INTERNATIONAL CIVIL AVIATION ORGANIZATION

ASIA AND PACIFIC OFFICE

REPORT OF THE THIRD

ATN TRANSITION TASK FORCE MEETING

Singapore, 26 to 30 March 2001

The views expressed in this Report should be taken as those of the Task Force and not of the Organization. The Result of the Meeting will be submitted to the CNS/MET SG/5 Meeting for review and consideration.

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1 Introduction

1.1 The Third Meeting of the ATN Transition Task Force (ATNTTF/3) was held in Singapore Aviation Academy, Singapore from 26 to 30 March 2001. The meeting was hosted by the Civil Aviation Authority of Singapore.

1.2 On behalf of Mr. L. B. Shah, ICAO Regional Director, Mr. K.P.Rimal, Regional Officer CNS of the ICAO Asia/Pacific Regional Office expressed gratitude and appreciation to the Civil Aviation Authority of Singapore for hosting the meeting and for the excellent arrangement made for the meeting. He highlighted the main events taken place in the CNS/ATM field including the development of the ATN SARPs and guidance materials as well as recent implementation activities in the ASIA/PAC Region. He also highlighted the main objectives of the meeting.

1.3 On behalf of the Director-General of Civil Aviation Authority of Singapore, Mr. Ong Chuan Bin, Senior Engineer (ATE), extended a warm welcome to all the participants.

2 ATN Seminar

2.1 An ATN seminar was organised by ICAO in accordance with Conclusion 11/19 of APANPIRG in conjunction with the ATNTTF/3. The seminar covered a comprehensive list of topics on the ATN, as follows:

- Basic ATN Concept
- Routing, Naming and Addressing
- ATN Ground-Ground Applications: ATSMHS; AIDC
- ATN Air-Ground Application –CPDLC; ADS/FIS
- New ATN Features-Security; Network Management and Directory
- Planning and Implementation Considerations
- Seminar Evaluation

2.2 In the seminar, a number of speakers from various States participated in providing valuable information on the ATN. The topics included the basic ATN concept providing an overview on the ATN, ICAO activities and documentation and the ATN Panel organisation. Information was also provided on ATN architecture, ATN routing, addressing and naming conventions and ATN applications (ground-ground and air-ground) and new additional features that were added to the ATN SARPs on security, system management and directory services. The seminar provided opportunity for a number of States and organisations to present information on ATN implementation activities occurring in the region and around the world.

2.3 The ATN seminar was well received by all participants who expressed that such seminars should be organized in the future.

3 Attendance

3.1 The seminar and the meeting was attended by seventy-eight experts from Australia, Bahrain, Brunei Darussalam, China, Hong Kong China, Fiji, Maldives, Mongolia, India, Indonesia, Japan, Malaysia, New Zealand, Philippines, Republic of Korea, Russian Federation, Singapore, Sri Lanka, Thailand, United States, Vietnam, ATNSI, AVITECH, IATA, IFALPA and SITA. A list of participants is at Attachment 1.

4 Officers and Secretariat

4.1 Mr. Craig Head from Australia, Chairman of the Task Force presided over both the seminar and the meeting of the Task Force.

4.2 Mr. K.P. Rimal, Regional Officer, CNS acted as the Secretary of the seminar and the meeting, who was assisted by Mr. Li Peng, Regional Officer, CNS of the ICAO Asia and Pacific Regional Office and Mr M. Y. Traore, Regional Officer, CNS of the ICAO Regional Office, Middle East.

5 Agenda of the Meeting

5.1 The Agenda items adopted by the meeting were as follows.

Agenda Item 1: Review regional ATN planning documents on routing, naming and addressing.

Agenda Item 2: Review ground-ground ATN Transition Plan taking into account air-ground aspects.

Agenda Item 3: Develop ATN interface control documents.

Agenda Item 4: Develop ATN technical documents.

Agenda Item 5: Review Tables and Charts for the ground-to-ground part of the ATN

Agenda Item 6: Review status of implementation of AFTN circuits and evaluate circuit capacity.

Agenda Item 7: Review the Subject/Tasks List of the ATN Transition Task Force.

Agenda item 8: Any other business.

6 Organization, Working Arrangements and Language

6.1 The seminar and the Task Force met as a single body. The working language was English only inclusive of all documentation and this Report. Lists of Working Papers, Information Papers and Seminar Papers presented at the meeting are at Attachment 2.

6.2 The participants visited the ATS/COM Facilities in Singapore International Airport and training facilities at Singapore Aviation Academy.

List of Decisions and Draft Conclusions

Agenda Item 1: Review regional ATN planning documents on routing, naming and addressing

1.1 Under this agenda item, the meeting reviewed the following draft documents:

1. ASIA/PAC ATN AMHS Naming Plan
2. ASIA/PAC ATN Addressing Plan
3. ASIA/PAC ATN NSAP Address Registration Form
4. ASIA/PAC Routing Architecture Plan

1.2 The above documents were modified where required based on the comments provided and agreed by the meeting. It was agreed that the documents should be adopted as regional planning documents and formulated the following draft conclusion:

Draft Conclusion 3/1 – Regional ATN Planning Documents

That, the ASIA/PAC ATN AMHS Naming Plan, ASIA/PAC ATN Addressing Plan, ATN NSAP Address Registration Form and the ATN Routing Architecture Plan provided in Appendices A, B, C, D respectively, be adopted and circulated to States in the ASIA/PAC region and adjacent regions.

Agenda Item 2: Review ground-ground ATN Transition Plan taking into account air-ground aspects

2.1 The meeting reviewed the draft ATN Transition Plan for the Asia/Pacific region. The plan was modified in a number of areas, but the main changes were confined to Table A-1 of the Transition Plan where States provided information on when they would be likely to implement ATN. This Table will be incorporated into Table CNS-1B of the ASIA/PAC FASID in the future. The ICAO Regional Office is, therefore, requested to circulate the Plan provided in Appendix E to States to seek their comments and the meeting formulated the following draft conclusion:

Draft Conclusion 3/2 - ATN Transition Plan

> That, the ICAO Regional Office circulate informally the ATN Transition Plan provided in Appendix E to States in the Asia/Pacific region and concerned States in the adjacent regions to seek comments on the plan and provide resulting comments to the CNS/MET SG/5 Meeting.

2.2 New Zealand indicated that there is a need for another connection between either New Zealand or Fiji to another backbone router to provide alternative routing to the region. As Fiji already has an existing connection to the United States, it was agreed that an ATN routing connection would be retained between Fiji and the United States for the purpose of the plan.

2.3 Fiji proposed that it would like to be considered as part of the backbone of the Asia/ Pacific region and also requested that it would like to be a member of Working Group B. It was agreed that Working Group B would review this request to see if this would be practical in the overall design of the routing architecture. Fiji would also be invited to participate in Working Group B.

2.4 Japan presented two working papers expressing the need to be able to connect additional ATN links to Europe and Russia (Khabarovsk) as an inter-regional backbone link. The meeting agreed that this would be possible and Table A-1 of the ATN Transition Plan would be amended accordingly.

Agenda Item 3: Develop ATN interface control documents

3.1 Japan presented a draft AMHS Interface Control Document (ICD) which could be used by States in the Asia/Pacific region so as to ensure that compatibility and interoperability is maintained between States implementing AMHS services. The AMHS ICD was developed as part of the requirements between Japan and the United States in implementing their AMHS service.

3.2 The meeting agreed that the document should be reviewed in detail by the ATNTTF Working Group B and to report at the next ATNTTF/4 meeting with a final version of the document to be considered by the Task Force. It was agreed that in the mean time the document can be used as guidance material for assisting those States with their specifications who are about to start their AMHS implementation programmes.

Agenda Item 4: Develop ATN technical documents

4.1 It was noted that the Second Meeting of the Task Force in its Decision 2/2 had established the Working Group B and had assigned two tasks of which one task was completed and the other task relating to the development of ATN Technical Documents is yet to be completed.

4.2 It was further noted that the task is still going on and require further investigation and preparation work to be carried out before such documents can be made available for consideration by the Task Force.

4.3 The Technical Documents being considered are as follows:

1) Performance Issues:
   a) Link performance requirements including testing criteria
   b) Transit delays

2) Security Issues:
   a) IDRP Authentication
   b) AMHS Authentication
   c) Guidance Key Management
   d) Security Management
   e) Sunset date issue

3) System Management Issues

4.4 It was expected that the first draft of the above Technical Documents would be produced by the Working Group B for consideration by the Fourth Meeting of the ATN Transition Task Force.

Agenda Item 5: Review Tables and Charts for the ground-to-ground part of the ATN

5.1 The meeting reviewed the sample Tables CNS 1B - ATN Router Plan, Table CNS - 1C ATSMHS Routing Plan and Table CNS - 1D AIDC Circuit Plan contained in the Part IV CNS of ASIA/PAC FASID which is being approved.

5.2 The meeting completed Table CNS-1B provided in Appendix F incorporating the input from the Working Group B and comments from participants. It was agreed that the Table CNS - 1C provided in Appendix G will be completed and presented to the Fifth CNS/MET Sub-Group meeting to be held in July 2001 for review. States are expected to provide details for Table CNS - 1C to the ICAO Regional Office as soon as possible but not later than end of June 2001 for incorporation in the table. Table CNS - 1D is planned to be completed in 2002.

Agenda Item 6: Review status of implementation of AFTN circuits and evaluate circuit capacity

6.1 The AFTN plan was reviewed and updated regularly by the previous Task Force and the COM/MET/NAV/SUR Sub-Group meetings. The plan was further updated to reflect status of AFTN circuit implementation. The updated plan is provided in Appendix H.

6.2 The main highlights of the AFTN improvements made during the year 2000 and early 2001 were as follows:

6.2.1 Circuits:

- Hong Kong/Ho-Chi-Minh circuit was upgraded from dual 75 baud to 300 bauds since 1 April 2000;
- Nadi/Noumea circuit was upgraded from 75 baud to 2400 bps since July 2000;
- Beijing/Seoul 300 baud circuit was implemented using VSAT since 20 February 2001;
- Beijng/Khabarovsk 2400 bps circuit was established using VSAT since 13 February 2001.

6.3 The meeting reviewed the loading statistics presented to the meeting by Japan, Russian Fedration and the Secretariat. The meeting also reviewed AFTN circuits performance status of those circuits which require closer monitoring or upgrading. Accordingly, the meeting developed the following draft conclusion:

Draft Conclusion 3/3 - Need to monitor AFTN circuit performance

That, States concerned closely monitor performance of the following AFTN circuits and coordinate upgrading the circuits capacity, in accordance with the AFTN plan.

1. Manila/Singapore
2. Nadi/Apia Faleolo
3. Mumbai/Colombo
4. Christchurch/Papeete
5. Mumbai/Nairobi
6. Hong Kong/Manila
7. Kuala Lumpur/Chennai
8. Colombo/Singapore
9. Tokyo/Singapore
10. Colombo/Male

6.4 The loading statistics review conducted by Japan indicated that peak hour loading between Tokyo and Moscow had reached 60 percent of the circuit capacity. In the mean time the loading between Tokyo and Khavarovsk was around 4 percent. Russian Federation indicated that there is no need to upgrade the circuit in the near future as traffic can be handled via Tokyo/Khabarovsk circuit.

6.5 The United States provided an overview of the analysis of the AFTN circuit loading statistics with respect to the USA-Brisbane, Nadi and Tokyo AFTN circuits. The need to upgrade the capacity of the above circuits was foreseen three years ago and the timely action taken to cope with potential traffic growth indicated by the statistics was of a significant value. States concerned should regularly analyse the loading statistics and take timely action to upgrade circuits to avoid any performance deficiency.

6.6 The meeting was informed that the implementation of the AFTN circuit between Kunming and Yangon is expected by the end of 2001 upon the restoration of the VSAT link between the two locations. Mumbai/Paro circuit will be implemented upon commissioning of the new AFTN switch at Paro in 2002. Brisbane/Santiago inter-regional circuit is not considered for implementation until June 2002 as current requirement is met via North America.

6.7 It was noted that in the List of Shortcomings and Deficiencies developed by APANPIRG/11, the need to upgrade the existing Calcutta/Dhaka HF RTT circuit to LTT operation by the end of 2000, had been identified. States concerned had been repeatedly urged to take urgent action to implement LTT circuits. However, no progress has been made due to regulatory and technical reasons which are being resolved. IATA expressed serious concern on the long standing delay in upgrading the only HF RTT AFTN circuit operating in the Asia/Pacific region. It was noted that change in routing of messages between Calcutta and Dhaka could be made via Calcutta/Mumbai/Bangkok/Dhaka, as an interim arrangement, in the event of any further delay in upgrading the Calcutta/Dhaka HF RTT circuit. It was noted that India is considering this possibility immediately upon upgrading of the Mumbai/Calcutta circuit in September 2001.

6.8 The meeting noted implementation of the Beijing/Khabarovsk AFTN circuit. It was noted that messages were exchanged between Z and U AFSRAs. This will result in the amendment to the Routing Directory. Japan agreed to accept alternate routing for the Beijing/Khabarovsk circuit. The ICAO Regional Office will issue amendments to this Directory as soon as possible.

Agenda Item 7: Review the Subject/Tasks List of the ATN Transition Task Force

7.1 The meeting reviewed the Terms of Reference (TOR) of the Task Force. It did not recognize the need to propose any change to the TOR. The meeting carried out a thorough review of the Subject/Tasks List and noted that Task No. 1 relating to the development of the ATN Transition Guidance Material and Task No 2 relating to the development of ATN Transition Plan and Planning Documents had been completed. The target date of completion of Tasks 3 and 5 were revised.

7.2 The meeting identified the need to undertake , as a matter of urgency, an additional Task for the development of technical guidance material including interface control documents (ICDs). The meeting reviewed a list of 5 items to be addressed and proposed that they be added as Task List No. 6 in the Subject/Tasks List. The meeting assigned this task to Working Group B and reached the following decision:

Decision 3/4 – Assignment of Additional Tasks

That, the Working Group B of the Task Force undertake the Task No. 6 listed in Subject/Tasks List of the ATN Transition Task Force provided in Appendix I.

7.3 The meeting updated the Subject/Tasks List in light of the above and formulated the following draft decision:

Draft Decision 3/5 - Revision of the Subject/Tasks List

That, the updated Subject/Tasks List of the ATN Transition Task Force be adopted as shown in Appendix I.

Agenda Item 8: Any other business

8.1 Next Meeting

8.1.1 The meeting agreed that the next meeting of the Task Force should be held in February/March 2002. The exact date will be provided at the CNS/MET Sub-Group Meeting to be held in Bangkok in July 2001.

8.2 The documents of the meeting and the seminar presentations are posted on the ICAO web site. The address is as follows:

http://www.icao.int/apac/

Appendix A

ASIA/PAC 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 Asia/Pacific region.

Background

Based upon the ATN SARPs as published in ICAO Annex 10 and ICAO Doc. 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 Asia/Pacific ATN Transition Task Force established an ad hoc group referred to as Working Group A to develop a number of planning documents including a draft AMHS naming convention plan. This document presents the latest draft from Working Group A.

Overview

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 Asia/Pacific 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 Asia/Pacific 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 Asia/Pacific Regional ATN AMHS naming convention presented here will comply with the relevant formats as specified in ICAO Doc. 9705 (Reference 1).

The Asia/Pacific 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 9705-AN/956) Second Edition 1999.

Reference 2 ICAO Location Indicators – Document 7910

1.4 Definitions

MF-Address (MHS-form address) is the Originator/Recipient name of an AMHS user.

XF-Address is a particular MF-Address of which the attributes identifying the user within an AMHS Management Domain may be converted by an algorithmic method to and from an AFTN form address.

1.5 Abbreviations

The following abbreviations are used in this document:

ADMD Administration Management Domain

AFTN	Aeronautical Fixed Telecommunication Network
AMHS	ATS Message Handling System
ATSMHS	ATS Message Handling Service
APANPIRG	Asia Pacific Air Navigation Planning and Implementation Regional Group
ATN	Aeronautical Telecommunication Network
ATNTTF	APANPIRG 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

The Asia Pacific AMHS naming convention is based on a number of factors that have arisen from the third meeting of the ATN Panel held in Montreal during the 7th to 18th of February 2000 and the results from other AMHS planning activities developed by other regions.

To ensure continuity and compatibility with other AMHS naming conventions developed by other regions, it is proposed that the Asia Pacific Region's AMHS naming convention should be based upon the outcomes of the European SPACE[1] Project.

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

[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.

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 MF-Address Attributes

Attribute	**Notation**	**Comment**
Country-name	C	
ADMD	A	
PRMD	P	
Organization-name	O	
Organizational Unit name	OUn	n = 1 – 4
Common name	CN	
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.

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:

1. An AMHS Management Domain,
2. An organization-name attribute set to the 4-character value “AFTN” and encoded as a Printable String,
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 Asia Pacific 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 Asia/Pacific 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 as documented in the relevant ITU-T Standards. However it is recommended that this attribute is made mandatory and is implemented by States in the Asia Pacific 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 7910 [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 7910 [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 7910 or some other value determined by an ATSO and published with ICAO. Figure 2-1 provides a pictorial view of how the organization name can be used in relation with the lower attribute structure.

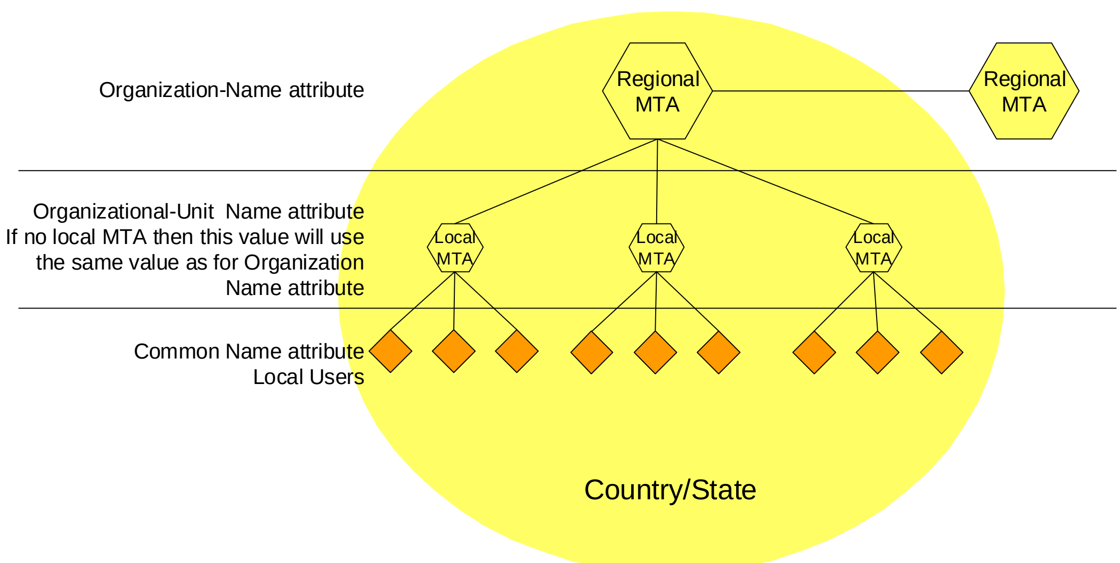


Figure 2-1 Lower Attribute Structure

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. This shall only apply for AFTN users only.

Possible example of an O/R address is shown in Table 2-2.

Table 2-2 Example of a MF-Address AMHS Naming Convention

Attribute	**Assigned By**	**Value**	**Comment**
Country-name (C)	ITU-T	XX	International Organization
ADMD (A)	ICAO	ICAO	ICAO Responsibility to register
PRMD (P)	ATSO	e.g. THAI	ATSO registered private domain with ICAO.
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

Note: It is proposed that for a direct AMHS user that an ATSO should be able to assign a suitable name to that user without being restricted to an AFTN indicator.

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 Section 2.3.1.

2.4.2 ADMD

As proposed in Section 2.3.2.

2.4.3 PRMD

As proposed in Section 2.3.3.

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 2-3.

Table 2-3 Example of a XF-Address AMHS Naming Convention

Attribute	Assigned By	Value	Comment
Country-name (C)	ITU-T	XX	International Organization
ADMD (A)	ICAO	ICAO	ICAO Responsibility to register
PRMD (P)	ATSO	e.g. Australia	ICAO Country Indicator or ATSO registered private domain with ICAO.
Organization-name (O)	ATSO	AFTN	AFTN name
Organizational-Unit name (OU1)	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 non-operational 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 Asia Pacific 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.

In addition until a formal registration authority is established within ICAO, that the ICAO Asia/Pacific regional office maintain a local register within the region for registering all PRMDs and for the plan to be maintained and formally published for wide distribution within the Asia Pacific region.

Appendix B

ASIA/PAC ATN ADDRESSING PLAN

Table of Contents

Executive Summary

This document provides technical guidance on the Planning and Implementation of the transition of ground communications to Aeronautical Telecommunication Network (ATN) within the Asia/Pacific region.

The material presented here is technical in nature, and the description is detailed.

The material is intended for Regional Planning. Although the plan itself is mainly left to the States for planning and implementation, it is hard to differentiate the regional planning from State planning.

Background

Based upon the ATN SARPs as published in ICAO Annex 10 and ICAO Doc. 9705, 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 such as Network Service Access Point (NSAP) Addresses.

At its first meeting, the Asia/Pacific ATN Implementation Task Force established an ad hoc group to develop a draft NSAP addressing plan. This document presents the latest draft from the ad hoc group.

Overview

This document presents recommendations for the assignment of NSAP addresses within the Region. Each field of the NSAP address is presented with the recommended method of assigning values. Fields which are purely local State matters are identified.

1 Introduction

This paper presents the Network Service Access Point (NSAP) address assignment conventions for use in the Asia/Pacific Region.

1.1 Objectives

The objectives of the document are to provide:

- Guidance in the specification of NSAP addresses,
- Guidance in the specification of routing domain identifiers (RDI) for Routing Domains (RD) and Routing Domain Confederations (RDC).

In providing guidance on the specification of NSAP addresses, each NSAP address field is described with the recommendations on how the field may be used. This is important so that consistency in the use of NSAP addresses is obtained and efficiency in routing is maintained.

The guidance on the specification of RD and RDC identifiers is a continuation to the specification of the NSAP address structure. By applying the rules of the address assignments to the addressing of RDs and RDCs will ensure the efficiency of the routing mechanisms are maintained.

1.2 Scope

The scope of the document includes:

- Describing the NSAP address format, and
- Recommending the values in the fields of the regional NSAP addresses.

The Asia/Pacific Regional ATN Addressing Plan presented here will comply with the NSAP format as specified in ICAO Doc. 9705 (Reference 1).

The Asia/Pacific Regional ATN Addressing Plan defines the method for assigning values to each of the fields of the NSAP address. States within the Region may choose to assign their NSAP addresses based upon the recommendations found here.

1.3 Document Structure

Section 2 presents the background information for the formulation of recommendations.

Section 3 presents the assumptions on which the recommendations are based upon.

Section 4 presents the NSAP address structure and the recommended values to be used in Asia/Pacific region.

Section 5 presents the conclusions.

1.4 Terms Used

Network Addressing Domain – A subset of the global addressing domain consisting of all the NSAP addresses allocated by one or more addressing authorities.

Network Entity (NE) – A functional portion of an internetwork router or host computer that is responsible for the operation of internetwork data transfer, routing information exchange and network layer management protocols.

Network Entity Title (NET) – The global address of a network entity.

Network Service Access Point (NSAP) Address – A hierarchically organized global address, supporting international, geographical and telephony-oriented formats by way of an address format identifier located within the protocol header. Although the top level of the NSAP address hierarchy is internationally administered by ISO, subordinate address domains are administered by appropriate local organizations.

NSAP Address Prefix – A portion of the NSAP Address used to identify groups of systems that reside in a given routing domain or confederation. An NSAP prefix may have a length that is either smaller than or the same size as the base NSAP Address.

Routing Domain (RD) – A set of End Systems and Intermediate Systems that operate the same routing policy and that are wholly contained within a single administrative domain.

Routing Domain Confederation (RDC) – A set of routing domains and/or routing domain confederations that have agreed to join together. The formation of a routing domain confederation is done by private arrangement between its members without any need for global coordination.

Routing Domain Identifier (RDI) – A generic network entity title as described in ISO/IEC 7498 and is assigned statically in accordance with ISO/IEC 8348. An RDI is not an address and cannot be used as a valid destination of an ISO/IEC 8473 PDU. However, RDIs are like ordinary NETs, assigned from the same addressing domain as NSAP addresses.

1.5 References

Reference 1 Manual of Technical Provisions for the ATN (Doc 9705-AN/956) Second Edition 1999.

Reference 2 Comprehensive Aeronautical Telecommunication Network (ATN) Manual (Doc 9739-AN/961) First Edition 2000.

Reference 3 ACCESS - ATN Compliant Communications European Strategy Study
Define Network topology – Addressing Plan
Addressing Plan of the European ATN Network

Reference 4 ICAO Location Indicators – Document 7910

Reference 5 Designators for Aircraft Operating Agencies, Aeronautical Authorities and Services - Document 8585.

2 Background

2.1 System Level Requirements

The ATN SARPs are divided into a set of System Level Requirements. These requirements are found in the ICAO Annex 10 text and are repeated in ICAO Doc. 9705 (Reference 1), Sub-Volume 1. The System Level Requirements detail specific requirements that all ATN compliant systems must meet and form the basis for the technical specifications.

Some of the System Level Requirements may best be satisfied through Regional Planning and Regional specification of procedures.

The following list presents the important System Level Requirements and Recommendations that form the basis of the NSAP Addressing Plan.

- System Level Requirement #11 (Annex 10) presents the basis for the definition of NSAP addresses:
  "The ATN shall provide a means to unambiguously address all ATN end and intermediate systems."
- System Level Requirement #13 (Annex 10) presents the basis for the need of Regional Planning:
  "The ATN addressing and naming plans shall allow State and organizations to assign addresses and names within their own administrative domains."

System Level Requirement #11 forms the basis for assigning at least one unique NSAP address for each end system and intermediate system. The assignment of NSAPs to systems enables the unambiguous identification of ATN components and applications.

System Level Requirement #13 forms the basis for Regional Planning in the area of NSAP address assignment. The establishment of Regional plans for assigning addresses assists States and Organizations within a Region to develop consistent address assignment procedures that will result in more efficient routing policies.

2.2 Basis for ATN Address Planning

2.2.1 Regional Planning

At the second meeting of the ATN Panel, it was recognized that the establishment of naming conventions and registration procedures were necessary for the successful deployment of the ATN. Two specific Recommendations were approved at that meeting:

Recommendation 4/1 Advice to States on ATN addressing issues

"That ICAO advise States and international organizations to take the necessary actions for the assignment, administration, and registration of ATN names and addresses within their allocated name/address space, using the information provided."

Recommendation 4/2 Setting up an ICAO ATN addressing process

"That ICAO take the necessary actions to provide a facility for maintaining an up-to-date repository of ATN addresses and names registered in the Air Traffic Services Communication (ATSC) domain, and publish the repository entries at usual regular intervals."

2.2.2 Asia/Pacific Regional Planning

The APANPIRG Asia/Pacific ATN Transition Task Force agreed that a consistent plan for naming and addressing is required to simplify the transition to ATN.

3 Assumptions

In developing the recommendations for the Asia/Pacific Regional ATN Addressing Plan, several assumptions were made about the structure of the Region's ATN implementation. Some of these assumptions may appear unnecessary, but they tend to guide the development of the recommendations presented in Section 4.

- The Asia/Pacific Regional ATN Addressing Plan will comply with the rules in ICAO Doc. 9705 (Reference 1). This means that the syntax, semantics and encoding rules of the NSAP address fields as specified in ICAO Doc. 9705 must be observed.
- There will be a number of ATN routers deployed in the Region. This assumption drives the need for multiple routing domains within the Region and the need to develop a plan that allows for efficient routing.
- The regional routing architecture will eventually include RDCs such as Island RDCs and Backbone RDCs. Therefore the Asia/Pacific Regional ATN Addressing Plan must allow for the addressing of these RDCs.
- The Region will have at least one ATN router in each defined routing domain. This assumption is based on the ATN requirement for the establishment of routing domains.
- The Region will support both ground-ground and air-ground services and applications.

4 NSAP Addressing Plan

4.1 Introduction

The Asia/Pacific 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 Asia/Pacific 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 Asia/Pacific Regional ATN Addressing Plan take advantage of the work performed by the European ACCESS[1] Project (Reference 3).

4.2 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 4.2-1.

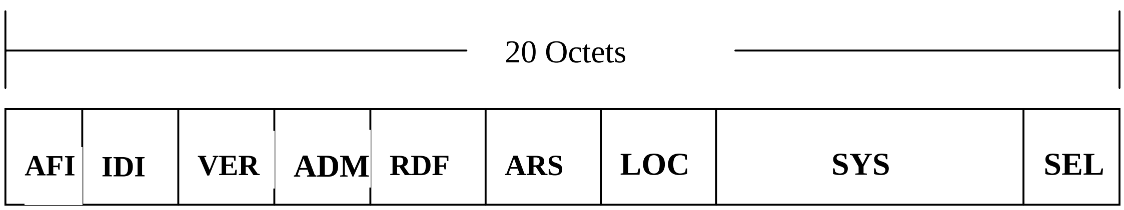


Figure 4.2-1 NSAP Address Format

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	BCD
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

[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).

Field Name	Field Description	Size	Syntax	Number of Characters/ Digits	Field Encoding
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

4.3 Recommendations For NSAP Address Fields Assignments

4.3.1 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.

4.3.2 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 4.3.2-1.

VER Field Value	Network Addressing Domain	Common NSAP Address Prefix for Domain	Value to be used by States of Asia/Pacific 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)

VER Field Value	Network Addressing Domain	Common NSAP Address Prefix for Domain	Value to be used by States of Asia/Pacific Region
[1100 0001]	Mobile ATSC	470027+C1	470027+C1 (General Aviation)

Table 4.3.2-1 - Defined Values for the VER Field

4.3.3 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 Asia/Pacific 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 Asia/Pacific Regional Office would be the allocation authority of the ADM field.

In summary, the values allocated for the ADM field is indicated in Table 4.3.3-1.

VER Field Network Addressing Domain	**ADM Field Values**
Fixed AINSC	Derived from the set of three-character alphanumeric characters from Doc. 8585 (Reference 5).
Mobile AINSC	Derived from the set of three-character alphanumeric characters from Doc. 8585.
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

VER Field Network Addressing Domain	ADM Field Values
	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 4.3.3-1 - Defined Values for the ADM Field

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

Table 4.3.3-2 – Example of Proposed ADM Value Assignment for Selected Asia/Pacific Entities

4.3.4 The RDF Field

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

4.3.5 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 Asia/Pacific 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.

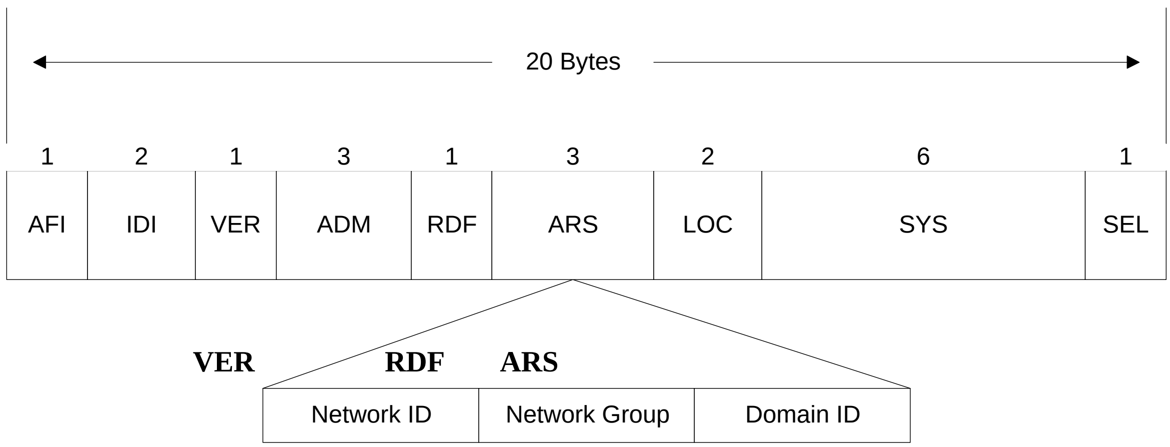


Figure 4.3.5-1 Proposed ARS Field Format

4.3.5.1 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.

4.3.5.2 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”.

4.3.5.3 Domain ID

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

Table 4.3.5.3-1 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 4.3.5.3-1 – Example of ARS Value Assignment

4.3.5.4 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 4.3.5.2 and 4.3.5.3 for the addressing of RDs can be applied to the addressing of RDCs, as required:

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

4.3.6 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 4.3.6-1: Subdomain Group ID and Subdomain ID.

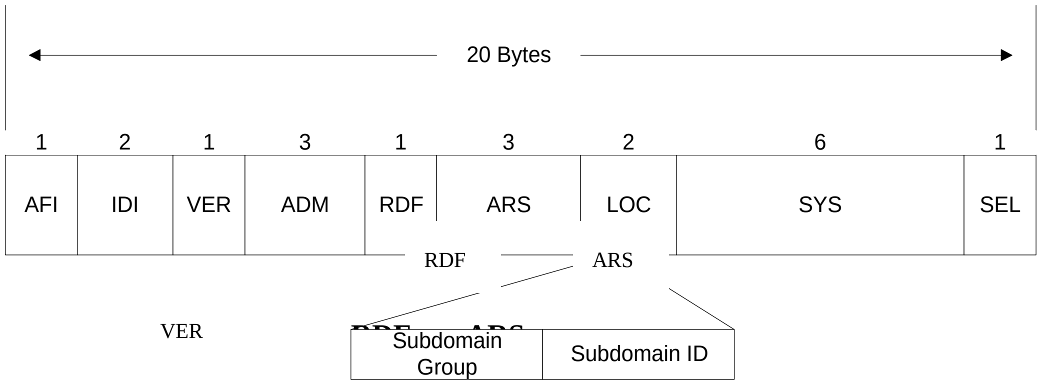


Figure 4.3.6-1 Proposed LOC Field Format

4.3.6.1 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 4.3.6.1-1.

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 4.3.6.1-1 – Example of Subdomain Group ID Value Assignment

4.3.6.2 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 4.3.6.2-1 – Example of Subdomain ID Value Assignment

4.3.7 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.

4.3.8 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 4.3.8-1 identifies the defined values that shall be used in this field in accordance with Reference 1.

SEL Field Value	**Usage**
[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 4.3.8-1 - Defined Values for the SEL Field

4.4 Authority Responsible for NSAP Field Assignments

The responsibility for the assignment of values to each of the NSAP address fields is held by only one organization. This is to ensure that each NSAP address is unique within the ATN. Table 4.4-1 identifies which organization is responsible for the assignment of each field.

NSAP Field	Assignment Authority
AFI	ITU-T and ISO
IDI	ITU-T and ISO
VER	ICAO – defined in Doc. 9705
ADM	States or Organizations identified by the VER field and according to rules found in Doc. 9705 – Recommended values found in this plan
RDF	Reserved
ARS	States or Organizations at the discretion – Recommended values found in this plan
LOC	States or Organizations
SYS	States or Organizations
SEL	ITU-T and ISO for standard transport protocol, States and Organizations for other values/uses

Table 4.4-1 – NSAP Address Field Assignment Responsibility

5 Conclusions

The Asia/Pacific 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.

Appendix C

ASIA/PAC ATN NSAP REGISTRATION FORM

ID	Routing Domain Prefix	NSAP or NET (not including the prefix)	System Name	System Type	Point of Contact	Location
1	470027+8181.5654.0001.4154				Somnuk Rongthong	Thailand
1.1		.424B.4953.0000.0001.00	mk1			
1.2		.424B.4953.0000.0002.00	mk2			
1.3		.424B.4953.0000.0003.00	mk3			
1.4		.424B.4953.0000.0004.00	mk4			
1.5		.434D.4953.0000.0001.00	mai			
1.6		.444D.4953.0000.0001.00	don			
1.7		.4858.4953.0000.0001.00	yai			
1.8		.504B.4953.0000.0001.00	puk			

Table 1 – Documentation of Router and End-System NSAP Addresses

Legend:

ID – Numbering scheme where each routing domain is assigned an ordinal number with each attached end-system or intermediate-system a sub-ordinate number.

Routing Domain Prefix – The ATN routing domain (includes all NSAP address fields through the ARS, or 11 octets). For each Routing Domain Prefix and NSAP address, each two characters represent one (1) octet. Therefore, there are 40 characters in each NSAP address.

System Name – The name assigned to the system, whether an end-system or intermediate-system.

System Type – Whether the system is either an end-system or intermediate system. This field may also include information about the applications or uses, e.g., end-system/AMHS gateway.

Point of Contact – The person or office to contact about further information about this entry.

Location – The physical location of the system. This may be either an address or an AFTN location identifier.

Link ID	Link Name	Element ID	Element ID	Media	Speed	Point of Contact
1		1.1	1.5			
2		1.1	1.7			
3		1.1	1.8			
4		1.1	1.6			
5		1.1	1.2			
6		1.2	1.3			
7		1.3	1.4			

Table 2 – Documentation of Router and End-System Communication Circuits

Legend:

Link ID – Numbering scheme where each link is assigned an ordinal number.

Link Name – This field is used to provide a text description of the link, e.g., AMHS dedicated circuit.

Element ID – This field is the linkage between Table 1 and Table 2 and is the ID field from Table 1. The two Element ID fields are used to indicate which systems are the end-points for this link.

Media – This field is used to indicate the type of link, e.g., satellite, ISDN, T-1.

Speed – This field indicates the speed of the link in bits per second.

Point of Contact – The person or office to contact about further information about this entry.

Appendix D

ASIA/PAC ROUTING ARCHITECTURE PLAN

Table of Contents

Executive Summary

This document provides technical guidance on the Planning and Implementing of the transition to the Aeronautical Telecommunication Network (ATN) for ground communication within the ICAO ASIA/PAC Region.

The material presented here is technical in nature with descriptions provided. The intent of this document is to provide technical details. An overall description of the ATN architecture and implementation planning may be found in other documents.

Background

The ATN Implementation Planning Group of APANPIRG/ATNTTF has agreed to develop an ATN Implementation Plan (ATNIP) for the Asia/Pacific Region. The contents of the ATNIP may include information about the implementation of a Regional ATN Routing Architecture. This is the topic of this document.

Another area that may be included in the ATNIP is Naming and Addressing Conventions, which is the subject of another document.

Scope

The routing architecture is based upon the need for a ground-ground infrastructure to eventually replace the existing AFTN infrastructure. For this reason, the routing architecture uses the existing AFTN 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 be suitable as the routing architecture for the introduction of the air-ground communication requirements.

History

This is the third draft of the routing architecture document. The first meeting discussed two documents that addressed routing issues. That meeting focused on the need to combine the information in the two papers into a single text. The second draft incorporated the definition of router types from one paper and proposed the establishment of sub-areas as proposed in the other paper. The next meeting further refined the concept of sub-areas and agreements were reached on the sub-area definitions. Those agreements are incorporated into this draft.

1 Introduction

This paper presents an initial plan for the routing architecture within the Asia/Pacific Region.

1.1 Terms used

Aeronautical Fixed Telecommunication Network: 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.

Boundary Intermediate Systems: a router that supports IDRP and routes PDUs to more than one routing domain. This term is defined in ICAO Doc. 9705.

Backbone Boundary Intermediate Systems: 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.*

End Boundary Intermediate Systems: a router that primarily routes PDUs between routing domains and connected End Systems.

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

Inter Regional Boundary Intermediate Systems: 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.

Network Service Access Point (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
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 Fundamentals

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

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.

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

2.2 Inter-Domain Routing

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.

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.)

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

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.

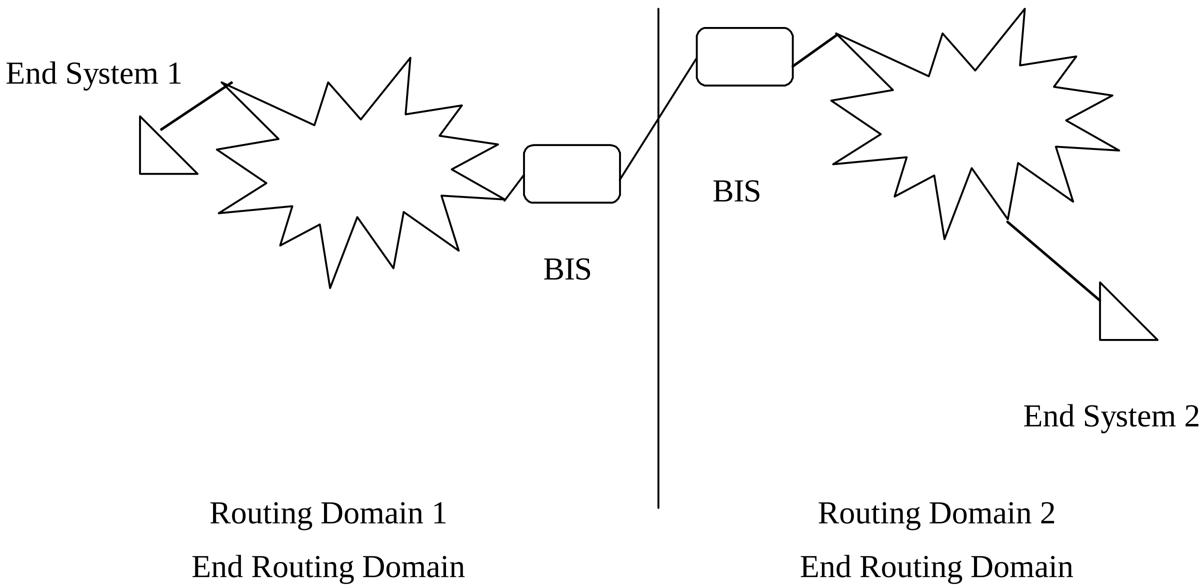


Figure 1 – End Routing Domains

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.

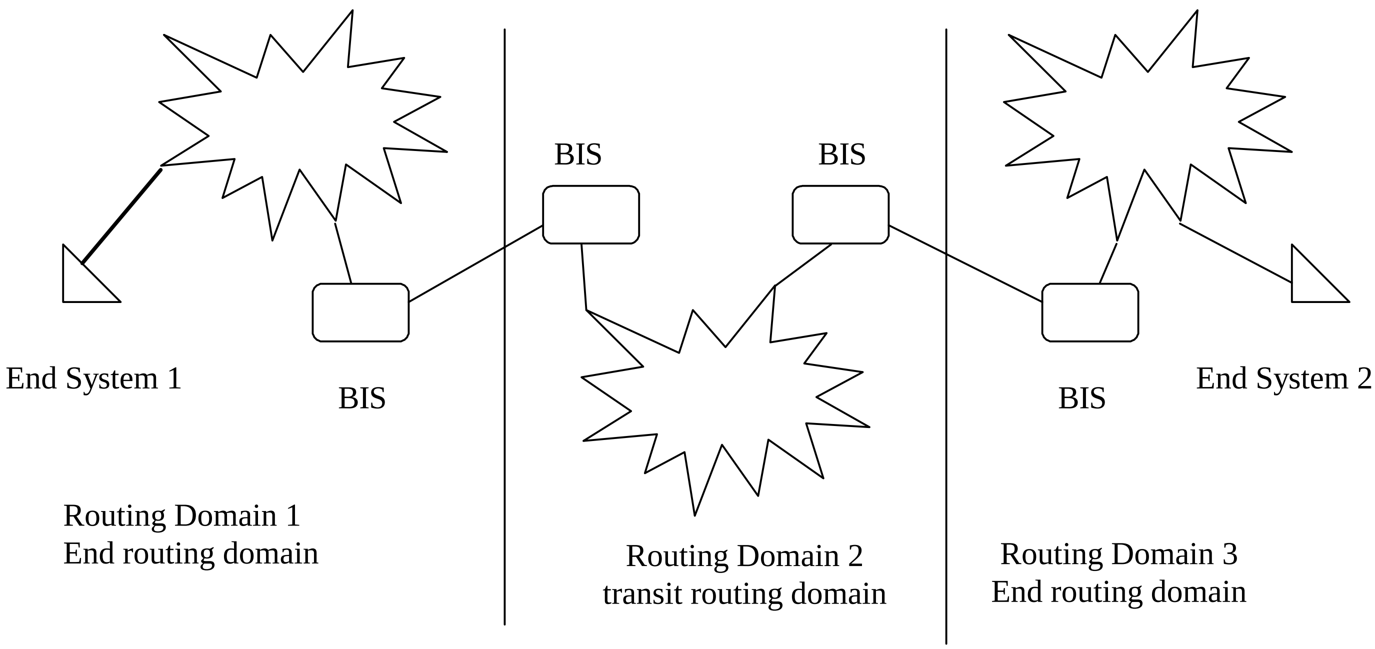


Figure 2 – Transit Routing Domains

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

2.4 Routing Domain Construction

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 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

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”.

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

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.

Within the context of the Asia/Pacific 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 interconnection 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

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 Asia/Pacific Regional Routing Architecture

The Asia/Pacific Regional 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 Asia/Pacific Regional Backbone

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.

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

The Asia/Pacific Region is comprised of a large number of countries distributed over a wide geographic area. Within the Region there are existing major communication centers that can be used to simplify the definition of backbone architecture.

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.

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.

The eight (8) BBIS sites defined in Table 4.1-1 are based on the expected traffic flows. The table is organized with one State and a current AFTN centre site identified as a potential backbone router site. This site is listed first and in bold text.

Note: The identified backbone router sites are only examples. Actual backbone router sites will be determined by implementation schedules and States' willingness to implement backbone routers.

ATN BackBone router site	State
1	**JAPAN (Tokyo)**
2	**CHINA (Beijing)**
3	**CHINA (Hong Kong)**
4	**SINGAPORE**
5	**THAILAND (Bangkok)**
6	**INDIA (Mumbai)**
7	**AUSTRALIA (Brisbane)**
8	**FIJI (Nandi)**

Table 4.1-1 – Definition of Asia/Pacific Regional BackBone Sites

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 Asia/Pacific Regional Backbone

Summarizing the information presented above, the Asia/Pacific Regional Backbone network will consist of at least one BBIS router at each of the backbone sites identified above. Examples of locations for these routers are: Tokyo, China, Singapore, Bangkok, and Brisbane. The actual location of the routers will be based upon implementation schedules and the choices of States.

4.1.2 Asia/Pacific Regional 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

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 Asia/Pacific Regional 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.

To re-state from the previous section, the Inter-Regional BBISs provide communication from routers within the Asia/Pacific 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 Asia/Pacific Region are found in Table 4.2-1 below.

State	**Region**
Australia	Africa, North America
China	Europe, Middle East
India	Africa, Middle East
Japan	Europe, North America
Singapore	Europe, Middle East
Thailand	Europe

Table 4.2-1 States with Circuits to Other ICAO Inter-Regional Backbone

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

Note: Information is needed on the plans of States in implementing ATN.

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 Asia/Pacific Region.

For the long term implementation of ATN, it would be advisable to have 3 circuits to each Region. The addition of circuits to North America and Africa should be considered.

4.2.2 Initial Implementation

Note: Information is needed on the plans of States in implementing ATN.

The initial implementation of the ATN, outside of the Asia/Pacific Region, will most likely be in North America and Europe. Therefore, initial transition planning may focus on those locations.

For connecting to North America, there should be a minimum of two (2) Inter-Regional BBISs. The location of these Inter-Regional BBISs may be located at the centres where the AFTN centres are already located. For example, the following locations would be candidates for such routers:

Tokyo (RJAA), and

Brisbane (YBBB).

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. The location of this router may be Nandi (based on current AFTN routing) or some other circuit connection to North America may be used.

For connecting to Africa or the Middle East, an Inter-Regional BBISs may be located at the location of the existing AFTN centre, Mumbai. 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.

One Inter-Regional BBIS (for example, one located at RJAA) should serve as a routing gateway to the North American Region.

A second Inter-Regional BBIS (for example, one located at YBBB) should serve as a routing gateway to the North American Region.

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

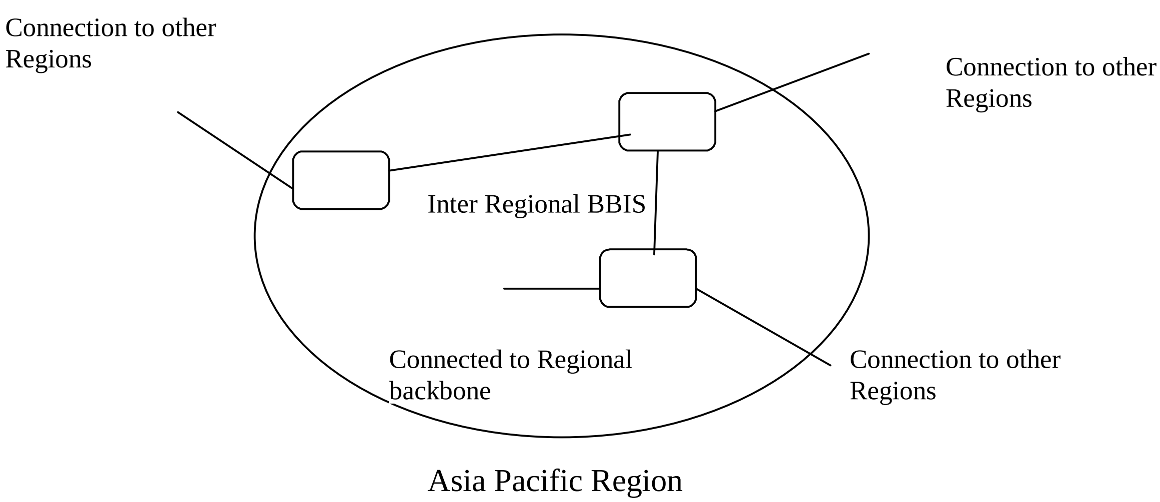


Figure 3 – Inter-Regional Backbone Routers

4.2.3 Transition Issues

The transition issues relating to the regional routing architecture is found in the ATN Transition Plan,

4.3 End BISs

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. 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

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.

The Asia/Pacific 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.

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 Asia/Pacific Region may require considerable planning for the transition of the AFTN.

6.1 Initial Regional Implementations

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.

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

6.2 Regional ATN Implementation

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.

Appendix E

ASIA/PAC ATN TRANSITION PLAN

Table of Contents

Executive Summary

This document provides technical guidance on the transition from the ground infrastructure support of the Aeronautical Fixed Telecommunication Network (AFTN) services to the Aeronautical Telecommunication Network (ATN) for the Asia Pacific Region.

Background

The ATN Transition Task Force was assigned a number of tasks to prepare the region for the introduction of the ATN. Task 2 of the task list was to develop an ATN Ground Transition Plan to provide a seamless transition from the AFTN to the ATN. The plan is to also take into consideration the air to ground aspects within the region.

At the second meeting of the Asia Pacific ATN Transition Task Force (ATNTTF) it was decided to establish a second working group called Working Group B who would be responsible for the development of the transition plan.

Overview

This document presents recommendations for the transition activities for the Asia Pacific Region.

1. INTRODUCTION

This document presents a plan on the ATN ground transition activities applicable to the Asia Pacific region. The document provides information on the ground infrastructure required to support the ATN and to take into consideration the ATN air-to-ground requirements of the region.

1.1 OBJECTIVES

The objective of this document is to provide guidance and information on the transition activities that will need to occur for the Asia Pacific region to migrate from the AFTN to the ATN.

The document also takes into account the air-ground aspects as promoted by the ATN Routing Architecture Plan (Reference 2).

1.2 SCOPE

The scope of the document includes:

- A brief description of the existing ground infrastructure based on AFTN;
- 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 Manual of Technical Provisions for the ATN (Doc 9705-AN/956) Second Edition 1999.

Reference 2 ATN Routing Architecture Plan for the Asia Pacific Region

Reference 3 ICAO Location Indicators – Document 7910

Reference 4 ICAO Asia Pacific CNS Facilities and Services Implementation Document

2. EXISTING GROUND INFRASTRUCTURE

The existing AFTN is mainly made up of low speed circuit links operating at 600 bps to 9600 bps using X.25 or asynchronous protocols. There are also a number of low speed circuits operating at 50 baud using telegraph technology. Currently there are over 90 International AFTN circuits that operate within the Region and between neighboring regions. Further details for each AFTN circuit within the Asia Pacific Region is documented in the ICAO Asia Pacific CNS Facilities and Services Implementation Document (FASID) (Reference 4).

When reviewing the current AFTN topology, the majority of AFTN circuit links will not be suitable to be used for the ATN without some form of upgrade. These upgrades will need to be in the form of high-speed links (bandwidth capacity) and the use of modern protocols such as X.25 that is compatible with the ATN lower layers.

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

It may also be possible for some States that operate private subnetworks using protocols such as X.25 that they could be in a position to carry transit ATN traffic between States that have implemented ATN without being forced to implement ATN in their own country straight away. This would allow the progression of the ATN to continue within the Region without being restricted or having to operate expensive links as a temporary measure while waiting for other States to start their implementation programs.

3. ATN END SYSTEM APPLICATIONS

There are currently six end system applications identified in the Manual of Technical Provisions for the ATN (Reference 1). Table 3-1 lists these applications and provides a brief summary of their functions.

Table 3-1 ATN Applications

Application	Function
Context Management (CM)	An ATN application that provides a logon service allowing initial aircraft introduction into the ATN and 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 purposes.
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 subnetworks.
Flight Information Service (FIS)	An ATN application that provides to aircraft information and advice useful for the safe and efficient conduct of flight.

Application	**Function**
ATS Message Handling Service (ATSMHS)	The set of computing and communication resources 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.

4. ATN TRAFFIC

4.1 GROUND-GROUND TRAFFIC

With the introduction of AMHS as the replacement for AFTN, a number of AFTN circuit links between centres will need to be upgraded to cater for the increase in traffic load generated by AMHS overheads. Table 4-1 shows a comparison of different size messages transmitted over both an AFTN service and an AMHS service using X.25. From the results shown in Table 4-1 there is an increase in message size of 93% due to 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 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.

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.

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.

Table 4-1 Comparison of X.25 Message Sizes Using AFTN and AMHS (Results courtesy of the INCA[1] Project.)

Data Set #	Set # 1	Set # 2	Set # 3	Set # 4
Size of user message (A)	42	255	7480	13
AFTN				
Size of complete message including overheads **(B)**	98	311	7845	N/A
Size of total data transported - user data **= (B) - (A)**	56	56	365	N/A
Ratio of user message / total message size (%) **= (A)/(B) %**	42.86%	81.99%	95.35%	N/A
AMHS				
Size of complete message including overheads and delivery report **(C)**	4231	4448	12783	4271
Size of total data transported - user data **= (C) - (A)**	4189	4193	5303	4258
Ratio of user message / total message size (%) **= (A)/(C) %**	0.99%	5.73%	58.52%	0.30%
AMHS vs. AFTN				
Ratio of total AFTN / total AMHS (%) **= (B) / (C) %**	2.32%	6.99%	61.37%	N/A
Ratio of total AMHS / total AFTN **= (C) / (B)**	43.17	14.30	1.63	N/A

4.2 AIR-GROUND TRAFFIC

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.

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. This information is further explained in Section 5.

[1] INCA (Investigation of Networked CNS/ATM Applications) project was a joint Airservices Australia and Airsys ATM Pty Ltd ATN research and development program, which investigated the AMHS during 1999/2000.

5. ATN ROUTING ARCHITECTURE

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.

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 Asia Pacific Region is document in the Asia Pacific ATN Routing Architecture Plan (Reference 2) and is summarized in Figure 5-1 of this document.

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 cause 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.

Figure 5-1 shows the proposed ATN Routing Backbone for the Asia Pacific 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.

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 Asia Pacific Region can function on its own without support from other regions relaying information on behalf of a failed router or trunk service within the Asia Pacific Region. These additional trunks have been shown as dashed lines in Figure 5-1. Also shown are the inter-regional connections between the Asia Pacific Region and its neighboring Regions. Additional inter-regional connections are also proposed and are further documented in Section 6.

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.

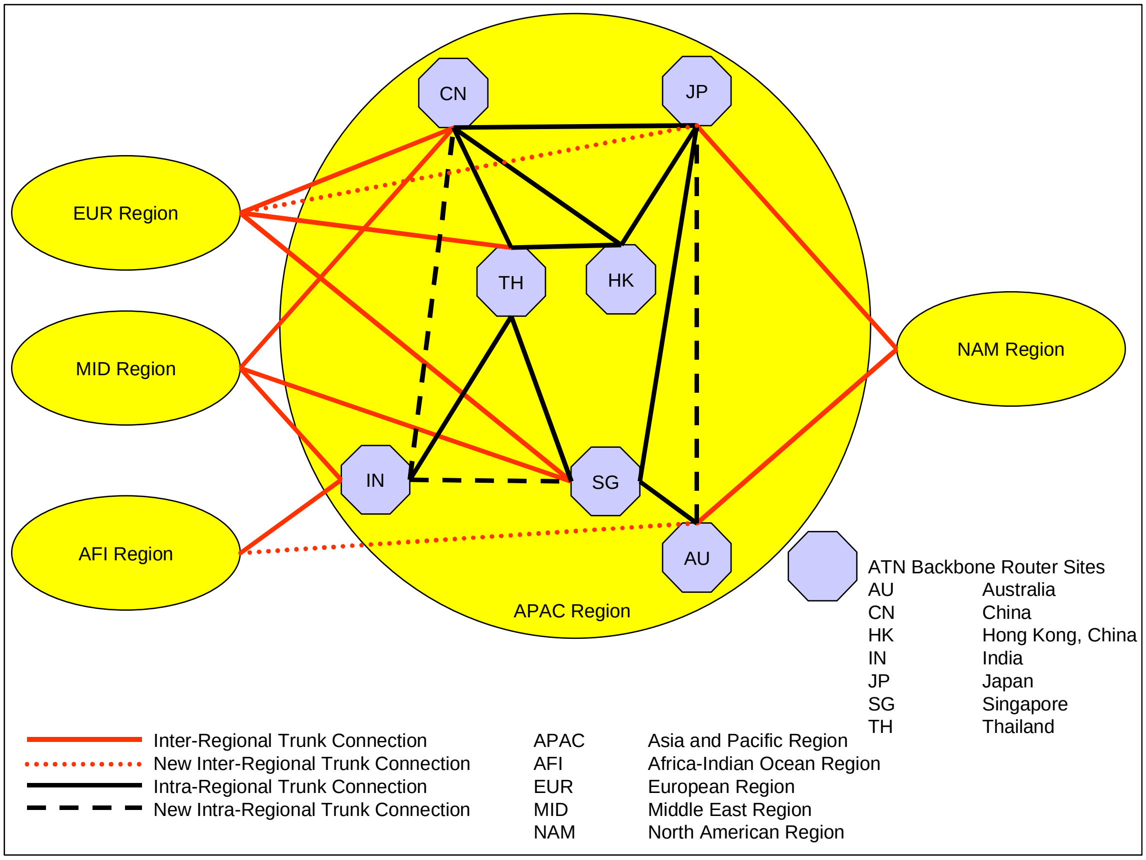


Figure 5-1 Proposed Routing Backbone Architecture

6. ATN BACKBONE TRUNKS

Table 6-1 provides a list of existing or proposed upgrade AFTN 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.

As part of the transition from AFTN to the ATN, the existing link capacity, especially those using X.25, 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, can do so.

An additional backbone site will need to be identified to provide proper redundancy for the South Pacific. At present if a failure occurs in Australia then such States as Fiji, New Zealand and other South Pacific States will be isolated from the network. If either Fiji or New Zealand becomes a backbone site with a connection to the United States will alleviate this problem. Under the current AFTN topology Fiji currently has a connection to the United States.

Table 6-1 ATN Circuit Upgrade and Backbone BIS Implementation

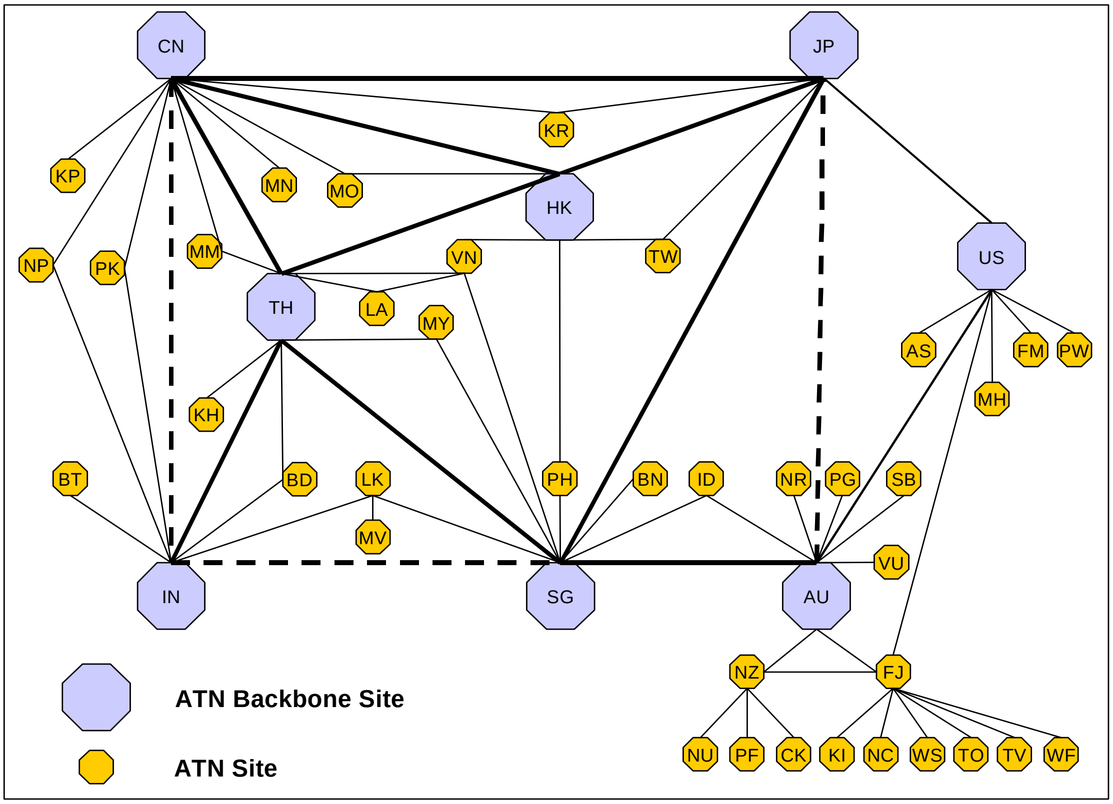
Nominated State	ATN Backbone Connection		Target Date Of Implementation		Trunk Type	Comment
	Speed	Protocol	Circuit	BBIS		
Australia				2003		
Japan	64000bps	X.25	2003		Intra-Regional	New circuit
Singapore	64000bps	X.25	2003		Intra-Regional	Upgrade of circuit
South Africa	19200bps	X.25	2003		Inter-Regional	New circuit
United States	64000bps	X.25	2003		Inter-Regional	Upgrade of circuit
China				2005		
Japan	64000bps	X.25	2005		Intra-Regional	Upgrade of circuit
Hong Kong, China	64000bps	X.25	2005		Intra-Regional	Upgrade of circuit
India	64000bps	X.25	2005		Intra-Regional	New circuit
Russian Federation	19200bps	X.25	2005		Inter-Regional	Upgrade of circuit
Thailand	64000bps	X.25	2002		Intra-Regional	New circuit
Hong Kong, China				2003		
China	64000bps	X.25	2005		Intra-Regional	Upgrade of circuit
Japan	64000bps	X.25	2003		Intra-Regional	Upgrade of circuit
Thailand	64000bps	X.25	2003		Intra-Regional	Upgrade of circuit
India				2005		
China	64000bps	X.25	2005		Intra-Regional	New circuit
Kenya-Nairobi	19200bps	X.25	2005		Inter-Regional	Upgrade of circuit
Oman-Muscat	19200bps	X.25	2005		Inter-Regional	Upgrade of circuit
Singapore	64000bps	X.25	2005		Intra-Regional	New circuit
Thailand	64000bps	X.25	2003		Intra-Regional	Upgrade of circuit

Nominated State	ATN Backbone Connection		Target Date Of Implementation		Trunk Type	Comment
	Speed	Protocol	Circuit	BBIS		
Japan				2002		
Australia	64000bps	X.25	2003		Intra-Regional	New circuit
China	64000bps	X.25	2005		Intra-Regional	Upgrade of circuit
Hong Kong, China	64000bps	X.25	2003		Intra-Regional	Upgrade of circuit
Europe	64000bps	X.25	2005		Inter-Regional	New circuit – Interim Service
Singapore	64000bps	X.25	2003		Intra-Regional	Upgrade of circuit
Russia Federation	19200bps	X.25	2005		Inter-Regional	New circuit – Interim Service
United States	64000bps	X.25	2003		Inter-Regional	Upgrade planned.
Singapore				2005		
Australia	64000bps	X.25	2003		Intra-Regional	Upgrade of circuit
Bahrain	19200bps	X.25	2005		Inter-Regional	Upgrade of circuit
England-London	64000bps	X.25	2005		Inter-Regional	Upgrade of circuit
Japan	64000bps	X.25	2003		Intra-Regional	Upgrade of circuit
India	64000bps	X.25	2005		Intra-Regional	New circuit
Thailand	64000bps	X.25	2003		Intra-Regional	Upgrade of circuit
Thailand				2002		
China	64000bps	X.25	2002		Intra-Regional	New circuit
Hong Kong, China	64000bps	X.25	2003		Intra-Regional	Upgrade of circuit
India	64000bps	X.25	2005		Intra-Regional	Upgrade of circuit
Italy-Rome	64000bps	X.25	2005		Inter-Regional	Upgrade of circuit
Singapore	64000bps	X.25	2003		Intra-Regional	Upgrade of circuit

7. INTERCONNECTION OF ATN ROUTERS

This section describes the interconnection requirements for all other States ATN routers for the Asia Pacific Region. Figure 7-1 shows a pictorial view of the international interconnection between various Asia Pacific countries. Annex **Error! Reference source not found.** contains a list of the international connections between countries and proposed bandwidth requirements and implementation dates.

It is proposed that all existing AFTN circuits are upgraded as soon as practicable to use X.25 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 subnetwork 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.



Country	ISO Code	Country	ISO Code
American Samoa	AS	Mongolia	MN
Australia	AU	Myanmar	MM
Bangladesh	BD	Nauru	NR
Bhutan	BT	Nepal	NP
Brunei Darussalam	BN	New Caledonia	NC
Cambodia	KH	New Zealand	NZ
China	CN	Niue	NU
Cook Islands	CK	Pakistan	PK
Fiji	FJ	Palau	PW
French Polynesia	PF	Papua New Guinea	PG
Hong Kong China	HK	Philippines	PH
India	IN	Samoa	WS
Indonesia	ID	Singapore	SG
Japan	JP	Solomon Islands	SB
Kiribati	KI	Sri Lanka	LK
Korea, Democratic People's Republic of	KP	Taibei	TW
Korea, Republic of	KR	Thailand	TH
Lao	LA	Tonga	TO
Macau China	MO	Tuvalu	TV
Malaysia	MY	United States	US
Maldive Islands	MV	Vanuatu	VU
Marshall Islands	MH	Viet Nam	VN
Micronesia, Federated States of	FM	Wallis and Futuna Islands	WF

Figure 7-1 Asia Pacific ATN Router Interconnection

8. TRANSITION ACTIVITIES

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

- Phase 1, Upgrade of existing subnetwork infrastructure 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

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.

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.

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

In respect to the upgrade of protocols, it is recommend that X.25 will be the preferred protocol to be used for the ATN between States in the first instance. However as other more efficient Wide Area Network protocols are implemented in ATN routers such as Frame Relay and Asynchronous Transfer Mode (ATM) it is expected that these protocols will be implemented on a bilateral arrangement between States.

8.2 PHASE 2

Phase 2 consists of implementing the Backbone BISs (BBISs) that will support the Asia Pacific 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.

Table 6-1 provides target dates in which these facilities should be provided.

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

8.3 PHASE 3

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

Error! Reference source not found. provides initial target dates for the upgrade of the subnetwork links and protocols and implementation of the BISs for each State. 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 ASIA/PAC Regional Office.

9. CONCLUSIONS

The Asia Pacific Region 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 Asia Pacific 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.

ANNEX A

ATN INTER/INTRA REGIONAL CONNECTIONS

Table 0-1 Asia Pacific BIS Routing Interconnections

Backbone State	ATN Interconnection		Target Date Of Implementation		Connection Type	Comment
	Speed	Protocol	Circuit	BIS		
Australia				2003		
Fiji	9600bps	X.25	2005	2005	Intra-Regional	Upgrade of circuit required
Kiribati	9600bps	X.25	2005	2005	Intra-Regional	Upgrade of circuit required
New Caledonia	9600bps	X.25	2005	2005	Intra-Regional	Upgrade of circuit required
Samoa	9600bps	X.25	2005	2005	Intra-Regional	Upgrade of circuit required
Tonga	9600bps	X.25	2005	2005	Intra-Regional	Upgrade of circuit required
Tuvalu	9600bps	X.25	2005	2005	Intra-Regional	Upgrade of circuit required
Wallis Island	9600bps	X.25	2005	2005	Intra-Regional	Upgrade of circuit required
Indonesia	9600bps	X.25	2005	2005	Intra-Regional	
Nauru	9600bps	X.25	2005	2005	Intra-Regional	Upgrade of circuit required
New Zealand	9600bps	X.25	2005	2005	Intra-Regional	Upgrade of circuit required
Cook Islands	9600bps	X.25	2005	2005	Intra-Regional	Upgrade of circuit required
Fiji	9600bps	X.25	2005	2005	Intra-Regional	Upgrade of circuit required
French Polynesia	9600bps	X.25	2005	2005	Intra-Regional	Upgrade of circuit required
Niue	9600bps	X.25	2005	2005	Intra-Regional	Upgrade of circuit required
Papua New Guinea	9600bps	X.25	2005	2005	Intra-Regional	
Solomon Islands	9600bps	X.25	2005	2005	Intra-Regional	Upgrade of circuit required
Vanuatu	9600bps	X.25	2005	2005	Intra-Regional	New circuit required

Backbone State	**ATN Interconnection**		**Target Date Of Implementation**		**Connection Type**	**Comment**
	Speed	**Protocol**	**Circuit**	**BIS**		
China				2005		
DPR of Korea	9600bps	X.25	2005	2005	Intra-Regional	Upgrade of circuit
Macau China	9600bps	X.25	2005	2005	Intra-Regional	Upgrade of circuit
Mongolia	9600bps	X.25	2005	2005	Intra-Regional	Upgrade of circuit
Myanmar	9600bps	X.25	2005	2005	Intra-Regional	Upgrade of circuit
Nepal	9600bps	X.25	2005	2005	Intra-Regional	Upgrade of circuit
Republic of Korea	9600bps	X.25	2005	2005	Intra-Regional	New circuit
Hong Kong, China				2003		
Taibei	9600bps	X.25	2005	2005	Intra-Regional	Upgrade of circuit
Macau, China	9600bps	X.25	2005	2005	Intra-Regional	Upgrade of circuit
Philippines	9600bps	X.25	2005	2005	Intra-Regional	Upgrade of circuit
Viet Nam	9600bps	X.25	2005	2005	Intra-Regional	Upgrade of circuit
India				2005		
Bangladesh	9600bps	X.25	2005	2005	Intra-Regional	Upgrade of circuit
Bhutan	9600bps	X.25	2005	2005	Intra-Regional	Upgrade of circuit
Nepal	9600bps	X.25	2005	2005	Intra-Regional	Upgrade of circuit
Pakistan	9600bps	X.25	2005	2005	Intra-Regional	
Sri Lanka	9600bps	X.25	2005	2005	Intra-Regional	Upgrade of circuit
Maldives	9600bps	X.25	2005	2005	Intra-Regional	Upgrade of circuit
Japan				2002		
Republic of Korea	9600bps	X.25	2005	2005		
Taibei	9600bps	X.25	2005	2005		Upgrade of circuit
Singapore				2005		
Brunei	9600bps	X.25	2005	2005	Intra-Regional	Upgrade of circuit
Indonesia	9600bps	X.25	2005	2005	Intra-Regional	Upgrade of circuit
Malaysia	9600bps	X.25	2005	2005	Intra-Regional	Upgrade of circuit
Philippines	9600bps	X.25	2005	2005	Intra-Regional	Upgrade of circuit
Sri Lanka	9600bps	X.25	2005	2005	Intra-Regional	Upgrade of circuit
Viet Nam	9600bps	X.25	2005	2005	Intra-Regional	Upgrade of circuit

Backbone State	**ATN Interconnection**		**Target Date Of Implementation**		**Connection Type**	**Comment**
	Speed	**Protocol**	**Circuit**	**BIS**		
United States				2003		
American Samoa	9600bps	X.25	2005	2005	Intra-Regional	Upgrade of circuit
Marshall Islands	9600bps	X.25	2005	2005	Intra-Regional	Upgrade of circuit
Micronesia	9600bps	X.25	2005	2005	Intra-Regional	Upgrade of circuit
Palau	9600bps	X.25	2005	2005	Intra-Regional	Upgrade of circuit
Thailand				2002		
Bangladesh	9600bps	X.25	2005	2005	Intra-Regional	Upgrade of circuit
Cambodia	9600bps	X.25	2002	2002	Intra-Regional	Upgrade of circuit
Laos	9600bps	X.25	2002	2002	Intra-Regional	Upgrade of circuit
Viet Nam	9600bps	X.25	2005	2005	Intra-Regional	Upgrade of circuit
Malaysia	9600bps	X.25	2005	2005	Intra-Regional	Upgrade of circuit
Myanmar	9600bps	X.25	2005	2005	Intra-Regional	Upgrade of circuit
Viet Nam	9600bps	X.25	2005	2005	Intra-Regional	Upgrade of circuit

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.

Appendix F

ATN ROUTER PLAN – TABLE CNS – 1B

TABLE CNS 1B – ATN ROUTER PLAN

Explanation of the Table

Column

1	Administration – the name of the Administration, State or Organization responsible for management of the router
2	Location of Router
3	Type of Router: BBIS - Backbone Boundary Intermediate System BIS - Boundary Intermediate System
4	Type of Interconnection: Inter – Regional Intra – Regional Inter – Domain
5	Interconnection, Connection to router of: name of the city or location of the correspondent router
6	Link Speed – Speed requirements of the interconnecting link
7	Link Protocol – Protocol requirements for the interconnecting link
8	Target Date of Implementation – date of implementation of the router services
9	Remarks

Table CNS 1B – ATN ROUTER PLAN

Administration	Location of Router	Type of Router	Type of Interconnection	Interconnection, Connected to router of:	Link Speed	Link Protocol	Target date of Implementation	Remarks
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
American Samoa	Pago Pago	BIS	Inter-Domain	United States	9600bps	X.25	2005	
Australia	Brisbane	BBIS	Intra-Regional	Japan	64000bps	X.25	2003	
		BBIS	Intra-Regional	Singapore	64000bps	X.25	2003	
		BBIS	Inter-Regional	South Africa	19200bps	X.25	2003	
		BBIS	Inter-Regional	United States	64000bps	X.25	2003	
		BIS	Inter-Domain	Fiji	9600bps	X.25	2005	May need to be upgraded to BBIS
		BIS	Inter-Domain	Indonesia	9600bps	X.25	2005	
		BIS	Inter-Domain	Nauru	9600bps	X.25	2005	
		BIS	Inter-Domain	New Zealand	9600bps	X.25	2005	
		BIS	Inter-Domain	Papua New Guinea	9600bps	X.25	2005	
		BIS	Inter-Domain	Solomon Islands	9600bps	X.25	2005	
		BIS	Inter-Domain	Vanuatu	9600bps	X.25	2005	
Bangladesh	Dhaka	BIS	Inter-Domain	India	9600bps	X.25	2005	
		BIS	Inter-Domain	Thailand	9600bps	X.25	2005	
Bhutan	Paro	BIS	Inter-Domain	India	9600bps	X.25	2005	
Brunei Darussalam	Brunei	BIS	Inter-Domain	Singapore	9600bps	X.25	2005	
Cambodia	Phnom Penh	BIS	Inter-Domain	Thailand	9600bps	X.25	2002	

Administration	Location of Router	Type of Router	Type of Interconnection	Interconnection, Connected to router of:	Link Speed	Link Protocol	Target date of Implementation	Remarks
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
China	Beijing	BBIS	Intra-Regional	Japan	64000bps	X.25	2005	
		BBIS	Intra-Regional	Hong Kong, China	64000bps	X.25	2005	
		BBIS	Intra-Regional	India	64000bps	X.25	2005	
		BBIS	Inter-Regional	Russian Federation	19200bps	X.25	2005	
		BBIS	Intra-Regional	Thailand	64000bps	X.25	2002	
		BIS	Inter-Domain	DPR Korea	9600bps	X.25	2005	
		BIS	Inter-Domain	Macau, China	9600bps	X.25	2005	
		BIS	Inter-Domain	Mongolia	9600bps	X.25	2005	
		BIS	Inter-Domain	Myanmar	9600bps	X.25	2005	
		BIS	Inter-Domain	Nepal	9600bps	X.25	2005	
		BIS	Inter-Domain	Pakistan	9600bps	X.25	2005	
		BIS	Inter-Domain	Republic of Korea	9600bps	X.25	2005	
Hong Kong, China	Hong Kong	BBIS	Intra-Regional	China	64000bps	X.25	2005	
		BBIS	Intra-Regional	Japan	64000bps	X.25	2003	
		BBIS	Intra-Regional	Thailand	64000bps	X.25	2003	
		BIS	Inter-Domain	Macau, China	9600bps	X.25	2005	
		BIS	Inter-Domain	Philippines	9600bps	X.25	2005	
		BIS	Inter-Domain	Taibei	9600bps	X.25	2005	
		BIS	Inter-Domain	Viet Nam	9600bps	X.25	2005	

Administration	Location of Router	Type of Router	Type of Interconnection	Interconnection, Connected to router of:	Link Speed	Link Protocol	Target date of Implementation	Remarks
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Macau, China	Macau	BIS	Inter-Domain	China	9600bps	X.25	2005	
		BIS	Inter-Domain	Hong Kong, China	9600bps	X.25	2005	
Cook Island	Rarotonga	BIS	Inter-Domain	New Zealand	9600bps	X.25	2005	
DPR Korea	Pyongyang	BIS	Inter-Domain	China	9600bps	X.25	2005	
Fiji	Nadi	BIS	Inter-Domain	Australia	9600bps	X.25	2005	May need to be upgraded to BBIS
		BIS	Inter-Domain	Kiribati	9600bps	X.25	2005	
		BIS	Inter-Domain	New Caledonia	9600bps	X.25	2005	
		BIS	Inter-Domain	Samoa	9600bps	X.25	2005	
		BIS	Inter-Domain	Tonga	9600bps	X.25	2005	
		BIS	Inter-Domain	Tuvalu	9600bps	X.25	2005	
		BIS	Inter-Domain	United States	9600bps	X.25	2005	May need to be upgraded to BBIS
		BIS	Inter-Domain	Wallis Is	9600bps	X.25	2005	
French Polynesia	Papeete	BIS	Inter-Domain	New Zealand	9600bps	X.25	2005	
India	Mumbai	BBIS	Intra-Regional	China	64000bps	X.25	2005	
		BBIS	Inter-Regional	Kenya, Nairobi	19200bps	X.25	2005	
		BBIS	Inter-Regional	Oman-Muscat	19200bps	X.25	2005	
		BBIS	Intra-Regional	Singapore	64000bps	X.25	2005	
		BBIS	Intra-Regional	Thailand	64000bps	X.25	2003	

Administration	Location of Router	Type of Router	Type of Interconnection	Interconnection, Connected to router of:	Link Speed	Link Protocol	Target date of Implementation	Remarks
1	2	3	4	5	6	7	8	9
		BIS	Inter-Domain	Bangladesh	9600bps	X.25	2005	
		BIS	Inter-Domain	Bhutan	9600bps	X.25	2005	
		BIS	Inter-Domain	Nepal	9600bps	X.25	2005	
		BIS	Inter-Domain	Pakistan	9600bps	X.25	2005	
		BIS	Inter-Domain	Sri Lanka	9600bps	X.25	2005	
Indonesia	Jakarta	BIS	Inter-Domain	Australia	9600bps	X.25	2005	
		BIS	Inter-Domain	Singapore	9600bps	X.25	2005	
Japan	Tokyo	BBIS	Intra-Regional	Australia	64000bps	X.25	2003	Proposed new service
		BBIS	Intra-Regional	China	64000bps	X.25	2005	
		BBIS	Intra-Regional	Hong Kong, China	64000bps	X.25	2003	
		BBIS	Intra-Regional	Singapore	64000bps	X.25	2003	
		BBIS	Inter-Regional	United States	64000bps	X.25	2003	
		BIS	Inter-Domain	Europe	64000bps	X.25	2005	May need to be BBIS for the short term.
		BIS	Inter-Domain	Russia Federation	64000bps	X.25	2005	May need to be BBIS for the short term.
		BIS	Inter-Domain	Republic of Korea	9600bps	X.25	2005	
		BIS	Inter-Domain	Taibei	9600bps	X.25	2005	
Kiribati	Tarawa	BIS	Inter-Domain	Fiji	9600bps	X.25	2005	
Lao PDR	Vientiane	BIS	Inter-Domain	Thailand	9600bps	X.25	2002	

Administration	Location of Router	Type of Router	Type of Interconnection	Interconnection, Connected to router of:	Link Speed	Link Protocol	Target date of Implementation	Remarks
1	2	3	4	5	6	7	8	9
		BIS	Inter-Domain	Viet Nam	9600bps	X.25	2005	
Malaysia	Kuala Lumpur	BIS	Inter Domain	Singapore	9600bps	X.25	2005	
		BIS	Inter-Domain	Thailand	9600bps	X.25	2005	
Maldives	Male	BIS	Inter-Domain	Sri Lanka	9600bps	X.25	2005	
Marshal Island	Majuro	BIS	Inter-Domain	United States	9600bps	X.25	2005	
Micronesia Federated State of	CHUUK	BIS	Inter-Domain	United States	9600bps	X.25	2005	
	Kosrae	BIS	Inter-Domain	United States	9600bps	X.25	2005	
	Ponapei	BIS	Inter-Domain	United States	9600bps	X.25	2005	
	Yap	BIS	Inter-Domain	United States	9600bps	X.25	2005	
Mongolia	Ulaanbaatar	BIS	Inter-Domain	China	9600bps	X.25	2005	
Myanmar	Yangon	BIS	Inter-Domain	China	9600bps	X.25	2005	
		BIS	Inter-Domain	Thailand	9600bps	X.25	2005	
Nauru	Nauru	BIS	Inter-Domain	Australia	9600bps	X.25	2005	
Nepal	Kathmandu	BIS	Inter-Domain	China	9600bps	X.25	2005	
		BIS	Inter-Domain	India	9600bps	X.25	2005	
New Caledonia	Noumea	BIS	Inter-Domain	Fiji	9600bps	X.25	2005	
New Zealand	Christchurch	BIS	Inter-Domain	Australia	9600bps	X.25	2005	
		BIS	Inter-Domain	Cook Is	9600bps	X.25	2005	
		BIS	Inter-Domain	Fiji	9600bps	X.25	2005	

Administration	Location of Router	Type of Router	Type of Interconnection	Interconnection, Connected to router of:	Link Speed	Link Protocol	Target date of Implementation	Remarks
1	2	3	4	5	6	7	8	9
		BIS	Inter-Domain	French Polynesia	9600bps	X.25	2005	
		BIS	Inter-Domain	Niue	9600bps	X.25	2005	
Niue Is	Niue	BIS	Inter-Domain	New Zealand	9600bps	X.25	2005	
Pakistan	Karachi	BIS	Inter-Domain	China	9600bps	X.25	2005	
		BIS	Inter-Domain	India	9600bps	X.25	2005	
Palau	Koror	BIS	Inter-Domain	United States	9600bps	X.25	2005	
Papua New Guinea	Port Moresby	BIS	Inter-Domain	Australia	9600bps	X.25	2005	
Philippines	Manila	BIS	Inter-Domain	Hong Kong, China	9600bps	X.25	2005	
		BIS	Inter-Domain	Singapore	9600bps	X.25	2005	
Republic of Korea	Seoul	BIS	Inter-Domain	China	9600bps	X.25	2005	
		BIS	Inter-Domain	Japan	9600bps	X.25	2005	
Samoa	Apia	BIS	Inter-Domain	Fiji	9600bps	X.25	2005	
Singapore	Singapore	BBIS	Intra-Regional	Australia	64000bps	X.25	2003	
		BBIS	Inter-Regional	Bahrain	19200bps	X.25	2005	
		BBIS	Inter-Regional	England, London	19200bps	X.25	2005	
		BBIS	Intra-Regional	Japan	64000bps	X.25	2003	
		BBIS	Intra-Regional	India	64000bps	X.25	2005	
		BBIS	Intra-Regional	Thailand	6400bps	X.25	2003	
		BIS	Inter-Domain	Brunei	9600bps	X.25	2005	

Administration	Location of Router	Type of Router	Type of Interconnection	Interconnection, Connected to router of:	Link Speed	Link Protocol	Target date of Implementation	Remarks
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
		BIS	Inter-Domain	Indonesia	9600bps	X.25	2005	
		BIS	Inter-Domain	Malaysia	9600bps	X.25	2005	
		BIS	Inter-Domain	Philippines	9600bps	X.25	2005	
		BIS	Inter-Domain	Sri Lanka	9600bps	X.25	2005	
		BIS	Inter-Domain	Viet Nam	9600bps	X.25	2005	
Solomon Is	Honiara	BIS	Inter-Domain	Australia	9600bps	X.25	2005	
Sri Lanka	Colombo	BIS	Inter-Domain	India	9600bps	X.25	2005	
		BIS	Inter-Domain	Maldives	9600bps	X.25	2005	
		BIS	Inter-Domain	Singapore	9600bps	X.25	2005	
Thailand	Bangkok	BBIS	Inter-Regional	Italy	19200bps	X.25	2005	
		BBIS	Intra-Regional	China	64000bps	X.25	2002	
		BBIS	Intra-Regional	Hong Kong, China	64000bps	X.25	2003	
		BBIS	Intra-Regional	India	64000bps	X.25	2005	
		BBIS	Intra-Regional	Singapore	64000bps	X.25	2003	
		BIS	Inter-Domain	Bangladesh	9600bps	X.25	2005	
		BIS	Inter-Domain	Cambodia	9600bps	X.25	2002	
		BIS	Inter-Domain	Lao PDR	9600bps	X.25	2002	
		BIS	Inter-Domain	Malaysia	9600bps	X.25	2005	
		BIS	Inter-Domain	Myanmar	9600bps	X.25	2005	

Administration	Location of Router	Type of Router	Type of Interconnection	Interconnection, Connected to router of:	Link Speed	Link Protocol	Target date of Implementation	Remarks
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
		BIS	Inter-Domain	Viet Nam	9600bps	X.25	2005	
Tonga	Tongatapu	BIS	Inter-Domain	Fiji	9600bps	X.25	2005	
Tuvalu	Funafuti	BIS	Inter-Domain	Fiji	9600bps	X.25	2005	
United States	Oakland	BBIS	Inter-Regional	Australia	64000bps	X.25	2003	
		BBIS	Inter-Regional	Japan	64000bps	X.25	2003	
		BIS	Inter-Domain	American Samoa	9600bps	X.25	2005	
		BIS	Inter-Domain	Marshal Islands	9600bps	X.25	2005	
		BIS	Inter-Domain	Micronesia	9600bps	X.25	2005	
		BIS	Inter-Domain	Palau	9600bps	X.25	2005	
Vanuatu	Port Vila	BIS	Inter-Domain	Australia	9600bps	X.25	2005	
Viet Nam	Ho-Chi-Minh	BIS	Inter-Domain	Hong Kong, China	9600bps	X.25	2005	
		BIS	Inter-Domain	Lao PDR	9600bps	X.25	2005	
		BIS	Inter-Domain	Singapore	9600bps	X.25	2005	
		BIS	Inter-Domain	Thailand	9600bps	X.25	2002	
Wallis Is.	Wallis	BIS	Inter-Domain	Fiji	9600bps	X.25	2005	

Appendix G

ATS MESSAGE HANDLING SERVICE (ATSMHS)

TABLE CNS – 1C

TABLE CNS 1C
ATS MESSAGE HANDLING SERVICES (AMHS)
ROUTING PLAN

Explanation of the Table

Column

1 Administration - the name of the Administration, State or Organization responsible for management of the AMHS

2 Location of AMHS

3 ATSMHS Type:

AFTN/AMHS Gateway
Message Transfer Agent (MTA) Server

4 AMHS Pair - the name of the city or location of the correspondent end of the AMHS service

5 Target Date of Implementation - date of implementation of the AMHS services

6 Remarks

TABLE CNS 1C
ATS MESSAGE HANDLING SERVICES (AMHS) ROUTING PLAN

Administration	Location of AMHS	ATSMHS Type	AMHS Pair	Target date of Implementation	Remarks
1	2	3	4	5	6
Japan	Tokyo	AFTN/AMHS Gateway	Oakland	2003	
			Seoul	2005	
			Hong Kong China	2003	

(To be further developed)

Appendix H

AFTN PLAN – TABLE CNS – 1A

TABLE CNS 1A - AFTN CIRCUITS

Explanation of the Table

Column

1 The AFS station or facility of individual State, listed alphabetically. Each circuit appears twice in the Table.

2 Category of circuit

M - Main trunk circuit connecting Main AFTN communication centres.
T - Tributary circuit connecting Main AFTN communication centre and AFTN stations to relay or retransmit AFTN traffic.
S - AFTN circuit which is used to transmit and receive AFTN traffic to and from a Main or Tributary AFTN communication centre directly connected to it and does not relay AFTN traffic except for the purpose of serving national station(s).

3 and 7 Type of circuit provided:

HF High frequency radio teletype
LTT/a landline teletypewriter, analogue (eg. cable, microwave)
LTT/d landline teletypewriter, digital (eg. cable, microwave)
LDD/a landline data circuit, analogue (eg. cable, microwave)
LDD/d landline data circuit, digital (eg. cable, microwave)
SAT/n/a/d satellite link, the number indicates the number of hops in the circuit: Also use/a for analogue or/d for digital appropriate to the tail circuit.

4 and 8 Circuit signalling speed, current or planned.

5 and 9 Circuit protocols, current or planned.

6 and 10 Data transfer code (syntax), current or planned.

ITA-2 International Telegraph Alphabet No. 2 (Baudot code).
IA-5 International Alphabet No. 5 (ICAO 7 - unit code).
CBI Code and Byte Independent (ATN compliant).

11 Target date of implementation

12 Remarks

Note 1: Circuit is required for alternate routing and for national routing for international traffic.
Note 2: Requirements exist for speech and data (S + DX) communication.

TABLE CNS - 1A AFTN CIRCUITS

State/Station	Cat.	CURRENT				PLANNED				Target date of implemen-tation	Remarks
		Type	Signalling Speed	Protocol	Code	Type	Signalling Speed	Protocol	Code		
1	2	3	4	5	6	7	8	9	10	11	12
AMERICAN SAMOA											
PAGO PAGO - S/NSTU											
United States/KSLC	S	SAT/d	2400 bps	X.25	IA-5						
AUSTRALIA											
BRISBANE - M/YBBB											
Christchurch/NZCH	T	LDD/d	2400 bps	X.25	IA-5						Note 2
Honiara/AGGG	S	LTT	75 baud	None	IA-5						Note 2
Jakarta/WII	S	SAT/d	9600 bps	X.25	IA-5						Note 1,2
Mauritius/FIMP	S	LTT	50 baud	None	ITA-2						
Nadi/NFFN	M	LDD/d	2400 bps	IA-5	IA-5						Note 2
Nauru/ANAU	S	SAT/d	2400 bps	X.25	IA-5						Note 2
Port Moresby/AYPM	S	SAT/d	9600 bps	X.25	IA-5						Note 2
Port Vila/NVVV	S	LTT	300 baud	None	ITA-2						SITA
Santiago/SCSC	M					LDD/d	2400 bps	X.25	IA-5	06/02	Current routing via USA
Singapore/WSSS	M	LDD/d	600 baud	COP-B	IA-5	LDD/d	2400 bps	X.25	IA-5	12/01	
United States/KSLC	M	SAT/d	2400 bps	X.25	IA-5						
BANGLADESH											
DHAKA - S/VGZR											
Bangkok/VTBB	S	SAT/d	300 baud	None	IA-5						
Calcutta/VECC	S	HF RTT	50 baud	None	ITA-2	LTT	50 baud	None	ITA-2	12/02	Note 1,2
BHUTAN											
PARO - S/VQPR											
Mumbai/VABB	S					SAT/a	50 baud	None	ITA-2	12/02	Dial-up
BRUNEI DARUSSALAM											
BRUNEI - S/WBSB											
Singapore/WSSS	S	LTT	75 baud	None	ITA-2	LDD	2400 bps	X.25	IA-5	07/01	
Kota Kinabalu/WBKK	S	LTT	75 baud	None	ITA-2	LDD/d	300 baud	COP-B	IA-5	12/01	Note 1,2
CAMBODIA											
PHNOM PENH - S/VDPP											
Bangkok/VTBB	S	SAT/d	300 baud	None	ITA-2						Note 2
CHINA											
BEIJING - M/ZBBB											
Guangzhou/ZGGG	M	LDD/d	9600 bps	X.25	IA-5						
Karachi/OPKC	M	LTT	50 baud	None	ITA-2	LDD/a	300 baud	None	IA-5	12/01	
Kathmandu/VNKT	S	SAT/d	300 baud	None	IA-5						
Kunming/ZPPP	S	LDD/d	9600 bps	X.25	IA-5						
Russian Fedration/UHHH	M	SAT/d	2400 bps	None	IA-5						via Khabarovsk
Pyongyang/ZKKK	S	SAT/d	300 baud	None	IA-5						

TABLE CNS - 1A AFTN CIRCUITS

State/Station	Cat.	CURRENT Type	CURRENT Signalling Speed	CURRENT Protocol	CURRENT Code	PLANNED Type	PLANNED Signalling Speed	PLANNED Protocol	PLANNED Code	Target date of implemen-tation	Remarks
1	2	3	4	5	6	7	8	9	10	11	12
Seoul/RKSS	S	SAT/d	300 baud	None	IA-5	SAT/d	9600 bps	X.25	IA-5	12/01	Note1
Tokyo/RJAA	M	LDD/d	9600 bps	X.25	IA-5						
Ulaan Baatar/ZMUB	S	SAT/d	300 baud	None	IA-5						Note 2
GUANGZHOU-M/ZGGG											
Beijing/ZBBB	M	LDD/d	9600 bps	X.25	IA-5						
Hong Kong/VHHH	M	LDD/d	1200 bps	None	IA-5	LDD/d	2400 bps	None	IA-5	09/01	Note 1
Macau/VMMC	S	SAT/d	2400 bps	None	IA-5						
KUNMING - S/ZPPP											
Beijng/ZBBB	S	LDD/d	9600 bps	X.25	IA-5						
Yangon/VYYY	S					SAT/d	300 baud	None	IA-5	12/01	Note 1, 2
TAIBEI - S/RCTP											
Hong Kong/VHHH	S	LDD/d	4800 bps	X.25	IA-5						
Manila/RPLL	S	LTT	75 baud	None	ITA-2	LDD/d	300 baud	None	IA-5	07/01	Note 1, 2
Naha/ROAH	S	LDD/d	4800 bps	X.25	IA-5						
HONG KONG, CHINA											
HONG KONG-M/VHHH											
Bangkok/VTBB	M	LDD/d	2400 bps	X.25	IA-5						
Guangzhou/ZGGG	M	LDD/d	1200 bps	None	IA-5	LDD/d	2400 bps	None	IA-5	09/01	Note 1
Ho-Chi-Minh/VVTS	S	SAT/a	300 baud	None	ITA-2						Note 1, 2
Macau/VMMC	S	LDD/d	2400 bps	None	IA-5						
Manila/RPLL	S	LTT	2x75 baud	None	ITA-2	LDD/d	300 baud	None	IA-5	07/01	
Taibei/RCTP	S	LDD/d	4800 bps	X.25	IA-5						Note 2
Tokyo/RJAA	M	LDD/a	9600 bps	X.25	IA-5						
MACAU, CHINA											
MACAU - S/VMMC											
Hong Kong/VHHH	S	LDD/d	2400 bps	None	IA-5						
Guangzhou/ZGGG	S	SAT/d	2400 bps	None	IA-5						
COOK ISLAND											
RAROTONGA-S/NCRG											
Christchurch/NZCH	S	LDD/d	2400 bps	None	IA-5						
DPR KOREA											
PYONGYANG-S/ZKKK											
Beijing/ZBBB	S	SAT/d	300 baud	None	IA-5						
FIJI											
NADI - M/NFFN											
Apia/NSFA	S	LTT	50 baud	None	ITA-2						Note 2
Brisbane/YBBB	M	LDD/d	2400 bps	X.25	IA-5						Note 2
Christchurch/NZCH	S	LDD/d	2400 bps	X.25	IA-5						Note 2

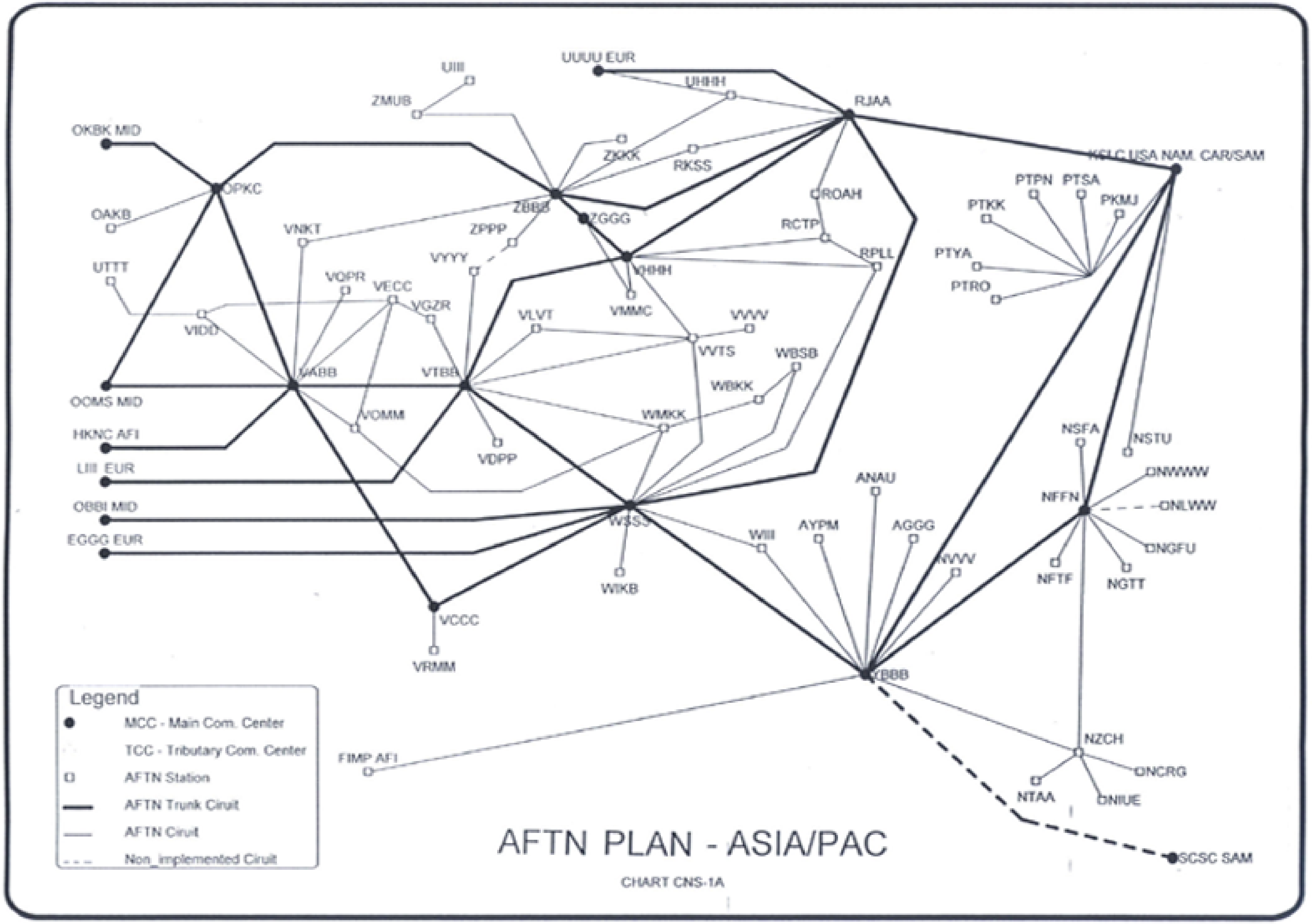
State/Station	Cat.	CURRENT				PLANNED				Target date of implemen-tation	Remarks
		Type	Signalling Speed	Protocol	Code	Type	Signalling Speed	Protocol	Code		
1	2	3	4	5	6	7	8	9	10	11	12
Funafuti/NGFU	S					LTT	50 baud	None	ITA-2	07/01	dial-up
Noumea/NWWW	S	LTT	2400 bps	X.21	ITA-2						Note 2
Tarawa/NGTT	S					LTT	2400 bps	None	IA-5	04/01	
Tongatapu/NFTF	S	LTT	50 baud	None	ITA-2						
United States/KSLC	M	SAT/d	2400 bps	X.25	IA-5						Note 2
Wallis Is./NLWW	S					LTT	50 baud	None	ITA-2	when traffic justifies	Current routing via Noumea
FRENCH POLYNESIA (FRANCE)											
PAPEETE/NTAA											
Christchurch/NZCH	S	LDD/d	300 baud	None	ITA-2	SAT/d	2400 bps	X.25	IA-5	12/01	
INDIA											
MUMBAI - M/VABB											
Bangkok/VTBB	M	SAT/a	2400 bps	X.25	IA-5						
Calcutta/VECC	S	LTT	2x50	None	ITA-2	LDD/d	2400 bps	X.25	IA-5	09/01	
Colombo/VCCC	M	SAT/a	50 baud	None	ITA-2	LDD/d	2400 bps	X.25	IA-5	06/01	
Karachi/OPKC	M	SAT/a	200 baud	None	ITA-2						Note 2
Kathmandu/VNKT	S	SAT/a	50 baud	None	ITA-2						
Muscat Seeb/OOMS	M	SAT/a	300 baud	None	ITA-2	SAT	2400 bps	X.25	IA-5	09/01	Note 2
Nairobi/HKNC	M	SAT/a	50 baud	None	ITA-2	LDD/d	2400 bps	X.25	IA-5	09/01	
Paro/VQPR	S					SAT/a	50 baud	None	ITA-2	12/02	Dial-up
CALCUTTA - S/VECC											
Dhaka/VGZR	S	RTT	50 baud	None	ITA-2	LTT	50 baud	None	ITA-2	12/02	Note 1, 2
Mumbai/VABB	S	LTT	2x50	None	ITA-2	LDD/d	2400 bps	X.25	IA-5	09/01	
DELHI - S/VIDD											
Tashkent/UTTT	S	SAT/a	50 baud	None	ITA-2						
CHENNAI - S/VOMM											
Kuala Lumpur/WMKK	S	LTT	50 baud	None	ITA-2	LDD/d	2400 bps	X.25	IA-5	12/01	Note 1, 2
INDONESIA											
JAKARTA - S/WIII											
Brisbane/YBBB	S	SAT/d	9600 bps	X.25	IA-5						Note1,2
Singapore/WSSS	S	SAT/d	2x50 baud	None	ITA-2	SAT/d	2400 bps	X.25	IA-5	07/01	Note 2
Ujung Pandang	S	SAT/a	2x50 baud	None	ITA-2	SAT/d	2400 bps	X.25	IA-5	2002	Note1, 2
BATAM - S/WIKB											
Singapore/WSSS	S	LTT	50 baud	None	ITA-2						
JAPAN											
TOKYO - M/RJAA											
Beijing/ZBBB	M	LDD/d	9600 bps	X.25	IA-5						
Hong Kong/VHHH	M	LDD/a	9600 bps	X.25	IA-5						
Russian Federation/UHHH	M	LTT	2400 bps	None	IA-5						

State/Station	Cat.	CURRENT				PLANNED				Target date of implemen-tation	Remarks
		Type	Signalling Speed	Protocol	Code	Type	Signalling Speed	Protocol	Code		
1	2	3	4	5	6	7	8	9	10	11	12
Russian Federation/UUUU	M	LTT	200 baud	None	IA-5	LDD/d				12/03	(Moscow)
Naha/ROAH	S	LDD/d	9600 bps	X.25	IA-5						
Seoul/RKSS	S	LDD/d	9600 bps	X.25	IA-5						Note 2
Singapore/WSSS	M	LDD/a	1200 bps	COP-B	IA-5	LDD/d	9600 bps	X.25	IA-5	07/01	
United States/KSLC	M	LDD/d	9600 bps	X.25	IA-5						
NAHA - S/ROAH											
Taibei/RCTP	S	LDD/d	4800 bps	X.25	IA-5						
Tokyo/RJAA	S	LDD/d	9600 bps	X.25	IA-5						
KIRIBATI											
TARAWA - S/NGTT											
Nadi/NFFN	S					LTT	2400 bps	None	IA-5	04/01	
LAO PDR											
VIENTIANE - S/VLVT											
Bangkok/VTBB	S	SAT/d	300 baud	COP-B	IA-5						Note 2
Ho-Chi-Minh/VVTS	S	SAT/d	9600 bps	None	IA-5						Note 1 via Hanoi
MALAYSIA											
KUALA LUMPUR-S/WMKK											
Bangkok/VTBB	S	SAT/d	2400 bps	X.25	IA-5						Note 1, 2
Chennai/VOMM	S	LTT	50 baud	None	ITA-2	LDD/d	2400 bps	X.25	IA-5	12/01	Note 1, 2
Singapore/WSSS	S	SAT/d	1200 bps	X.25	IA-5						Note 2
KOTA KINABALU-S/WBKK											
Brunei/WBSB	S	LTT	75 baud	None	ITA-2	LDD/d	300 baud	COP-B	IA-5	12/01	Note 1, 2
MALDIVES											
MALE - S/VRMM											
Colombo/VCCC	S	LTT	50 baud	None	ITA-2	SAT/d	2400 bps	X.25	IA-5	06/01	Note 2
MARSHAL ISLAND											
MAJURO - S/PKMJ											
United States/KSLC	S	SAT/d	1200 bps	X.25	IA-5						
MICRONESIA FEDERATED STATE OF											
CHUUK - S/PTKK											
United States/KSLC	S	SAT/a	1200 bps	X.25	IA-5						
KOSRAE - S/PTSA											
United States/KSLC	S	SAT/a	1200 bps	X.25	IA-5						

State/Station	Cat.	CURRENT Type	CURRENT Signalling Speed	CURRENT Protocol	CURRENT Code	PLANNED Type	PLANNED Signalling Speed	PLANNED Protocol	PLANNED Code	Target date of implemen-tation	Remarks
1	2	3	4	5	6	7	8	9	10	11	12
PONAPEI - S/PTPN											
United States/KSLC	S	SAT/a	1200 bps	X.25	IA-5						
YAP - S/PTYA											
United States/KSLC	S	SAT/a	1200 bps	X.25	IA-5						
MONGOLIA											
ULAANBAATAR-S/ZMUB											
Beijing/ZBBB	S	SAT/d	300 baud	None	IA-5						Note 2
Russian Federation/UII	M	LTT	50 baud	None	ITA-2						(Irkutsk)
MYANMAR											
YANGON - S/VYYY											
Bangkok/VTBB	S	SAT/d	300 baud	COP-B	IA-5						Note 2
Kunming/ZPPP	S					SAT/d	300 baud	None	IA-5	12/01	Note 1,2
NAURU											
NAURU - S/ANAU											
Brisbane/YBBB	S	SAT/d	2400 bps	X.25	IA-5						
NEPAL											
KATHMANDU - S/VNKT											
Beijing/ZBBB	S	SAT/d	300 baud	None	IA-5						
Mumbai/VABB	S	SAT/a	50 baud	None	ITA-2						
NEW CALEDONIA (FRANCE)											
NOUMEA - S/NWWW											
Nadi/NFFN	S	LTT/d	2400 bps	X.21	IA-5						Note 2
NEW ZEALAND											
CHRISTCHURCH-T/NZCH											
Brisbane/YBBB	T	LDD/d	2400 bps	X.25	IA-5						Note 2
Nadi/NFFN	S	LDD/d	2400 bps	X.25	IA-5						Note 1, 2
Niue/NIUE	S										Currently by FAX
Papeete/NTAA	S	LDD/d	300 baud	None	ITA-2	SAT/d	2400 bps	X.25	IA-5	12/01	
Rarotonga/NCRG	S	LDD/d	2400 bps	None	IA-5						
NIUE IS											
NIUE - S/NIUE											
Christchurch/NZCH	S										Currently by FAX
PAKISTAN											
KARACHI - M/OPKC											
Beijing/ZBBB	M	LTT	50 baud	None	ITA-2	LDD/a	300 baud	None	IA-5	12/01	
Mumbai/VABB	M	SAT/a	200 baud	None	ITA-2						Note 2

State/Station	Cat.	CURRENT				PLANNED				Target date of implemen-tation	Remarks
		Type	Signalling Speed	Protocol	Code	Type	Signalling Speed	Protocol	Code		
1	2	3	4	5	6	7	8	9	10	11	12
Kabul/OAKB	S	SAT/d	300 baud	None	IA-5						Note 2
Kuwait/OKBK	M	SAT/a	50 baud	None	ITA-2						
PALAU											
KOROR - S/PTRO											
United States/KSLC	S	SAT/d	1200 bps	X.25	IA-5						
PAPUA NEW GUINEA											
PORT MORESBY-S/AYPM											
Brisbane/YBBB	S	SAT/d	9600 bps	X.25	IA-5						Note 2
PHILIPPINES											
MANILA - S/RPLL											
Hong Kong/VHHH	S	LTT	2x75 baud	None	ITA-2	LDD/d	300 baud	None	IA-5	07/01	Note 2
Singapore/WSSS	S	LTT	2x75 baud	None	ITA-2	LDD/d	300 baud	None	IA-5	06/01	Note 1, 2
Taibei/RCTP	S	LTT	75 baud	None	ITA-2	LDD/d	300 baud	None	IA-5	07/01	Note 1, 2
REPUBLIC OF KOREA											
SEOUL - S/RKSS											
Beijing/ZBBB	S	SAT/d	300 baud	None	IA-5	SAT/d	9600 bps	X.25	IA-5	12/01	Note1
Tokyo/RJAA	S	LDD/d	9600 bps	X.25	IA-5						Note 2
SAMOA											
APIA - S/NSFA											
Nadi/NFFN	S	LTT	50 baud	None	ITA-2						Note 2
SINGAPORE											
SINGAPORE-M/WSSS											
Bahrain/OBBI	M	LTT	200 baud	None	ITA-2	SAT/a	2400 bps	X.25	IA-5	12/01	
Bangkok/VTBB	M	LDD/d	1200 bps	X.25	IA-5						Note 2
Batam/WIKB	S	LTT	50 baud	None	ITA-2						Note 2
Brisbane/YBBB	M	LDD/d	600 baud	COP-B	IA-5	LDD/d	2400 bps	X.25	IA-5	12/01	
Brunei/WBSB	S	LTT	75 baud	None	ITA-2	LDD/d	2400 bps	X.25	IA-5	07/01	
Colombo/VCCC	M	LTT	75 baud	None	ITA-2	LDD	2400 bps	X.25	IA-5	07/01	
Ho-Chi-Minh/VVTS	S	SAT/a	75 baud	None	ITA-2	SAT/a	300 baud	None	IA-5	07/01	
Jakarta/WII	S	LTT	2x50 baud	None	ITA-2	LDD/a	2400 bps	X.25	IA-5	07/01	Note 2
Kuala Lumpur/WMKK	S	SAT/d	1200 bps	X.25	IA-5						Note 1,2
London/EGGG	M	LDD/d	1200 bps	X.25	IA-5						
Manila/RPLL	S	LTT	2x75 baud	None	ITA-2	LDD/d	300 baud	None	IA-5	06/01	
Tokyo/RJAA	M	LDD/a	1200 bps	COP-B	IA-5	LDD/d	9600 bps	X.25	IA-5	07/01	
SOLOMON IS.											
HONIARA - S/AGGG											
Brisbane/YBBB	S	LTT	75 baud	None	IA-5						
SRI LANKA											
COLOMBO - M/VCCC											
Mumbai/VABB	M	SAT/a	50 baud	None	ITA-2	LDD/d	2400 bps	X.25	IA-5	06/01	

State/Station	Cat.	CURRENT Type	CURRENT Signalling Speed	CURRENT Protocol	CURRENT Code	PLANNED Type	PLANNED Signalling Speed	PLANNED Protocol	PLANNED Code	Target date of implemen-tation	Remarks
1	2	3	4	5	6	7	8	9	10	11	12
Male/VRMM	S	LTT	50 baud	None	ITA-2	SAT/d	2400 bps	X.25	IA-5	06/01	Note2
Singapore/WSSS	M	LTT	75 baud	None	ITA-2	LDD	2400 bps	X.25	IA-5	07/01	
THAILAND											
BANGKOK - M/VTBB											
Mumbai/VABB	M	SAT/a	2400 bps	X.25	IA-5						
Dhaka/VGZR	S	SAT/d	300 baud	None	IA-5						
Ho-Chi-Minh/VVTS	S	SAT/d	2400 bps	None	IA-5						
Hong Kong/VHHH	M	LDD/d	2400 bps	X.25	IA-5						
Kuala Lumpur/WMKK	S	SAT/d	2400 bps	X.25	IA-5						Note 1, 2
Phnom Penh/VDPP	S	SAT/d	300 baud	None	ITA-2						Note 2
Rome/LII	M	SAT/d	2400 bps	X.25	IA-5						
Singapore/WSSS	M	LDD/d	1200 bps	X.25	IA-5						Note 2
Vientiane/VLVT	S	SAT/d	300 baud	COP-B	IA-5						
Yangon/VYYY	S	SAT/d	300 baud	COP-B	IA-5						Note 2
TONGA											
TONGATAPU - S/NFTF											
Nadi/NFFN	S	LTT	50 baud	None	ITA-2						
TUVALU											
FUNAFUTI - S/NGFU											
Nadi/NFFN	S					LTT	50 baud	None	ITA-2	07/01	Dial-up Note 2
UNITED STATES											
USA-M/KSLC											
Brisbane/YBBB	M	SAT/d	2400 bps	X.25	IA-5						
Chuuk/PTKK	S	SAT/d	1200 bps	X.25	IA-5						
Koror/PTRO	S	SAT/d	1200 bps	X.25	IA-5						
Kosrae/PTSA	S	SAT/d	1200 bps	X.25	IA-5						
Majuro/PKMJ	S	SAT/d	1200 bps	X.25	IA-5						
Nadi/NFFN	M	SAT/d	2400 bps	X.25	IA-5						
Pago Pago/NSTU	S	SAT/d	2400 bps	X.25	IA-5						
Ponapei/PTPN	S	SAT/a	1200 bps	X.25	IA-5						
Tokyo/RJAA	M	LDD/d	9600 bps	X.25	IA-5						
Yap/PTYA	S	SAT/d	1200 bps	X.25	IA-5						
VANUATU											
PORT VILA - S/NVVV											
Brisbane/YBBB	S	LTT	300 baud	None	ITA-2						SITA
VIET NAM											
HO-CHI-MINH - S/VVTS											
Bangkok/VTBB	S	SAT/d	2400 bps	None	IA-5						
Hong Kong/VHHH	S	SAT/a	300 baud	None	ITA-2						Note 1, 2
Singapore/WSSS	S	SAT/a	75 baud	None	ITA-2	SAT/a	300 baud	None	IA-5	07/01	
Vientiane/VLVT	S	SAT/d	9600 bps	None	IA-5						Note 1 via Hanoi
WALLIS IS. (FRANCE)											
WALLIS - S/NLWW											
Nadi/NFFN	S					LTT	50 baud	None	ITA-2	when traffic justifies	Current routing via Noumea



AFTN PLAN - ASIA/PAC

CHART CNS-1A

Appendix I

REVISION OF THE SUBJECT/TASKS LIST

Subject/Tasks of the ATN Transition Task Force

No.	Ref.	Task	Priority	Action Proposed/In Progress	Target
1	RAN/3 C 10/12 C 10/11d	Subject: ATN Transition Guidance Material Task: Develop Regional ATN Transition Guidance Material.		1) Development of detailed guidance material.	Completed
2	RAN/3 C 10/11d	Subject: ATN Transition Plan Task: Develop an ATN Transition Plan to provide seamless transition to ATN.	A	1) Develop Ground Transition Plan taking into account Air-to-Ground aspects. 2) Develop a set of planning documents covering: i) ATN Regional Routing Architecture ii) ATN Naming and Addressing Conventions, and iii) Documentation of the Assigned ATN Names and Addresses.	Completed
3		Subject: ATN major elements. Task: Provide performance and functional requirements of ATN.	A	1) Develop ATN Technical Documents. - Security - Performance - System Management	2003
4	RAN/3 C 10/11b	Subject: AFTN related issues Task: Review operation of AFTN.	B	1) Evaluate and review the effect of increases or decreases in capacity and network changes, on circuit loading. 2) Plan network changes for support of OPMET and AIS databases, automated VOLMET broadcast.	On-going 2003
5		Subject: Planning and implementation information in ANP. Task: Develop G/G part of the CNS FASID.	A	Development of detail description for the existing tables and Charts for the G/G part of the CNS FASID. 1) Table CNS 1B – ATN Router Plan 2) Table CNS 1C – ATS MHS 3) Table CNS 1D – AIDC Routing Plan	 Completed 2001 2002

Subject/Tasks of the ATN Transition Task Force

No.	Ref.	Task	Priority	Action Proposed/In Progress	Target
6		Subject: ATN Documentation Task: Development of ATN Routing Documentations and ICDs.	A	Development of ATN Documents: 1) A Router ICD 2) A Routing Policy (IDRP) 3) Directory of Service 4) An AMHS ICD 5) An AIDC ICD	 2002 2002 2002 2002 2005

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International Civil Aviation Organization

ATN Seminar and Third ATN Transition Task Force Meeting

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LIST OF WORKING PAPERS

WP/No.	Agenda Item	Subject	Presented by
1	-	Provisional Agenda	Secretariat
2	7	Terms of Reference and Task List	Secretariat
3	1	Proposed Final Draft of the ASIA/PAC ATN AMHS Naming Plan	Rapporteur WG - A
4	1	Proposed Final Draft of ASIA/PAC ATN Addressing Plan	Rapporteur WG - A
5	1	Proposed Final Draft of ASIA/PAC ATN NSAP Addressing Registration	Rapporteur WG - A
6	1	Proposed 4th Draft of ATN Routing Architecture Plan	Rapporteur WG – A
7	2	Proposed Draft of the ASIA/PAC ATN Ground Transition Plan	Rapporteur WG – B
8	5	Review Ground-Ground Part of ATN Tables of the ASIA/PAC CNS FASID	Secretariat
9	6	Review Status of Implementation of ASIA/PAC AFTN Plan	Secretariat
10	3	Proposed Draft AMHS ICD	Japan
11	6	Review of AFTN Circuits Capacity	Secretariat
12	4	Review of Technical Documents	Australia
13	7	Future Tasks for the ASIA/PAC ATN Transition Task Force	Australia
14	6	AFTN Circuit Statistics of Tokyo	Japan

WP/No.	Agenda Item	Subject	Presented by
15	2	Establshing ATN circuit between Tokyo/Khabarovsk	Japan
16	6	Amendment of AFTN Routing Directory	Japan
17	2	Necessity of Estabishing New ATN Circuit between Japan and Europe	Japan

LIST OF INFORMATION PAPERS

IP/No.	Agenda Item	Subject	Presented by
1	-	Meeting Bulletin	-
2	6	AFTN Circuit Loading Statistics	Russian Federation
3	6	The FANS/ATN Transition	Australia
4	2	ATN Router Information	Japan

LIST OF SEMINAR PRESENTATIONS

SP/No.	Agenda Item	Subject	Presented by
3/1	3	AMHS Implementation Issues	Japan
3/2	3	AIDC, ATS Interfacility Data Communication	Japan
3/3	3	AMHS (ATS Message Handling System)	Japan
6/1	6	Air/Ground ATN Implementation	ATNSI
6/2	6	ATN Industrial Development Status Update	Australia
6/3	6	ATN Activities in Japan	Japan
6/4	6	ATN Implementation in Thailand	Thailand
6/5	6	ATN Activities in Australia	Australia
6/6	6	SITA AIRCOM ATN service	SITA
6/7	6	ATN Transition	Australia
6/8	6	From AFTN to ATN in Asia/Pacific Region	IATA
1/1	1	Overview of ATN	USA
1/2	1	ATN Architecture	USA
2/1	2	ATN Routing	USA
2/2-3	2	ATN Addressing & Naming	USA
4/1	4	CPDLC/CM	USA
5/1	5	Security	USA
5/2	5	Network Management	USA