or several values for the Network ID subfield within the range that has been reserved for its organization category.

In addition to the Network ID subfield being used for distinguishing the different national organizations, it is proposed that this subfield also be used for the identification of the particular role of the addressed domain. For example, setting the Network ID subfield to the hexadecimal value “01” would represent the set of operational Routing Domains of the national ATSO. Setting

the Network ID subfield to hexadecimal “11” would represent the set of non-operational Routing Domains of the national ATSO. In using the Network ID subfield in this manner, allows national ATSOs to provide for a duplicate non-operational network to be used for trials and pre-operational testing. Similar arrangements could be used for the other national organizations.

3.5.2 Network Group ID

This subfield can be used to subdivide a ground ATN network into smaller groups. This field is unique within a particular network. This may be useful for future expansion by allowing regions to be formed within a particular network as defined by the Network ID. The formation of regions may be useful in helping contain the routing traffic exchanged within the network.

This subfield is also used to designate an RDC. RDCs can also be used to assist in the formation of regions within an Administrative Domain and they offer an additional level of flexibility when used to combine RDs into a confederation. RDCs are designated by setting the uppermost bit of this subfield to “1”.

3.5.3 Domain ID

This subfield is a unique identifier assigned to each Routing Domain in the Network Group.

Table 3.5.3-1 shows possible examples on how the ARS field could be used. In the table two Network Groups “01” and “02” are defined. These two Network Groups can for example represent two FIRs in a country. One of the two Network Group contains two RDs and the other one contains three RDs. These two Network Groups can also address the initial RDs in a country (i.e. two RDs) with a planned expansion towards five RDs.

Network ID	Network Group ID	Domain ID	Comment
01	**01**	01	Network ID “01” indicates an ATSO operational network that contain two Network Groups “01” and “02”. Network Group “01” contains two RDs “01” and “02”. Network Group “02” contains three RDs “01”, “02” and “03”.
		02	
	02	01	
		02	
		03	

Table 3.5.3-1 – Example of ARS Value Assignment

3.5.4 Addressing RDCs in the ARS field

The Network Group ID subfield is used to segregate the addressing space of actual RDs and RDCs. When the uppermost bit of the Network Group ID subfield is set to “1” the second and third octets of the ARS field are assigned from the RDC addressing space (i.e., 8000-FFFF) and must be unique within that addressing domain. Otherwise, the subfields are assigned from the NSAP Address Space as described above for the Network Group ID and Domain ID subfields.

Similar principles as explained in sections 3.5.2 and 3.5.3 for the addressing of RDs can be applied to the addressing of RDCs, as required:

- The second octet of the ARD field may identify a group of RDCs.
- The third octet of the ARS field identifies RDCs.

3.6 The LOC Field

The LOC field is used to:
- Distinguish Routing Areas within Fixed Routing Domains, identified by the ARS field; and
- Distinguish Routing Areas and Routing domains within aircraft identified by the ARS field.

The assignment of the LOC field value is the responsibility of the State or organization that is the addressing authority for the routing domain in which the identified routing area is contained.

To assist States or organizations, it is recommended that the LOC field be decomposed into two subfields as shown in Figure 3.6-1: Subdomain Group ID and Subdomain ID.

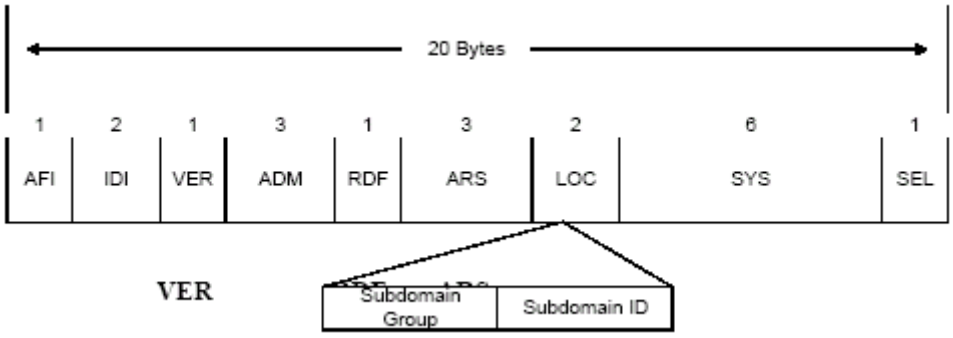


Figure 3.6-1 Proposed LOC Field Format

3.6.1 Subdomain Group ID

This subfield can be used to subdivide a domain into separate groups. For example, each control centre could defined as a routing domain. A control centre may contain an EnRoute facility, Terminal facilities, and Tower facilities. Each of these facilities can be classified as a different Subdomain Group allowing addressing to be delegated to each facility, if desired. For this example, this subfield can be assigned as shown in the Table 3.6.1-1.

Value (hex)	Description
00	Reserved
01	No specific group. Used for RDs that do not require subdivision
02	EnRoute Subdomain
03 - FF	Assigned as required

Table 3.6.1-1 – Example of Subdomain Group ID Value Assignment

3.6.2 Subdomain ID

This subfield is a unique identifier assigned to each routing area within a Subdomain Group. This subfield allows multiple areas to exist within a subdomain group and must be unique within the subdomain. This subfield could be assigned as shown in the Table 4.3.6.2-1.

Value (hex)	Description
00	Reserved
01	No specific area. Used for Subdomains that do not require subdivision
02 - FF	Assigned as required by the Subdomain Group Addressing Authority

Table 3.6.2-1 – Example of Subdomain ID Value Assignment

3.7 The SYS Field

The SYS field is used to uniquely identify an End-System or Intermediate-System. The allocation of the SYS field value is the responsibility of the organization that is the addressing authority for the routing area that contains the identified ATN End-System or Intermediate-System.

The type of values or structure for the SYS field is for individual authorities to choose, as appropriate.

It has been suggested that the 48-bit LAN address of a device attached to an IEEE 802 local area network that is being used as an ATN ES or IS, could be used in this field. However, this may have ramification if the SYS field is tied to a subnetwork dependent information such as the physical network address (e.g. 48-bit LAN address) that is associated with a particular device. The problem will occur when the device is replaced by another device which will use a different 48-bit LAN address, requiring the NSAP address of the ATN ES or IS to be changed.

It is therefore recommended that the SYS field be used to identify the system without any dependency on physical information. Possible examples of this is to define whether the system is an IS or an ES, the type of function or role the system is used for (e.g. primary system, hot standby system, cold standby system, etc.), or the type of applications that are running on the system (e.g. AMHS, AIDC, ADS, CPDLC, Network Management, etc.). A requirement found in Section 7.1.4.b.1 of ISO 10589 IS-IS states that all Level 2 ISs within a Routing Domain must have a unique SYS field value. In order to enforce this requirement related to IS-IS Level 2 addressing, it is recommended that the values assigned to the LOC subfields also be assigned to the upper two octets of the SYS field. Using this approach enables the addressing authority for each Subdomain Group the flexibility to assign addresses without conflicting with addresses of other groups within the same Routing Domain.

3.8 The SEL Field

The SEL field is used to identify the End-System or Intermediate-System network entity or network service user process responsible for originating or receiving Network Service Data Units (NSDUs).

Table 3.8-1 identifies the defined values that shall be used in this field in accordance with Reference 1.

SEL Field Value	Used
[0000 0000]	Used for an IS network entity except in the case of an airborne IS implementing the procedures for the optional non-use of IDRP.
[0000 0001]	Used for the ISO 8073 COTP protocol in the Ground or Airborne End-Systems.
[0000 0010]	Used for the ISO 8602 CLTP protocol in the Ground or Airborne End-Systems.
[1111 1110]	Used for an IS network entity belonging to an airborne IS implementing the procedures for the optional non-use of IDRP.
[1111 1111]	Reserved

Table 3.8-1 - Defined Values for the SEL Field

4. Conclusions

The MID Regional ATN Addressing Plan consists of a set of recommendations for each State to assign regional NSAP addresses in a consistent manner. Using these recommendations, it should be possible to develop efficient routing policies that limit the amount of information exchange while providing comprehensive ATN services. Further, the application of this plan will permit simplified ATN service growth with a minimum of router re-configuration.

5. Recommendations

The members of the IPS Working group to review and comment on the MID Regional ATN Addressing Plan as presented above.

CHAPTER FIVE

Short Term procedure for MID AMHS Address

(to be developed)

Appredicies

A MID ATN Stategy
B NSAP Address Registration Form
C MID AMHS Reference
D

1. **INTRODUCTION**

1.1 This paper was developed by the air traffic services (ATS) message handling system (AMHS) Inter-Regional Coordination Team (in short, the IRC Team) formed to address inter-regional air traffic services (ATS) message handling system (AMHS) issues under coordination by the ICAO European and North Atlantic Office (Paris) (EUR/NAT) Office, with the endorsement of the European Air Navigation Planning Group (EANPG).

1.2 The IRC Team action plan included, as part of the definition of short-term working arrangements for the global use of the ATS messaging management centre (AMC) for the AMHS Management Domain (MD) Register, draft procedures to be developed for global AMHS address management in the short term using AMC[1].

1.3 The AMC is a concept defined in the *ATS Messaging Management Manual* (ICAO EUR Doc 021), for the off-line management of the integrated, heterogeneous messaging environment made of the aeronautical fixed telecommunication network (AFTN), common ICAO data interchange network (CIDIN) and AMHS. The concept describes the management organization and includes a set of functions and procedures which are implemented in AMC systems to deliver services to AMC users in ANSPs, and particularly in their international communications (COM) centres.

1.4 This paper provides the proposed procedures. The overall goal of these procedures is to ensure for the short-term that the global AMHS address management is performed in a consistent manner, both from an operational viewpoint and from an official (institutional) viewpoint.

1.5 For the medium and longer term a task force will be set up by the Air Navigation Bureau to develop appropriate recommendations regarding the future evolution of AMHS address management, including the potential establishment of management centres in ICAO Regions, if needed. This task force should be composed of representatives of ICAO Contracting States in various regions.

2. **BACKGROUND ON GLOBAL AMHS ADDRESS MANAGEMENT IN THE SHORT-TERM USING AMC**

2.1 The approach for global AMHS address management in the short-term is the following:

a) for operational purposes, there is an agreement to use the AMC in the short-term by the European (EUR) and the Asia/Pacific (ASIA/PAC) Regions, as well as by the United States Federal Aviation Administration (FAA). Other regions which have not discussed AMHS management so far should be encouraged to use the AMC as soon as they start studying AMHS implementation; and

[1] More information is available at http://www.eurocontrol.int/amc/

b) for institutional aspects, ICAO intends to publish, on its web site, an official version of the register.

2.2 Furthermore, the official ICAO Register and the operational AMC contain the same data and must be periodically aligned.

2.3 The working arrangements proposed in this paper are designed for a global AMHS address management using AMC. This implies that **the use of AMC should be strongly recommended to every ICAO Contracting State worldwide, as soon as there is an AMHS project or implementation in that State**. The procedures rely upon the fact that all States be involved in AMHS, i.e. all States which may declare changes in AMHS addressing are AMC users.

2.4 The basis for these procedures should be that AMC is used operationally and that ICAO Headquarters publishes the AMHS MD Register officially on its website using AMC data.

3. **SCOPE OF ENVISAGED AMHS ADDRESS CHANGES**

3.1 The possible changes in AMHS addresses which need to be managed as part of the AMHS address management are classified in two categories and include the following modifications:

a) Major changes (should not be frequent):

1) Modification[2] of PRMD-name,
2) Change of addressing scheme, among those defined in ICAO Docs 9705/9880, from "XF" to "CAAS" or vice-versa (less likely to happen);

b) Minor changes (should be more frequent):
1) Modifications in CAAS table (associations between location indicator – "OU" address attribute value and "O" address attribute value).

3.2 Major changes have either an institutional impact or a major operational impact.

3.3 Minor changes have only an operational impact, which may be much more limited, depending on the magnitude of changes which may be roughly assessed on the basis of:

a) the number of location indicators impacted by the change; and/or

b) the frequency of messages to/from users in the locations of which the location indicators are impacted.

3.4 Exceptionally, a minor change may have an institutional impact. However this should be very rare and as no specific procedure is defined for this such situations will be handled case by case on an ad hoc basis.

[2] The term "modification" should be understood here in a general way, meaning addition, modification or deletion.

4. **ASSUMPTIONS RELATED TO THE PROCEDURES**

4.1 **Official interactions**

4.1.1 Major changes, due to their institutional impact or major operational impact, must be subject to official interactions between the States and ICAO. These interactions are assumed to be based on the exchange of written documents by fax or letter. Pro formas for such documents are provided in Attachment A to this letter.

4.2 **Systems**

4.2.1 In the short-term, only two systems are available to contribute to AMHS address management, as mentioned above:

a) the AMC implemented by EUROCONTROL under the aegis of the ICAO EUR Office (Paris), for all operational purposes, following an EANPG/45 conclusion; and
b) the ICAO AMHS MD Register, for official purposes. This system is loaded with AMC data to ensure consistency with the operational status of the AMHS network.

4.3 **Participants**

4.3.1 The procedures rely upon the fact that all States/ANSPs involved in AMHS participate in AMC activity. Participants to the procedures are expected to be:

a) States, both as the potential initiators of changes in AMHS addressing and as implementers of AMHS systems. The notion of "State" therefore includes:

1) the people in charge of official declarations, for major changes;

2) Cooperating COM Centre (CCC) Operators[3] in charge of operational management of AMHS. They use AMC data to configure their message switches and AFTN/AMHS gateways;

3) Other AMC users, such as AMHS project managers, engineers involved in AMHS projects, COM Centre personnel, etc. (several AMC user categories are defined for them, including "AMF-I User[4]" and "Read-only user");

b) ICAO Regional Offices as a possible interface for the States in each ICAO Region. The regional office is represented by the CNS Officer;

c) ICAO Headquarters, represented by the Air Navigation Bureau and more specifically (if needed) by its Communications, Navigation and Surveillance/Aeronautical Information Resource Services Section (CNS/AIRS) Section;

d) AMC Operators, responsible for overall operation of the AMC and of associated procedures.

[3] In the current AMC terminology, the term CCC is limited to Europe, and External COM Centre is used for States outside Europe. This distinction should disappear, and the terminology/documentation should be updated, when global use of AMC is started based on these procedures.

[4] The term "AMF-I User" denotes an AMC user specifically involved in AMHS Off-Line Management – Implementation Support functions, on behalf of his/her State or ANSP, e.g. the project leader for AMHS implementation.

5. **PROCEDURE FOR MAJOR CHANGES**

5.1 A simplified diagram of the proposed procedure for major changes is provided in Figure 1. The main stages are as follows:

1. an accredited person in the considered State declares the change to ICAO, using a standard written pro forma – "ICAO" in this case means the regional office for the ICAO Region where the State is located. The pro forma includes the applicability date of the change (an AIRAC date);

2. the CNS Officer in the regional office, in coordination with ICAO Headquarters as appropriate[5], validates the acceptability of the declared change from an official and institutional viewpoint;

3. after validation, the CNS Officer forwards the declaration of change to the AMC operator, using appropriate means such as fax, e-mail, etc. (different from data entry in AMC);

4. the AMC operator enters data in the AMC based on the input received from the regional office, at the appropriate time considering the applicability date of the change and using the AMC operational procedures;

5. at the date of applicability, i.e. at each AIRAC cycle date, the ICAO Headquarters CNS/AIRS Section retrieves an AMHS address management export file from the AMC and uploads it to the ICAO Official AMHS MD Register.

5.2 Steps 3 to 5 are performed as part of the normal AMC operation. This means that, in parallel with this process, standard AMC procedures are followed by the AMC operator and by AMHS managers in other States. The CCC operators exploit the AMC data reflecting the change, together with other AMHS management data, to update their systems.

5.3 At each stage, coordination may take place, if needed, between the different parties involved to ensure the correctness of the proposed change.

We have to changew the paragrph numbering

Part 1: Modification of PRMD-name Registration

State: ……

Nationality letters: ……..……

PRMD-name registered before modification: .....

Please consider the following options in case of modification:

Option A: the PRMD-name to be the following reserved identifier.

Option B: the PRMD-name to be modified as proposed below, after validation by the Secretariat.

Option C: the PRMD-name to remain unchanged (only the addressing scheme is modified, see Part 2).

Please specify your choice (A, B or C):

If choice is B, please specify the proposed PRMD-name identifier:

Proposed applicability date for the modification (an AIRAC date):
……

Name of organization managing the AMHS MD (if applicable):
……

The contact point:
……

Postal/electronic mail address and telephone/fax number:
……

Additional comments:

A-8 **Part 2: Modification of declaration of addressing scheme**

State: ……………………………………

Nationality letters: ………………………

PRMD-name registered before modification: ....

Addressing scheme declared before modification: ....

Please select one of the following options in case of modification:

Choice A: AMHS user addresses to be allocated by application of the (recommended) CAAS addressing scheme in the AMHS MD operated in the above State.

Choice B: AMHS user addresses to be allocated by application of the (default) XF addressing scheme in the AMHS MD operated in the above State.

Choice C: the addressing scheme to remain unchanged (only the PRMD-name is modified, see Part 1).

Please specify your choice (A, B or C):

If choice is A (CAAS), please fill in the following table for all location indicators found in Doc 7910 under the above nationality letters.

location indicators
(table to be expanded as appropriate)

<table>
<tr><th>Organization-name for the group of locations</th><th>Location indicator</th></tr>
<tr><td rowspan="4"></td><td></td></tr>
<tr><td></td></tr>
<tr><td></td></tr>
<tr><td></td></tr>
<tr><td rowspan="4"></td><td></td></tr>
<tr><td></td></tr>
<tr><td></td></tr>
<tr><td></td></tr>
<tr><td rowspan="2"></td><td></td></tr>
<tr><td></td></tr>
<tr><td rowspan="5"></td><td></td></tr>
<tr><td></td></tr>
<tr><td></td></tr>
<tr><td></td></tr>
<tr><td></td></tr>
<tr><td></td><td></td></tr>
</table>

Proposed applicability date for the modification (an AIRAC date):
……
Name of organization managing the AMHS MD (if applicable):
……
The contact point:
……
Postal/electronic mail address and telephone/fax number:
……

Appendix A

STRATEGY FOR IMPLEMENTATION OF THE AERONAUTICAL TELECOMMUNICATION NETWORK (ATN) IN THE MIDDLE EAST REGION

Considering that:

a) the requirement for a robust ground-to-ground Aeronautical Telecommunication Network (ATN) to meet growing need for a digital data communication to support the Air Traffic Management Concept;

b) the availability of ICAO SARPs and Technical Manuals for implementation of ATN;

c) the awareness generated in States for replacement of the present AFTN with digital data network by conducting various seminars and meetings;

d) the availability of several guidance materials, interface control documents (ICDs) required to assist States to ensure harmonization of procedures and protocol to assure inter-operability within the region;

e) the feasibility of introducing SARPs compliment air-ground application in a secured network without prolonged delay;

f) Air Navigation Commission has adopted ATN/IPS SARPs and the ACP completion of the Technical Manual for ATN/IPS;

g) the need to support the States using terminal for communication with other States to replace their AFTN terminals with a Personal Computer based terminal, User Agent using existing telecommunication network;

h) the trial and demonstrations conducted by several States in the MID region for implementation of ATN/AMHS and actions taken by States for introduction of ATN/AMHS; and

i) Availability of equipment and readiness of vendors to support provisions of equipment for both OSI/IPS ground-to-ground and OSI air-ground communications.

THE GENERAL STRATEGY FOR THE IMPLEMENTATION OF THE ATN INFRASTRUCTURE AND ASSOCIATED ATN APPLICATIONS IN THE MIDDLE EAST REGION IS AS FOLLOWS:

a) implementation be in compliance with Plans, Policies, , Interface Control Documents (ICDs) and guidance materials adopted by MIDANPIRG;

b) implementation be in compliance with Annex 10 SARPS ICAO Doc 9705/9880 and ICAO Doc 9896;

c) in the MID region ground-to-ground ATN will initially support the implementation of ATS Message Handling System (AMHS) to replace AFTN switches;

d) strategically deploy backbone ATN routers to provide a reliable infrastructure to initially support ground-to-ground applications and the planned support for air-ground applications which will operate ATN/OSI over VDL-Mode 2;

e) States with interface to other regions should implement ATN/OSI or ATN/IPS on a bilateral basis;

f) States with interface to other regions that have multiple connections should provide network redundancy using ATN/OSI;

g) during the transition phase, some AFTN system may remain in operation. A reasonable time frame should be established for their replacement with AMHS;

h) MTA sites should provide AFTN/AMHS gateways during the transition phase;

i) States should work co-operatively to assist each other on a multinational basis to implement the ATN expeditiously and to ensure system inter-operability;

j) States should organize training of personnel to provide necessary capability to maintain and operated the ground-to-ground ATN infrastructure and applications;

k) upon successful deployment of ground-to-ground ATN infrastructures and applications within the region, States gradually introduce ATN air-ground infrastructure and applications;

l) Strategically deploy a network approach that permits dual stacks protocols (ATN/OSI and ATN/IPS) using dual stack routers or by introducing separate IPS routers along side BIS routers;

m) States with AFTN terminal or minimal connection to other States can take advantage of Internet Protocol (IP) network based on bi-lateral agreement;

n) all States having Backbone Boundary Intermediate System (BBIS) should be able to support dual ATN/OSI and ATN/IPS with the particular IP version to be on a bilateral basis;

o) all States having Boundary Intermediate System (BIS) may support ATN/OSI or ATN/IPS or both on a bilateral basis with the Backbone Boundary Intermediate Systems (BBIS) to which they connect;

p) any subsequent upgrade of AMHS Message Transfer Agent (MTA) should be extensible to support dual stack to assist future transition to “ICAO Compliant” IPS network technology; and

q) States shall support CAAS addressing scheme and BBIS States shall support both CAAS

and XF addressing scheme.

_ _ _ _ _ _ _ _ _ _ _ _

Europe strategy – to be included with the strategy

Infrastructure - Pan-European Network (PEN)

The concept of a Pan-European Network (PEN) providing a European-wide ground-ground communications infrastructure has been agreed by ANSPs as a strategic approach necessary to support future international ATM system developments. Recent work conducted has established that a managed IP network is essential to guarantee operational service continuity and to provide the required services for future applications.

The COM-T has requested EUROCONTROL to support the planning and co-ordination of implementation of the PEN through the development of a Programme/Service leading to a contract for service provision.

The PEN initiative has been triggered by the results of the Internet Protocol for Aeronautical eXchange (iPAX) Task Force. The objective was to develop or modify guidelines, specifications and possibly aeronautical standards related to the exchange of data between ATS or CNS systems based on the TCP/IP protocol suite with the aim to propose an alternative for the eventual replacement of the X.25 protocol in ATS/CNS. In view of the existing IPv4 national or regional deployments and their non-interoperability, the iPAX-TF developed a solution combining both IPv4 and IPv6. The iPAX-TF concluded it's work in 2004.

Further information is provided in a separate presentation.

IPS WG/1
Appendix 4D to the Report on Agenda Item 4

Public Internet usage strategy and guidance

Security and Implementation Guidelines:

- All implementation must comply with ICAO document 9855.

- Internet based applications should be used for low traffic non-time critical applications where leased lines are not justifiable

- The user of the application should expect service outages and should have a fallback procedure during the internet based service outage
- Applications to be used via internet can be categorized into two groups:

- CAT1: View only facility

User can view only the data via internet such as AFTN messages or MET charts

- CAT2: Modify facility

User can send data via the internet such as sending AFTN messages or uploading AIS updates

- Authentication Requirements:
  - CAT1: username/password is required for this type of services with strong password policy
  - CAT2: two-factor authentication must be implemented for services in this category

- Authenticity and Privacy:
  - CAT1: The user should be able to verify the authenticity and integrity of the data received over the internet by implementing standard message signing or secure transfer protocol (HTTPS). Encryption of the data is not mandatory.
  - CAT2: mutual authentication is required where both ends the user and the server should be able to authenticate each other using PKI and the data must be encrypted using a minimum 128-bit
  - Users upon registration with the internet based service must be verified by some mean.

- Network topology
  - All internal systems must be protected by an enterprise class firewall from the external internet environment, no direct traffic allowed from the internet into the internal systems. All traffic must be forwarded to a proxy system placed in a DMZ with strong policy (such as system update and patching, minimum running services on systems ... etc)
  - Preferably systems exposed to the internet in the DMZ should have host based intrusion prevention or a dedicated intrusion prevention system appliance.

- Logging and Auditing
  - System exposed to the internet must be keep a log of all transactions with the user on the internet and the systems in the internal network.
  - Logs must be kept for a minimum period of 30 days.
  - The log must contain the original message received by the server with server time-stamp and user ID if available.

REPORT ON AGENDA ITEM 5: FUTURE WORK PROGRAMME

5.1 The meeting reviewed the terms of reference (TOR) and work programme of the Working Group, taking into consideration the accomplishment of the first IPS WG meeting, the Working Group was of the view that major tasks assigned were partially completed and therefore updated its TOR and work programme as at **Appendix 5A** to the report on Agenda Item 5, to reflect the actual task and the additional tasks, that need to be completed by the IPS WG and agreed to the following Draft Decision:

DRAFT DECISION 1/7: TERMS OF REFERENCE OF THE IPS WORKING GROUP

*That, the Terms of Reference and Work Programme of the IPS Working Group be updated as at **Appendix 5A** to the Report on Agenda Item 5.*

5.2 The meeting was of the view that the current TOR and work programme of the IPS Working Group, focuses to the selected networking technologies in support of ATM applications for ground-to-ground communications based on the Internet Protocol suite (IPS). The meeting was of the view that the Working Group could be tasked in future to consider air-to-ground communications.

5.3 With regard to the date of the next Working Group meeting, it was agreed that, in accordance with the MIDANPIRG Procedural Handbook, and based on Terms of Reference and Action Plan of the Work Group, the IPS WG/2 meeting could be tentatively scheduled before CNS SG/3 meeting planned for 16-18 November 2009, ideally could be planned back-to-back with the AMC training. However, the actual dates would depend on MID Regional Office workload/activities and would thus be confirmed in due course. The duration would be three (03) working days unless otherwise agreed. The venue would be Cairo, unless a State indicates an interest in hosting the meeting.

5.4 The meeting agreed to the Provisional Agenda for the IPS WG/2 meeting, as at **Appendix 5B** to the Report on Agenda Item 5.

5.5 In accordance with the ICAO Business Plan and the requirements for performance monitoring, the meeting developed a follow-up action plan based on the results of the meeting as at **Appendix 5C** to the Report on Agenda Item 5.

IPS WG/1
Appendix 5A to the Report on Agenda Item 5

TERMS OF REFERENCE

IPS WORKING GROUP

TERMS OF REFERENCE (TOR)

To promote a globally harmonized and agreed approach to transition planning in order for MID States to work collaboratively in developing their future transition arrangements towards the ATM system envisioned in the Global ATM Operational Concept.

In accordance with the MID Region Performance, taking into consideration that the evolution from a systems-based approach to a performance-based approach should be evolutionary and consistent with the Global plan, and the MID Region activity for the usage of the public Internet and the implementation of the ATN the IPS Working Group should:

No.	Strategic Objectives	Tasks
1	D/E	Develop MID Region public Internet usage guidance and document all Internet usage with particular attention to the safety/security of the data exchanged over the public internet.
2	A/D	Complete the development of the ATN planning document.
3	D/E	Review and analyze the MID Region rationalized AFTN plan and make suggestion for the improvement in accordance with the new development in the MID Region.
4	D	Provide the necessary support for the implementation of the IPS in the MID Region (MID IPNET)

WORK PROGRAMME

1) Finalize the MID region Strategy for the usage of the public internet as per ICAO guidance and start the implementations where needed
2) Document all public internet usage in the MID Region.
3) Analyze the public internet usage for safety and security of the data exchanged.
4) Suggest the public internet uses in the MID Region.
5) Review and complete the ATN planning document for the MID Region,
6) Develop AMHS implementation plan for the MID
7) Develop AMHS conformance test
6) Develop common specification for the MID IP Network
7) Develop the criteria for the MID Region centers.
8) Review and develop if necessary the rationalized AFTN plan to be in line with the MID Region. move towards the implementations of IPS based ATN network.
9) Develop MID Region AMC related Issues

COMPOSITION

The Group will be composed of experts nominated by MID Region provider States.

Other representatives, who could contribute to the activity of the Group, could be invited to participate as observers.

WORKING ARRANGEMENTS

The representatives shall maintain continuity in the work of the Group, by using communication facilities particularly e-mails to keep the Members and the Secretary in permanent contact with each other, the Group shall meet when necessary.

IPS WG/1
Appendix 5B to the Report on Agenda Item 5

SECOND MEETING OF THE INTERNET PROTOCOL SUITE WORKING GROUP

(IPS WG/2)

PROVISIONAL AGENDA

STRATEGIC OBJECTIVES	AGENDA ITEM #	SUBJECTS
D	1	Adoption of the Provisional Agenda
A&D	2	Completing of MID ATN Planning and planning & implementation Document
A&D	3	AMHS Related issues
A&D	4	MID IP Net
D	5	Public Internet usage issues
A and D	6	Future Work programme
D	7	Any other business

IPS WG/1
Appendix 5C to the Report on Agenda Item 5

IPS WG/1 FOLLOW-UP ACTION PLAN

CONC/DEC NO. --- STRATEGIC OBJECTIVE	TITLE OF CONCLUSION/DECISION	TEXT OF CONCLUSION/DECISION	FOLLOW-UP ACTION	TO BE INITIATED BY	DELIVERABLE	TARGET DATE
Draft Conc. 1/1	MID ATN Compatibilities	That, a) MID ATN will be IPS based and will maintain compatibility with AFTN, CIDIN and ISO/OSI based implementation and in close coordination with adjacent Region; and b) phase out of any protocol will be based in close coordination within MID Region and with the adjacent Region.	State to advise if any changes	State	Compatible ATN Network	On going
Draft Conc. 1/2	AMHS Address Coordination in MID Region	That MID States, a) use the EUROCONTROL AMC and follow the procedures as outlined in SL 7/49.1-09/34; b) operating international Communication centre, with the intention of implementing AMHS should engage into the AMHS address coordination process without delay ;and c) support ICAO MID regional Office by attending the AMC training which will be organized for the MID Region.	States to follow the procedure States ICAO MID Office	States States ICAO MID Office and states	Follow-up of the procedure Engagement with AMC operations State letter Host and nominate experts	On going for short term On going Jun 09

CONC/DEC NO. --- STRATEGIC OBJECTIVE	TITLE OF CONCLUSION/DECISION	TEXT OF CONCLUSION/DECISION	FOLLOW-UP ACTION	TO BE INITIATED BY	DELIVERABLE	TARGET DATE
Draft Conc. 1/3	Registration to AMC	That, a) ICAO MID Regional Office communicates the procedure developed by IPS WG to the concerned in ICAO HQ and EUROCONTROL for the modification of the registration procedure as outlined in **Appendix 4B** to the report on Agenda Item 4. b) MID States designate three users to AMC and send their details to ICAO MID Regional Office as soon as possible.	ICAO MID Office communication States designate users	ICAO MID Office States	Result of coordination Registration in AMC	Aug 09 Aug 09
Draft Conc. 1/4	Posting of AMHS Plans in AMC	That MID States, are encouraged to post their AMHS implementation plans in the AMC.	State letter and States posting	ICAO MID Office States	State letter Posting of the plan	Jun 09 Sep 09
Draft Dec. 1/5	MID Region ATN Planning and Implementation Document	That, MID ATN Planning document to be amended as at **Appendix 4C** to the report on Agenda Item 4 and renamed " MID Region ATN planning and Implementation Document" and IPS WG completes its development.	Amendment of MID ATN document State letter	IPS WG ICAO MID Office States	Amended document State letter Comments from State	Jun 09 Sep 09
Draft Conc. 1/6	Use of Public Internet in MID Region	That MID States, a) are encouraged to follow the guidance **Appendix 4D** to the report on Agenda Item 4, when using the public internet for critical aeronautical communication; and b) urgently provide the inventory on the public internet usage in their state to the ICAO MID office.	State letter State replies	ICAO MID Office State	State letter with survey and the guidance State reply and comments and inventrory	Jun 09 Sep 09

CONC/DEC NO. --- STRATEGIC OBJECTIVE	TITLE OF CONCLUSION/DECISION	TEXT OF CONCLUSION/DECISION	FOLLOW-UP ACTION	TO BE INITIATED BY	DELIVERABLE	TARGET DATE
Draft Dec. 1/7	Terms of Reference of the IPS Working Group	That, the Terms of Reference and Work Programme of the IPS Working Group be updated as at Appendix 5A to the Report of Agenda Item 5.	Follow up of the work programme	IPS WG	IPS WG report	Oct 09

REPORT ON AGENDA ITEM 6: ANY OTHER BUSINESS

6.1 The meeting agreed to conduct future meeting and discussion possibly using the available net meeting technologies, in this regard the meeting agreed that the following members are able to participate in net meeting (Bahrain, Saudi Arabia, Jordan, Libya, Iran, Iraq, and Egypt), only Syrian members advised that they could not participate in net meeting, but the delegate indicated that they would check and revert back.

6.2 The meeting agreed to utilize the MID forum for posting issues and receiving replies in order to foster healthy discussion and get the involvement from more participants from States.

6.3 The meeting expressed its gratitude for the conduct of meeting in an expert manner utilizing brain storming method, which contributed greatly to fruitful outcome of the meeting.

ATTACHMENT A

IPS WG/1
Attachment A to the Report

LIST OF PARTICIPANTS

NAME	TITLE & ADDRESS
STATES **BAHRAIN** Mr. Mohamed Ali Saleh	Head Aeronautical Communication Civil Aviation Affairs P.O.Box 586 KINGDOM OF BAHRAIN Fax: (973) 17 321 992 Tel: (973) 17 321 187 Mobile: (973) 3962 2202 Email: masaleh@caa.gov.bh
Mr. Hussain Hassan Ebrahim	Senior Network Engineer Civil Aviation Affairs P.O.Box 586 KINGDOM OF BAHRAIN Fax: (973) 17 321 992 Tel: (973) 17 321 183 Mobile: (973) 396 53 659 Email: hebrahim@caa.gov.bh
EGYPT Mr. Mahmoud Aly Ramadan	Director of AFTN/AIS/AIP/MAP Computers Ministry of Civil Aviation National Air Navigation Services Company Cairo Airport Road Cairo - EGYPT Fax: (202) 2268 5293 Tel: (202) 2265 7959 Mobile: (2010) 654 1506 Email: mahmoud.ramadan53@gmail.com
ISLAMIC REPUBLIC OF IRAN Mr. Gholam Ali Barzegari-Naeini	Aeronautical Messages Network Manager Iranian Airport Company (IAC) Mehrabad International Airport P.O. Box 13445 – 1558 Tehran - ISLAMIC REPUBLIC OF IRAN Fax: (9821) 6602 5101 Tel: (9821) 6604 6645 Email: barzegari@airport.ir

NAME	TITLE & ADDRESS
Mr. Esfandiar Nopourashrafi	Chief of Messages Network Department Iranian Airport Company (IAC) Mehrabad International Airport P.O. Box 13445 – 1558 Tehran - ISLAMIC REPUBLIC OF IRAN Fax: (9821) 6602 5101 Tel: (9821) 6604 6645 Email: napour.ipsir@yahoo.com
IRAQ Mr. Mohammed Azeez Kadhim	Terminal Manager Establishment of Civil Aviation Baghdad International Airport Baghdad - IRAQ Tel: (964) 8132 471 Mobile: (964-790) 229 8086 Email: hussein@iraqcaa.com
Mr. Ali Hussein Ahmed Alsharqi	Programmer Establishment of Civil Aviation Baghdad International Airport Baghdad – IRAQ Tel: (964) 8132 471 Mobile: (964-770) 7801 785 Email: hussein@iraqcaa.com
JORDAN Mr. Rashed Bani Ata	Head of Networking Division Civil Aviation Regulatory Commission P.O. Box 7547 Postal 11110 Amman - JORDAN Fax: (962-6) 489 1653 Tel: (962-6) 489 2282 Mobile: (962-79) 525 7734 Email : itcom@carc.gov.jo
LIBYA Mr. Abdurrazag Indeir	Chief of AFTN Maintenance Unit Civil Aviation Authority P.O. Box 14399 Tripoli - LIBYA Fax: (218-21) 563 2338 Tel: (218-21) 5630 414 Mobile: (218-91) 320 3247 Email : amindeir@yahoo.com

NAME	TITLE & ADDRESS
Mr. Adnan Ibrahim Ramadan	Information Office Civil Aviation Authority P.O. Box 14399 Tripoli - LIBYA Fax: (218-21) 360 5322 Tel: (218-21) 563 5520 Mobile: (218-92) 525 6639 Email : gattosa@lycaa.org info@lycaa.org
SAUDI ARABIA Mr. Abdullah A. Binsaleh	Computer Networking Engineer General Authority of Civil Aviation Air Navigation Services P.O.Box 15441 Jeddah 21444 KINGDOM OF SAUDI ARABIA Fax: (966-2) 671 9041 Tel: (966-2) 671 7717 Ext 550 Mobile: (966-50) 484 3757 Email: abs2000@maktoob.com
Mr. Hani A. Gari	Software Engineer General Authority of Civil Aviation Air Navigation Services P.O.Box 15441 Jeddah 21444 KINGDOM OF SAUDI ARABIA Fax: (966-2) 671 9041 Tel: (966-2) 671 7717 Ext 226 Mobile: (966-50) 370 3772 Email: garihani@hotmail.com
SYRIA Mr. Abdul Hadi Kabalan	Chief of AFTN and Head of Information Department Syrian Civil Aviation Authority Al Najma Square P.O.Box 6257 Damascus - SYRIA Fax: (963-11) 540 0571 Tel: (963-11) 540 0571 Mobile: (963) 966 851162 Email: abdulhad.kabalan@yahoo.com

NAME	TITLE & ADDRESS
Eng. Mysaa Ashoor	Engineer of Communication Directory Syrian Civil Aviation Authority Al Najma Square P.O.Box 6257 Damascus - SYRIA Fax: (963-11) 540 0571 Tel: (963-11) 540 0571 Mobile: (963) 933 708947 Email: maysaa_ashour@yahoo.com
Mr. Mohamed Alawi	Computer Engineer Syrian Civil Aviation Authority Al Najma Square P.O.Box 6257 Damascus - SYRIA Fax: (963-11) 540 0571 Tel: (963-11) 540 0571 Mobile: (963) 932 024235 Email: alaa.elawi@gmail.com

- END -