**INTERNATIONAL CIVIL AVIATION ORGANIZATION**

**ASIA AND PACIFIC OFFICE**

# REPORT OF THE

# FIFTH ATN TRANSITION TASK FORCE MEETING

**Phuket, Thailand, 9 – 13 June 2003**

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## 1. Opening of the Meeting

1.1 The Fifth Meeting of the ATN Transition Task Force was held in Phuket, Thailand, from 9 to 13 June 2003. The meeting was hosted by AEROTHAI.

1.2 Mr. Somnuk Rongthong Vice President, Air Traffic Service Engineering Bureau**,** of Aerothai, welcomed all the participants to Phuket. He emphasized the importance of working in a close coordinated manner among various Administration/Organizations in order to progress development to the next step in planning and implementing the ATN.

1.3 On behalf of Mr. L.B. Shah, Regional Director, ICAO Asia/Pacific Office, Mr. K.P. Rimal thanked AEROTHAI for hosting the meeting in Phuket and for the excellent arrangement made within a short period of time. He also thanked China for the efforts made for the preparation for hosting of the Fifth Meeting of ATN Transition Task Force which had to be rescheduled at the last moment due to outbreak of SARS in Asia. He also highlighted the main objectives of the meeting.

1.4 Mr. Craig Head, Chairman of the Task Force, in his opening address, outlined objectives and main tasks of the Task Force. He encouraged the participants for active participation in the deliberation and review of the required technical and the planning documents.

## 2. Attendance

2.1 The meeting was attended by 48 participants from Australia, Bangladesh, Bhutan, Brunei Darussalam, Hong Kong China, Fiji, India, Indonesia, Japan, Malaysia, Myanmar, Philippines, Republic of Korea, Singapore, Sri Lanka, Thailand, Vietnam, IATA and SITA. A list of participants is at Attachment 1.

## 3. Officers and Secretariat

3.1 Mr. Craig Head presided over the meeting.

3.2 Mr. K.P. Rimal, Regional Officer, CNS was the Secretary of the meeting who was assisted by Mr. Li Peng, Regional Officer, CNS of the ICAO Asia and Pacific Office.

## 4. Agenda

4.1 The Agenda adopted by the meeting was as follows:

Agenda Item 1: Review the latest developments in the ATN Panel and the Aeronautical Mobile Communication Panel

Agenda Item 2: Report on the ATN Transition Task Force Ad Hoc Working Group activities

Agenda Item 3: Review of the ATN Router Interface Control Document

Agenda Item 4: Review the development status of ATN technical documents

Agenda Item 5: Review the development of guidance material for the use of IP as a Sub Network for the ATN

Agenda Item 6: Review Tables and Charts for the ground-to-ground part of the CNS FASID:

- AIDC
- AMHS; and
- ATN Routers

Agenda Item 7: Review the development of guidance material for the use of the Public Internet Technology to support AFTN

Agenda Item 8: Review status of implementation of AFTN circuits, evaluated circuit capacity and consider timescale for transition to ATN

Agenda Item 9: Review ATN implementation activities/issues

Agenda Item 10: Review the Subject/Task List of the ATN Transition Task Force and develop future work of the Task Force

Agenda Item 11: Any other business

## 5. Organization, Working Arrangements and Language

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

**Agenda Item 1: Review the latest developments in the ATN Panel and the Aeronautical Mobile Communication Panel**

1.1 Under this agenda item, the meeting reviewed the latest development of aeronautical communications in the ATN Panel and AMC Panel.

1.1.1 Australia presented an information paper on the results of the Eighth Meeting of the Aeronautical Mobile Communication Panel (AMCP/8) held in Montreal 4-13 February 2003 including the new name and structure established after the merger of the ATN Panel and AMC Panel into Aeronautical Communication Panel (ACP). The works conducted by WG-A, WG-B and CCB of ATNP will be continued by the new Working Group-M and Working Group-N of ACP. A brief summary on each agenda items of the AMCP/8 was presented.

1.1.2 The Secretariat informed that a seminar on satellite and datalink implementation will be held in Bangkok from 17-19 November 2003 in conjunction with ACP Working Group M meeting which will be held from 20-28 November 2003. All states in the Asia/Pacific region will be invited for participation of the seminar.

1.1.3 Japan also informed the meeting of the results of the Fourth Meeting of Joint Working Group of ATNP held in Toulouse, France in October 2002. The meeting noted that the interim guidance on "AMHS over TCP/IP" developed by the joint working groups meeting included the following main points:

- "AMHS over TCP/IP" should be a local solution only;
- "AMHS over TCP/IP" should not be considered as fully SARPs-compliant ATN implementation;
- "AMHS over TCP/IP" should be subject to bilateral/regional agreements; and
- Necessary measures should be taken by the States that implement "AMHS over TCP/IP" to ensure interoperability with SARPs-compliant AMHS.

1.1.4 Japan presented an information paper on the First Meeting of ACP Working Group-N held in May 2003. The meeting noted that the Working Group-N of ACP established 4 Sub-Groups: N1, N2, N3 and N4. The programme of each Sub-Group was also presented. It was noted that a task to develop SARPs for IP SNDCF for to use as a Sub-network of ATN was assigned to a Sub-Group N1 of ACP Working Group-N.

1.2 It was noted that Doc. 9705, Edition 3 was available in CD-ROM format only. The Edition 4 of the document was expected to be published to include the use of IP Subnetwork as part of the ATN i.e. IP SNDCF and confidentiality solution in the near future. However, with the disbandment of the ATNP, it was not cleared when the ACP is going to complete the work started by ATNP.

**Agenda Item 2: Report on the ATN Transition Task Force Ad Hoc Working Group activities**

2.1 The meeting reviewed the works carried out by the ATNTTF Ad Hoc Working Group (formally known as the ATNTTF Working Group B) since the Fourth Meeting of the Task Force held in Mumbai, April 2002. The Working Group met twice.

2.1.1 The Sixth Meeting of the Ad Hoc Working Group, hosted by Airservices Australia, was held in Canberra 18-22 November 2002. The Meeting was attended by 18 participants from Australia, Fiji, Japan, Singapore, Thailand, United States and SITA. The final draft version of ATN Router ICD and other technical documents were reviewed by the meeting.

2.1.2 The Seventh Meeting of the Working Group, hosted by Airports Fiji Limited, was held in Nadi from 3-6 March 2003. The meeting was attended by 17 participants from Australia, Fiji, Japan, Thailand, United States, Papua New Guinea and SITA. The meeting reviewed the final draft version of the ATN Router ICD for presentation to the Fifth Meeting of the ATNTTF. The information on attributes associated with Directory Services was also reviewed.

2.2 The meeting noted the progress made by the Ad Hoc Working Group on issues associated with Directory Services. It was noted that the ATN contains non-standard X500 objects and attributes that would need to be defined. The meeting agreed that it would need to review the object classes, determine object requirements, contents and proposed sharing arrangements. The meeting identified that a policy statement should be developed and that this information would need to be exchanged between the Regions and within the Asia/Pacific region.

2.3 The status of the document outlining the issues of MTA routing policy was noted. It was informed that the following assumptions were made by the Ad Hoc Working Group to allow the AMHS Routing Policy document to be developed.

- That a number of MTAs within the Region can interconnect to each other;
- That inter regional connections should go via nominated backbone MTAs to reduce the number of addresses to be maintained; and
- Alternate backbone MTAs to be nominated for each regional connection.

2.3.1 It was recommended that ICAO Regional Office maintain the Routing of MTAs to ensure that no MTA within the Region would be isolated from traffic delivery.

2.4 The progress on the ATN Routing Policy document was noted. The document needs to insert a routing drawing into Section 3 to assist with the description of the various routing policies being described. The Internet working of air ground subnet between subnet service providers was required to be further elaborated.

2.5 The status of the document outlining the issues of the System Management Document was reviewed by the meeting. Discussions where based on system monitoring, system management, configuration management and how the various system objects are to be managed.

2.6 It was agreed that the ATNTTF Ad Hoc Working Group would convene two meetings during 2003 to complete development of the remaining technical documents.

2.7 The meeting appreciated the works conducted and progress made by the members of the Working Group in completing the tasks assigned by the ATNTTF. Australia, Hong Kong China, Fiji, Japan; Singapore; Thailand; (USA via email to confirm) and SITA confirmed their membership and continued support to the research and study work of the Ad Hoc Working Group.

**Agenda Item 3: Review of the ATN Router Interface Control Document**

3.1 The meeting reviewed a draft Asia/Pacific Regional ICD for ATN G/G Router finalized by the Ad Hoc Working Group which had updated the document at its Sixth Meeting in Canberra, Australia and at its Seventh Meeting in Nadi, Fiji. The meeting reviewed and agreed to the changes made to the document and recommended for its adoption by APANPIRG and publish it as Issue 1. In view of the above, the meeting formulated the following draft conclusion

**Draft Conclusion 5/1 - ASIA/PAC Interface Control Document (ICD) for ATN Router**

That, the ASIA/PAC regional ICD for ATN Router provided in Appendix A be adopted and published.

3.2 It was also proposed to develop an ATN Ground-to-Ground Router Description as reference material. The proposed outline of the document was provided to the meeting for comments. It was recognized that such material would help States to better understand the requirements of the specification for an ATN router. The meeting endorsed the proposal and formulated the following decision:

**Decision 5/2 – Development of reference material for an ATN Router description**

That, the Ad Hoc Working Group develop ATN Router description and finalize the document for review by the Sixth meeting of the Task Force in 2004.

3.3 Japan indicated that similar material might also need to be developed for system performance requirement in the future.

**Agenda Item 4: Review the development status of ATN technical documents**

4.1 Under this Agenda Item, a number of working papers and information papers were presented regarding development status of materials on Performance, Security, AMHS Routing Policy and Network Management.

4.1.1 The status of development of a technical document on ATN Performance prepared by the Ad Hoc Working Group was presented to the meeting. The document would provide the technical guidance on the ATN performance. The information on the definition of performance, especially Required Communication Performance (RCP), and planning as well as monitoring of ATN performance were included in the document. It was advised that there are two generic approaches on the Performance: one is the technology independent approach and the other is the technology dependent approach. The first approach is also called "top-down" approach and the other is called "bottom-up" approach. These two approaches are complementary to each other and the performance can not be properly planned, implemented and evaluated without both approaches.

4.1.2 The draft technical document on ATN Performance is focused on the "top-down" approach. The document was structured to identify the performance related activities to be conducted during the System Life Cycle.

4.1.3 The work on the operational performance on RCP (air-ground performance) was presented to the meeting. It was noted that there is little information relating to ground-ground applications performance requirements. It was considered desirable to RCP guidance material for ground-to-ground network based on network matrix and AMHS metrics in the draft RCP Manual

4.1.4 The meeting was informed that the ICAO OPLINK Panel had completed the RCP Concept document and a draft Manual of the RCP, which is in a draft form and is, expected to be completed in 2005.

4.1.5 Recognizing complexity of the document and pending further outcomes of the OPLINK Panel, it was considered that more time would be required to complete a RCP document with specific values. The meeting noted with appreciation the progress and efforts made by the Ad Hoc Working Group in this regard. The Ad Hoc working group was requested to make a decision at its next meeting on how to proceed further in this regard in light of the work carried out by OPLINK Panel.

4.2 The meeting reviewed the changes proposed to the ATN Documentation Tree. The proposed modifications to the document contained the latest and accurate reference information to assist members of the Task Force and States in the Asia/Pacific region with their development and implementation plans for the ATN. The meeting agreed to adopt the updated ATN Documentation Tree, which provides an index and hierarchy on available ATN related documents. The meeting recommended that this document, shown in Appendix X be considered for inclusion in the Second Edition of the ATN Planning and Technical Document. In view of the foregoing the meeting formulated the following draft conclusion:

**Draft Conclusions 5/3 - ATN Documentation Tree**

That, the updated ATN Documentation Tree provided in Appendix B be adopted and be included in the Second Edition of the ATN Planning and Technical Document.

4.3 It was proposed to develop an AMH System Description document to be used as reference material. The outline of the proposed material was provided to the meeting for comments. It was recognized that such material would help States to better understand the AMHS and the Interface Control Document (ICD) for AMHS. The meeting endorsed the proposal and formulated the following decision to assign this task to the Working Group:

**Decision 5/4 - Development of reference material of AMHS description**

That, the Ad Hoc Working Group develop an AMHS System Description document and finalize the document for review and adoption by the Sixth Meeting of the Task Force to be held in April 2004.

4.4 The meeting reviewed the status of the development of the document on the use of the ATN Directory Services. It was informed that the document had been processed through three drafts, which presented an overview of the ATN Directory Services. It was expected that it would take another 6 to 12 months to complete it. The meeting agreed to keep it in its tasks list and asked the Ad Hoc Working Group to continue progressing its effort in this regard.

4.5 The meeting reviewed the status of the development of the document on the AMHS message routing between message transfer agents (MTAs). It was informed that the Working Group had reviewed several drafts of the AMHS routing policies and had began to reach consensus and that the first draft outlining the principles of AMHS routing would be available at the next Working Group meeting. It was expected that an agreed final document may be available to the next Task Force meeting in 2004. The meeting agreed that the Ad Hoc Working Group to continue progressing its effort in this regard.

4.6 The meeting reviewed the draft Asia/Pacific ATN Inter Domain Routing Policy (IDRP) developed by the Ad Hoc Working Group.

4.6.1 The detailed policy requirements and recommendations specified in the Asia/Pacific ATN IDRP Routing Policy are derived from the general routing policy goal of providing global shortest path connectivity with a minimal exchange of routing information. The Routing Policy has explicit requirements for backbone routers as well as a number of recommendations for non-backbone routers intended to meet the above policy goal. It is considered as first release and complete routing policy for the ground/ground element of ATN.

4.6.2 The Asia/Pacific ATN IDRP Routing Policy document allows States/Organizations to have additional local routing policies. Such policies may include various local preferences or Quality of Service based routing, for example, routing based on line error rates, delay, capacity, and priority.

4.7 In view of the above, the meeting agreed to recommend for adoption of the ASIA/PAC IDRP by APANPIRG and formulated the following draft conclusion:

**Draft Conclusion 5/5 -ASIA/PAC ATN Inter Domain Routing Policy (IDRP)**

That, the ASIA/PAC ATN Inter Domain Routing Policy (IDRP) provided in Appendix C be adopted and distributed to States.

**Certification and operational approval**

4.8 A paper on the processes associated with the qualification of equipment for ATN networks was presented to the meeting. The examples of existing SITA VHF Avionics Qualification process was introduced and steps for a similar process for ATN network providers was expected to be developed.

4.9 The method adopted by SITA as an example was considered to have ATN qualification process in the process and compatibility test for internetworking, system performance and selection process cross administration for harmonization in ATN implementation. It was recognized that it would involve system integrity related issues in such a process.

4.10 There was a concern regarding the management and enforcement of such a process. Although such qualification process is required for ground/ground ATN implementation, it is not identified as a priority at the regional level. It was suggested to consider the terms certification and operational approval as it was commonly used in certifying new system and providing operational approval. Therefore, it was considered appropriate to refer the matter to the Ad Hoc Working Group to explore it further and come up with an appropriate recommendation.

4.11 The meeting reviewed ATN System Integrity Policy for the Asia/Pacific region. It was considered as high level draft policy based on Common Criteria ISO/IEC 15408. The policy rules for system integrity generally fall into two interrelated classes: (1) rules establishing criteria for evaluation, which are further differentiated as functional criteria, which establish the minimum required capabilities, and assurance criteria, which establish the level of assurance, i.e., the degree of rigour or formalization to be applied for evaluation; and, (2) rules governing the actual process of evaluation, that is, rules for certification and accreditation. In addition to generally adopting the system integrity policy, it was recommended that the participating States/organizations must assign Designated Approving Authorities (DAAs) who have the authority and accountability for the implementation of the system integrity policy.

4.12 The meeting acknowledged the requirement for such a document and identified the need for the Working Group to develop further details.

4.13 The meeting reviewed the initial draft of the development of transitional System Management guidance material prepared by the Ad Hoc Working group. The document was expected to be finalized by the sixth ATNTTF meeting to be held in 2004. The progress made by the Ad Hoc Working Group in this regard was noted by the meeting.

**Agenda Item 5: Review the development of guidance material for the use of IP as a Sub Network for the ATN**

5.1 The meeting reviewed outcome of the ATNTTF Ad Hoc Working Group deliberations in the development of guidance material for the Internet Protocol (IP) to be used as a Sub Network for ATN. It was noted that the task is now assigned to Aeronautical Communication Panel working group N1. The meeting agreed the recommendation made by the Ad Hoc working group to hold any further work in developing the regional guidance material until further information is forthcoming from the ACP Working Group N. In view of this, the meeting agreed to monitor developments and progress in the ACP WG N.1

5.2 It was also recommended that if administrations within the Asia/Pacific region wish to pursue the implementation of the TCP/IP subnet as part of the ATN, they should be able to do so through bilateral agreements on the understanding that they may be required to make changes to their subnets if and when the TCP/IP subnet is developed as part of the ATN SARPs.

**Agenda Item 6: Review Tables and Charts for the ground-to-ground part of the CNS FASID:**

- **AIDC**
- **AMHS; and**
- **ATN Routers**

6.1 The meeting reviewed the ATN Router Plan CNS-1B and Chart CNS-2 which were adopted by APANPIRG/12 in its Conclusion 12/14 in August 2001 and already included in Part IV, CNS of the ASIA/PAC Facilities And Services Implementation Documents. The updated Table is provided in Appendix D.

6.1.1 In view of the technical development and trials conducted so far, changes to the target dates of implementation of some interconnection links were proposed. It was agreed that the proposed changes would be incorporated in the planning and implementation document in the future.

6.1.2 The meeting agreed to the proposal made by Fiji and confirmed by the AD Hoc Working Group to designate Nadi as BBIS - Backbone Boundary Intermediate System. It was agreed that changes will be made in the Table, accordingly.

6.2 While reviewing the ATS Message Handling Services (ATSMHS) Plan – Table CNS-1C, the meeting identified the need for changes in the Explanation of the Table and some terms used in the table in order to keep consistencies with other AMHS related technical documents. The meeting reviewed ATSMHS plan based on the existing Table CNS-1C and developed a sample format for Table CNS-1C based on the description given in the samples. It was agreed to present the plan for further comment at the next meeting of Ad Hoc Working Group to be held in November 2003. The Working Group would incorporate the resulting comments and present it to the next meeting of the Task Force for adoption.

**Agenda Item 7: Review the development of guidance material for the use of the Public Internet Technology to support AFTN**

7.1 The meeting reviewed the guidance material developed by the Working Group for the use of the public Internet technology to support low speed AFTN. It was identified that various issues need to be addressed before implementing a system that uses the Internet as a delivery mechanism for AFTN. These areas include conducting a safety case analysis that identifies risks and mitigation plans, ensuring that security measures are implemented in order to protect the integrity of the AFTN from external unauthorized users. The use of appropriate logging and audit reporting required ensuring conformity and integrity of the service. The guidance material also identifies the need for appropriate contract agreements to be put in place with end users to ensure that they do not abuse or allow the system to be misused.

7.2 It was also recognized that before considering the development and implementation of a system that utilizes the Internet for delivery of AFTN, a Safety Hazard Analysis must be conducted. The Safety Hazard Analysis should identify hazards and risks. Once the risks are identified they must be mitigated.

7.3 The Secretariat informed the meeting that the Aviation Use of the Public Internet Study Group (AUPISG) is being established by ICAO to assist ICAO Secretariat in conducting study for aviation use of public Internet and to develop guidelines and other relevant provisions.

7.4 The meeting appreciated the efforts made by the Ad Hoc Working Group in completing this task in time. The meeting reviewed the guidance material and agreed to make recommendation to APANPIRG for its adoption as an interim arrangement pending outcome of the result of the study conducted by AUPISG.

7.5 In view of the above, the meeting formulated the draft conclusion as follows:

**Draft Conclusion 5/6 – Use of Public Internet to support AFTN**

That, the guidance material for the use of Public Internet to support low speed AFTN provided in Appendix E be adopted and circulated for States for use as an interim means pending the outcome of the result of Aviation Use of Public Internet Study Group.

**Agenda Item 8: Review status of implementation of AFTN circuits, evaluated circuit capacity and consider timescale for transition to ATN**

8.1 The AFTN plan was reviewed and the status of implementation was updated. The updated Table CNS-1A is provided at Appendix F. The main highlights of the AFTN improvements made during the year 2002 and early 2003 were as follows:

8.1.1 Circuits:

- Apia-Faleolo/USA 2400 bps AFTN circuit with X.25 protocol was implemented using a router provided at Pago Pago, American Samoa;

- Singapore/Tokyo AFTN circuit was upgraded from 1200 bps to 9600 bps using X.25 protocol on 15 January 2003;

- Colombo/Mumbai AFTN circuit was upgraded from 50 baud to 64 Kbps using X.25 on 19 March 2003;

- A 64 Kbps circuit was implemented in April 2003 to upgrade AFS circuits between Chennai/Kuala Lumpur;

- Kolkata/Mumbai AFTN circuit was upgraded from 9600 bps to 64 Kbps in March 2003;

- Colombo/Singapore AFTN circuit was upgraded from 75 Baud to 9600 bps using X.25 protocol on 12 May 2003;

- Christchurch - USA 9600 bps AFTN circuit using X.25 protocol is under testing and expected to be implemented in July 2003.

- Christchurch/Tongatapu AFTN circuit was implemented using 2400 bps.

**Inter-regional AFTN entry/exit point**

8.2 Australia informed the meeting that a new 64 Kbps AFTN circuit between Brisbane to Johannesburg is being established in 2-3 months time to replace the Brisbane –Mauritius 50 Baud AFTN circuit in accordance with the Conclusion 13/9 of the Thirteenth African Planning and Implementation Regional Group (APIRG/13) Meeting which had proposed to change the AFI ASIA/PAC entry/exit point from Mauritius to Johannesburg.

8.2.1 It was also advised that the 2400 bps COP-B circuit between Brisbane and Singapore was converted to X.25 protocol on 13 November 2002. In order to provide diversity between two centres in Australia, capability has been provided at Melbourne to operate Melbourne/Singapore AFTN using IPL. A need to rationalize three circuits linking to USA from Brisbane, Nadi and Christchurch was identified.

8.3 Australia, Japan and United States presented AFTN circuit loading statistics for review by the meeting. The loading conditions were well within the specified limits except for the Tokyo – Moscow circuit where the occupancy was more than 40 percent for the outgoing traffic. Japan had made a proposal to the Russian Federation to upgrade the Tokyo/Moscow circuit from 200 baud to 9600 bps through a 64 Kbps satellite circuit. Japan is expecting response from the Russian Federation concerning their readiness to upgrade the circuit.

8.4 Sri Lanka informed the meeting of the achievement made in upgrading the Colombo/Singapore and Colombo/Mumbai AFTN circuits. Sri Lanka is ready for upgrading the Colombo – Male AFTN circuit in accordance with the AFTN Plan. Accordingly, it is expected that Male will be ready for upgrading the circuit at 9600 bps by the end of 2003. In view of the availability of high capacity AFTN circuit, Sri Lanka proposed to revert back to their AFTN routing to assume relay responsibility of traffic as was done prior to 1995. India and Singapore had no problem to the proposal and ICAO agreed to co-ordinate routing changes in due course of time.

**Signalling Speed**

8.5 The meeting noted that minimum signalling speed available from international telecommunication service provider in some States in the region for upgrading AFTN circuits is 64 Kbps for International Private Lease Circuit (IPLC).

**Agenda Item 9: Review ATN implementation activities/issues**

9.1 Japan informed the meeting of their trial and phased implementation plan for implementation of ATN Router and AMHS with USA. The existing 9.6 kbps AFTN link will be disconnected within six months after the "Initiation of the AMHS service between JCAB and FAA to replace current AFTN service.

9.2 It was suggested that all States and/or administrations, especially those who are nominated as BBIS sites in the Region to implement systems according to the schedule listed in ATN Router plan and AMHS plan. States were also advised to establish their implementation schedule in a realistic and practical manner.

9.3 The FAA and JCAB had agreed to commence AMHS service between the USA and Japan in March 2004. Hong Kong CAD and JCAB have recently agreed to commence AMHS service between Hong Kong and Japan in September 2004.

9.4 Fiji advised the meeting of its plan for ATN implementation. To provide diversity for backbone connectivity within the Asia/Pacific region and neighboring regions, Fiji's geographical location and current status as a major AFTN switching center in the region makes it an ideal choice as the another backbone site in the region. The Fiji-US link has been upgraded to 64K while discussions on a 64K link between Fiji and Australia have commenced. In view of readiness and willingness of Fiji, the meeting agreed to designate Nadi as a location for Back Bone Boundary Intermediate System routers in the Asia/Pacific region.

9.5 Indonesia informed the meeting that the preparations being made by Indonesia to implement the Communication Centers one in Jakarta and the other in Ujung Pandang scheduled to be operational by 29 September 2004 associated with the restructuring plan of Indonesia FIR by 2004. Indonesia agreed to take appropriate action to reflect changes to the location indicators in Doc. 7910 well in advance of the implementation of the consolidation of FIRs.

9.6 China provided three information papers on their R & D activities on AFTN/AMHS Gateway and air/ground data systems for implementation of ATN. The meeting noted the progress made by China. The meeting also noted the experience gain and lessons learned by China, which was considered to be valuable information.

9.7 Hong Kong, China informed the meeting of their ATN trials and planned further trials. The meeting noted the experience gained by Hong Kong China in conducting these trials.

9.8 Being an ATN backbone site in the APAC Region, Hong Kong, China has actively progressed on the ATN development and trials, which include joint technical and operational ATN trials with adjacent ATS authorities, evaluation of equipment compatibility and interoperability problems, ATN/AFTN performance comparison, and ATN/AMHS transition planning. In August 2002, a joint ATN technical trial was carried out between Beijing and Hong Kong with satisfactory results. From September 2002 to January 2003, a joint tripartite ATN technical trial between Beijing, Bangkok and Hong Kong had been conducted. It was identified that with the use of 9.6 Kbps communication connections through IPLC, IDD circuit or VSAT link, an average of 2-3 seconds additional transit time was required for re-routing the messages through a transit routing domain (TRD). Bangkok and Hong Kong have have commenced the second phase of trial using a 64 Kbps circuit in February 2003.

9.9 To comply with the Regional Implementation Plan, close liaison with relevant ATS authorities had been initiated with trial status as given below:

- Beijing, China – To continue further ATN technical trials with Hong Kong, China from July 2003 with router developed by Beijing.
- Hochiminh, Vietnam – To carry out AMHS technical trial with Hong Kong, China as from early 2004.
- Tokyo, Japan – To implement ATN and AMHS with Hong Kong, China in September 2004, with pre-operational trials starting from end 2003.
- Manila, Philippines – To carry out ATN/AMHS joint trials with Hong Kong, China in the 3rd quarter of 2004.
- Chinese Taibei – To commence ATN/AMHS trials with Hong Kong, China in 2004.

9.10 Subject to thorough operational trials, Hong Kong, China is planning to launch the new 64 Kbps ATN for operational use with Bangkok, Thailand in late 2003.

9.11 The meeting was advised that the European AFSG was informed of a proposal for amendment to the Asia/Pacific Regional Air Navigation Plan that specified the requirements for inter-regional gateways in the United Kingdom, Italy and the Russian Federation, which need to be met by 2005. In the case of the Russian Federation this involved the BBIS (X.25) routers of Japan (64 Kbit/sec) and China (19.2 Kbit/sec). The response of the Russian Federation to the proposal was to propose to change the specified parameters and date to TBD, in order to have time to develop a more coherent approach, based on agreed and common principles. The European Group agreed with this approach and requested as a first step, that the CNS Officer in Paris coordinate his counter part in Bangkok, in particular with respect to the X.25 developments and the operational requirements that had to be accommodated.

9.12 The meeting noted that the concerns expressed by the Russian Federation, and that the Ad Hoc Working Group would be tasked to investigate the impact of X.25 capability within the region to determine availability and need for X.25 subnet technology and to wait on the development on TCP/IP from the ACP Working Group.

9.13 It was agreed that this issue needs further study by the Task Force to identify alternate communication protocol with understanding the difference of using X.25 communication protocol in this Asia/Pacific region for support to AFS are mainly for end to end connection communication control over IPLC. Accordingly, the meeting formulated a draft decision for including X.25 protocol issue in the Task List of the Task List.

**Decision 5/7 - Identification of alternate communication protocol to X.25**

That, the Ad Hoc Working Group study and investigate the impact of X.25 capability within the region to determine availability and need for X.25 communication protocol in the Asia/Pacific region.

9.14 The meeting reviewed the CNS/ATM Implementation Matrix and updated the entries accordingly. The updated Matrix is provided in Appendix G**.**

9.15 The Secretariat informed the meeting of the concerns expressed at the OPMET/E TF/1 Meeting held in February 2003 and AIDC Review Task Force Meeting held in March 2003 regarding possible operational impact during the AFTN-AMHS transition.

9.15.1 The OPMET Exchange Task Force expressed concern that the migration from AFTN to AMHS might affect the OPMET exchange, though the new message handling systems should support the present AFTN formats. The meeting developed an action item and requested the Secretariat to raise this issue at the next meeting of the ASIA/PAC ATN Transition Task Force and subsequently inform the OPMET/E TF on any possible alterations to the current formats and procedures of OPMET exchange.

9.15.2 AIDC Review Task Force meeting noted that current communication infrastructure used to support existing AIDC is based on AFTN. The meeting further noted that development of ATN based ICD for AIDC is in the task list of the ATN Transition Task Force. The current messages sets, as updated by this meeting and contained in the ICD for AIDC version 2.0, should be supported during the transition period.

9.15.3 The meeting noted the requirement of supporting the existing AFTN services during the transition period and perceives that there would be no changes to the messages format for those carried over by AMHS.

**AMHS Routing**

9.16 Japan presented a working paper on AMHS routing highlighting the possible problems of AMHS message transmission from the U.S. to Hong Kong (via direct BIS routing) during the ATN transition period, when the ATN mesh is only partially implemented in the APAC region. It was proposed that when the ATN link between Tokyo and Hong Kong fails, the AMHS message from the U.S. to Hong Kong would need to be diverted to Tokyo by dynamically changing the AMHS routing table for onward delivery from Tokyo to Hong Kong via alternate AFTN routing. Such change of routing address would require specific software customization of the various AMHS systems and the approach was not considered appropriate. It was agreed that further investigation/coordination would be continued among the U.S., Hong Kong, China and Japan and that the result would be reported at the next meeting.

9.17 Considering that the situation would become worse as the AFTN circuits would be decommissioned after the implementation of the respective replacement ATN links, Hong Kong, China expressed their concern of the potential problems and willingness to implement direct ATN links to the U.S. and/or Australia so as to facilitate a smooth and reliable ATN/AMHS transition in the APAC region as well as for a reliable and efficient on-going ATN/AMHS operations.

9.18 The Ad-Hoc Working Group was tasked to investigate the issue of AMHS Routing raised above and report to the Sixth Meeting of the Task Force in 2004.

**Validation of ICDs**

9.19 As the AMHS and Router trials were going on it was agreed that States/Administrations, in a position to do so, undertake the task of carrying out validation of the relevant ICDs adopted by APANPIRG and report results at the next Meeting Task Force. The Ad Hoc Working Group was also asked to assist in the validation process and report back to the Sixth Meeting of the Task Force in 2004.

**Agenda Item 10: Review the Subject/Task List of the ATN Transition Task Force and develop future work of the Task Force**

10.1 Japan presented an information paper on Internet Protocol in the ATN. The paper discussed several options on the use of IP (Internet Protocol) in the ATN environment, which included the following:

i) Use IP as an ATN sub network (ATN SARPs compliant) which may be a solution for as tunnelling using IP SNDCF;

ii) AMHS over TCP/IP (NON ATN SARPs compliant) which could be limited for use of "AMHS over TCP/IP" with Dual Stack AMHS

iii) Use IP technology to support AFTN, which is not an ATN issues

10.2 The FAA and JCAB have agreed to commence AMHS service between the USA and Japan in March 2004. Also, Hong Kong CAD and JCAB have recently agreed to commence AMHS service between Hong Kong and Japan in September 2004.

10.3 The meeting reviewed the tasks identified by the Ad Hoc Working Group in its effort to further the implementation planning of the ATN AMHS. At the Seventh Meeting of ATNTTF Ad Hoc Working Group it was suggested that these work items as details below be started.

**i) AMHS Naming Registration**

States are permitted to apply several different algorithms in the conversion of AFTN user addresses to AMHS addresses as well as in assigning AMHS addresses to users not part of AFTN. It is important that all AMHS systems and States accessing these systems to know the assignment algorithm. For that reason, it is required to develop a planning document registering the AMHS naming conventions and assignments used within the Region;

**ii) AFTN/AMHS Operational Procedures**

As the Region moves towards implementing the ATN and AMHS, procedures will need to be developed for handling unusual conditions. It would be possible for each pair of States to develop their own procedures to handle these conditions. However, since AMHS messages may be relayed amongst more than the source and destination States, it would be appropriate to develop Regional procedures that provide a level of consistency.

Some conditions that need to be addressed are as follows:

- maximum queuing time of messages
- error codes on delivery failure
- alternate routing/delivery procedures
- AFTN/AMHS gateway error procedures
- Use of AFTN for AMHS back-up.

10.4 The meeting endorsed the need to undertake the above task and formulated the following decision:

**Decision 5/8 – Assignment of additional tasks**

That, the AD Hoc Working Group undertakes the Tasks to develop guidance material on AMHS Naming Registration and AFTN/AMHS Operational Procedures.

10.5 The meeting reviewed the Subject Task List of the Task Force, took account of the relevant items, the Key Priorities for the CNS/ATM implementation approved by APANPIRG/13. The Router ICD identified in the item 1) of the Task No. 6 was completed and the Task No. 7 regarding the use of Public Internet was also completed.

10.6 The meeting reviewed and amended target date of completion of other items and updated the Subject/Tasks List. Two new tasks No. 9 and 10 proposed to be undertaken were included in the Tasks List.

10.7 In view of the above, the Subject/Tasks List of the ATN Transition Task Force were revised and the following draft decision was formulated:

**Draft Decision 5/9 – Revision of the Subject/Tasks List of the ATN Transition Task Force**

That, the updated Subject/Tasks List of the ATN Transition Task Force provided in Appendix H be adopted.

**Agenda Item 11: Any other business**

**11.1 Next Meeting**

11.1.1 The meeting appreciated Indonesia's offer to host the 6th ATN Transition Task Force in April 2004 at Bali, Indonesia

11.2 **ATN Seminar/Workshop**

The meeting also appreciated the offer made by Thailand to host an ATN Seminar/Workshop in Chiang Mai, Thailand during early 2004. The exact date will be coordinated with the Secretariat during November 2003.

Appendix A to the Report


**INTERNATIONAL CIVIL AVIATION ORGANIZATION**
**ASIA AND PACIFIC OFFICE**

# DRAFT

# ASIA/PACIFIC REGIONAL ROUTER INTERFACE CONTROL DOCUMENT FOR AERONAUTICAL TELECOMMUNICATION NETWORK GROUND-GROUND ROUTER FOR THE ISO/IEC 8208 SUB-NETWORK

**ISSUE 1.4- MARCH 2003**

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**EXECUTIVE SUMMARY**

The Aeronautical Telecommunication Network (ATN) is a global inter-network that provides digital communications to satisfy the increasing telecommunications demand of air traffic service communication, aeronautical operational control, aeronautical administrative communication , and aeronautical passenger communication.

The ATN is composed of an ATN network infrastructure and ATN applications that provide the global communication for ground-ground (G/G) and air-ground (A/G) services. The ATN network infrastructure includes the ATN backbone communication link, ATN router, and end system. The ATN applications include among others, context management (CM), controller-pilot data link communication (CPDLC), air traffic service message handling service (ATSMHS).

The Asia/Pacific region is undertaking the implementation of an ATN network to support regional and global ATN services. This Interface Control Document (ICD) specifies the interface requirements for the ATN G/G Routers that form nodes of the Asia/Pacific ATN regional backbone network and/or have inter-State connectivity, to ensure interoperability between States. This ICD applies to an ISO/IEC 8208 connection over point-to-point circuit.

# 1.0 Introduction

## 1.1 Purpose and Scope

This document provides G/G router ICD guidelines for the routers that form nodes of the Asia/Pacific regional network Backbone and/or have inter-State/organization connectivity within the Asia/Pacific region, to assure interoperability. The ICD guideline provisions include:

1. ISO layer 1 to layer 3 interface requirements between G/G routers;

2. G/G router functional requirements associated with ATN Protocol Requirements Lists (APRLs) relevant to support layer 1 to layer 3 interface requirements.

This ICD applies to the ISO/IEC 8208 connections over point-to-point circuit.

## 1.2 Organization

This ICD addresses the physical, data link, and network layers of the ATN G/G router using the International Organization for Standardization (ISO) Information Processing Systems Open Systems Interconnection (OSI) Basic Reference Model. This document is based on the standards and recommended practices (SARPs) specified in ICAO Doc. 9705 Edition 2. The SARPs paragraph numbers in the APRLs are referred to ICAO Doc. 9705, Edition 3.

This document is organized as follows:

- **Section 1, INTRODUCTION,** summarizes the contents of this document and reference documents.

- **Section 2, PHYSICAL LAYER,** provides the physical interface requirements for a point-to-point circuit.

- **Section 3, DATA LINK LAYER,** provides the data link layer interface requirements using link access procedure balanced (LAPB) to support the interface between G/G routers.

- **Section 4, NETWORK LAYER,** provides the interface requirements to support the network layer including the sub-networks, sub-network dependent convergence functions (SNDCF), connectionless network protocol (CLNP) and inter-domain routing protocol (IDRP).

## 1.3 ATN Documentation Tree and Reference Documents

### 1.3.1 ATN Documentation Tree

Figure 1-1 shows the ATN documentation tree for the Asia/Pacific ATN documents. This figure provides a hierarchical representation of the relationship between the various ICAO, ATN documents and Asia/Pac regional ATN ICD. From this documentation tree, the relationship between this ICD and other documents is clearly defined.

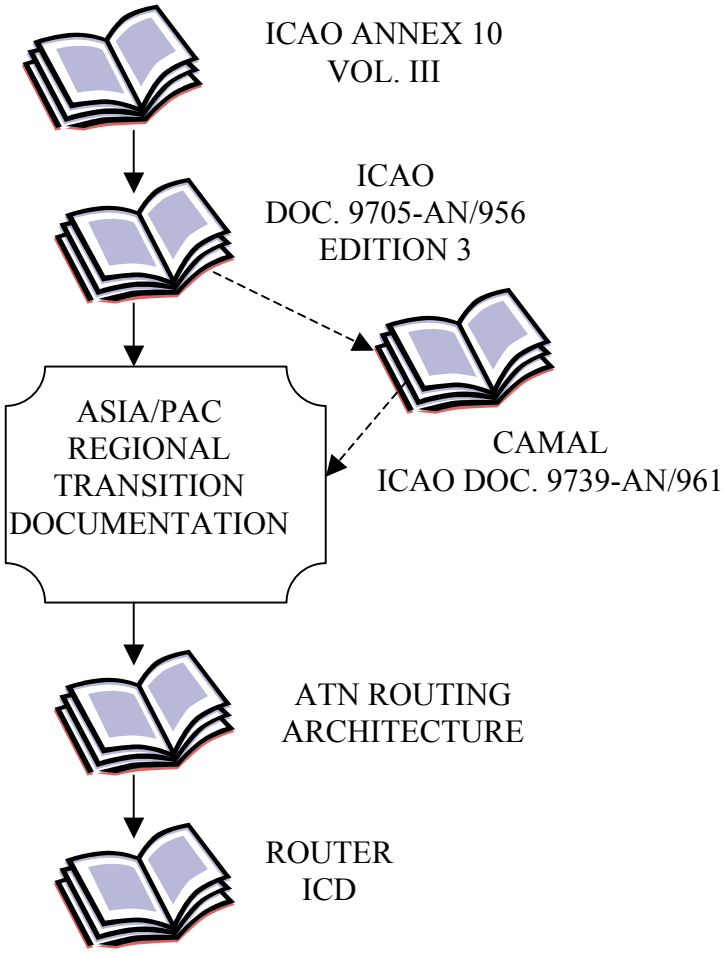



***Figure 1-1: ATN Documentation Tree***

### 1.3.2 Documents

#### 1.3.2.1 Applicable Documents

The following documents, with specific editions and/or versions , contain requirements which, through reference in this text, constitute requirements of this document. The requirements for the Asia/Pacific Regional Router ICD for ATN G/G Router are found in the following documents:

1. ITU-T Rec. X.25, (1984), Interface Between Data Terminal Equipment (DTE) and Data Circuit-terminating equipment (DCE) for Terminals Operating in the Packet Mode and Connected to Public Data Networks by Dedicated Circuit, Section 2, 3 and 4.

2. ISO/IEC 8208: 1995, Information Technology – Data Communications – X.25 Packet Level Protocol for Data Terminal Equipment (Revision of ISO/IEC 8208:1990).

3. ICAO Doc. 9705-AN/956. Manual of Technical Provisions for the Aeronautical Telecommunication Network, Edition 3 – 2001, Volume V.

4. ISO/IEC 10747:1994 Information Technology – Telecommunications and Information Exchange between Systems – Protocol for exchange of inter-domain routing information among intermediate systems to support forwarding of ISO 8473 PDUs.

5. ISO/IEC 8473-1:1994 Information Technology – Protocol for providing the connectionless-mode network service Part 1 – Protocol Specification.

6. ISO/IEC 8473-3:1995 Information Technology – Protocol for providing the connectionless-mode network service Part 3 – Provision of the underlying service by an X.25 sub-network.

7. Asia/Pacific ATN Addressing Plan.

8. Asia/Pacific ATN IDRP Routing Policy.

9. Table CNS-1B of the Asia/Pacific FASID.

#### 1.3.2.2 Supporting Documents

The following documents are supporting documents applicable to the Asia/Pacific Regional Router ICD for ATN G/G Router. These documents do not form a part of this ICD and are not referenced within the document, however, these documents provide supporting background information for better understanding of this ICD.

1. ICAO Annex 10 - Volumes I and II, Fifth Edition, Incorporating Amendment 70.

2. ISO/IEC TR 9575:1995 Information Technology – Telecommunications and Information Exchange between Systems -- OSI Routing Framework.

3. Asia/Pacific ATN Routing Architecture.

## 2.0 Physical Layer (Layer 1)

The physical layer of the G/G router in this document supports the connection of a point-to-point circuit. The physical layer characteristics are based on mutual agreement between States and service providers.

## 3.0 Data Link Layer (Layer 2)

The data link layer of ATN G/G router defined in this document uses Link Access Procedure Balanced (LAPB). The following sections provide the requirements for LAPB. LAPB shall comply with ITU X.25, 1984.

### 3.1 Procedures

**3.1.1** Link-level control procedures between the routers shall comply with LAPB procedure.

**3.1.2** Link-level control procedures between the routers shall be configured in an Asynchronous Balanced Mode (ABM) defined in ITU X.25, section 2.3 and 2.4.

**3.1.3** The router shall be as a logical Data Terminal Equipment (DTE) or Data Communication Equipment (DCE), as specified in ITU X.25 for a point-to-point circuit or under mutual agreements between States/organizations.

### 3.2 Frame Structure

The unit of transmission is the frame that shall comply with the LAPB frame structure as defined in ITU X.25, section 2.2.

### 3.3 Link Control Parameter Setup

Table A-1 in Appendix A defines the recommended X.25 data link layer level parameter values, which are highlighted in the following paragraphs.

**3.3.1** Time-out functions are necessary to ensure recovery action is taken by a combined station to respond to I-frames, S-frames, and U-frames that require acknowledgment. Timers shall be adjustable in one-second increments within a range of 2 to 120 seconds.

**3.3.2** The retransmission attempts parameter shall indicate the maximum number of unsuccessful transmission attempts to complete successful transmission. The value in the range 3 to 7 is recommended for private interfaces for low to medium circuit speed.

**3.3.3** The maximum number of sequentially numbered outstanding I frames shall be seven for private terrestrial interfaces.

**3.3.4** The DTE and DCE shall use the same value for maximum number of sequentially numbered outstanding I frames in all cases.

**3.3.5** Interfaces operating over satellite circuits shall use modulo 128 numbering for the maximum number of sequentially numbered outstanding I frames, and select a value appropriate for the frame size and signalling speed.

## 4.0 Network Layer (Layer 3)

The first sub-layer is the sub-network, which is X.25 PLP layer complying with ISO/IEC 8208. The second sub-layer is SNDCF complying with ISO/IEC 8473-3. The third sub-layer includes CLNP and IDRP, which respectively comply with ISO/IEC 8473-1 and 10747 with specific requirements defined by ICAO Doc. 9705.

### 4.1 ISO/IEC 8208 Sub-Network

The router is capable of establishing one or more connections to other ATN routers via a point-to-point circuit. For a point-to-point circuit, the sub-network layer shall use ISO/IEC 8208 to access the services of the data link layer.

#### 4.1.1 Procedures

Packet level procedures between the sub-networks are described herein and in accordance with ISO/IEC 8208, section 4 through section 11.

#### 4.1.2 Packet Structure

The packet structure shall comply with the packet structure described in ISO/IEC 8208 section 12.

#### 4.1.3 Functionality and Specific Setup

The sub-network layer shall support the functions defined in ISO/IEC 8208. The functions and specific setup are highlighted as follows.

**4.1.3.1** Each router shall be capable of initiating an ISO/IEC 8208 sub-network connection.

**4.1.3.2** The usage of diagnostic codes shall be established by mutual agreement between States/organizations.

**4.1.3.3** Table A-2 in Appendix A provides ISO/IEC 8208 recommended interface parameters for point-to-point circuit.

The values of parameter in Appendix A are recommended values only for guidance. However, the actual values used for the circuit shall be defined by mutual agreement between States/organizations.

**4.1.3.4** When connectivity is provided by a point-to-point circuit, the DTE addresses shall be 10 decimal digits and be agreed between States/organizations during the implementation planning.

**4.1.3.5** Each router shall be capable of terminating a sub-network connection.

**4.1.3.6** The M-bit shall be supported to indicate a message transfer that consists of more than one packet.

**4.1.3.7** Q-bit and D-bit shall be both set to 0.

### 4.1.4 Use of Switched Virtual Circuits

The use of Switched Virtual Circuits (SVCs) is preferred. The use of Permanent Virtual Circuits (PVCs) shall be taken into the consideration of the service availability.

**4.1.4.1** CR Packet Transmission at Call

1. In the case that two-way virtual circuit is an SVC, although not essential it is desirable to tune the transmission of CR packets when call are made between two peers for the following reasons:
   - To avoid collisions between transmitted and received calls, avoiding excessive protocol exchanges;
   - To make for more easily comprehensible communications logs.
2. In the case of PVCs, calls are made directly without the transmission of CRV packets.

## 4.2 Sub-Network Dependent Convergence Functions (SNDCF)

Sub-Network Dependent Convergence Functions (SNDCF) must be implemented in the router for each type of underlying sub-network. The purpose of a SNDCF is to provide the connectionless sub-network service assumed by the ATN Internet Protocol over real sub-network.

When a G/G router interfaces with another G/G router via a point-to-point circuit, the SNDCF shall comply with the following requirements:

1. The SNDCF shall provide byte- and code-independent service to the CLNP as specified in ICAO Doc. 9705, section 5.7.2;

2. The SNDCF that is used with the ISO 8208 sub-network for the G/G router shall comply with the APRLs given in Appendix B.

## 4.3 Connectionless Network Protocol (CLNP)

The G/G router interprets the CLNP protocol data unit (PDU) header and forwards the PDU to another G/G router without flow control or connection setup. The CLNP protocol functions shall be as specified in

ISO/IEC 8473-1 and section 5.6.2 and 5.6.3 of ICAO Doc. 9705 in accordance with the APRLs in Appendix C.

### 4.4 Inter-Domain Routing Protocol (IDRP)

The IDRP protocol function shall be specified as in ISO/IEC 10747 in accordance with APRLs in Appendix D.

# APPENDIX A - X.25 RECOMMENDED INTERFACE PARAMETERS FOR POINT-TO-POINT CIRCUIT

## A.0 X.25 Minimum Recommended Interface Parameters for a Point-to-Point Circuit

This appendix provides the X.25 minimum recommended interface parameters for point-to-point circuit. Other values may be established by mutual agreement

## A.1 Data Link Layer Interface Parameters

Table A-1 provides the data link layer (LAPB) interface parameters.

***Table A-1: Data link Layer (LAPB) Interface Parameters***

| Parameter | G/G Router A | G/G Router B | Comments |
|---|---|---|---|
| Max Outstanding Frames (k) | 7 | 7 | 127(satellite and high circuit speed) |
| ACK Receipt Timer (T1) | 6 | 6 | Based on 9.6Kb and 256 byte packets. |
| ACK Send Timer (T2) | 500 milliseconds | 500 milliseconds | T2 < T1 |
| Idle Channel State Timer (T3) | 18-60 seconds | 12-60 seconds | T3 > T4 |
| Idle Probe Timer (T4) | 3 seconds | 3 seconds | |
| Maximum Number Bits in I-Frame (N1) | 2104 | 2104 | N1 > Maximum Packet Size X 8 |
| Frame Retry Counter (N2) | 3-7 | 3-7 | |
| Frame Sequence | Modulo 8 or 128 | Modulo 8 or 128 | |

## A.2 Layer Interface Parameters

Table A-2 provides the packet layer (ISO/IEC 8208) Packet interface parameters.

***Table A-2: Packet Layer (ISO 8208) Interface Parameters***

| Parameter | G/G Router A | G/G Router B | Comments |
|---|---|---|---|
| Reference Standard (Packet/Network layer) | ISO 8208 | ISO 8208 | |
| Packet Sequence | Modulo 8 | Modulo 8 | 128 for Satellite and high circuit speed |
| Packet Negotiation | No | No | |
| Packet Data Size | 256 | 256 | |
| Allowed Packet Data Size during Negotiation | None | None | |
| Allowed Packet Data Size (agreed in advance) | 64, 128, 256 | 64, 128, 256 | |
| Window Size Negotiation | No | No | |
| Window Size, W (Receive/Send) | 7/7 | 7/7 | 1 to 7<br>1 to 127 (satellite and high circuit speed) |
| Total LCNs | 5 | 5 | |
| LCN Order | | | DCE-ascending DTE-descending Note 1 |
| LCN Base | 1 | 1 | |
| Total PVCs | 3 | 3 | |
| Total two way Virtual Circuits | | | Note 1 |
| Total Outgoing Virtual Circuits | | | Note 1 |
| Total Incoming Virtual Circuits | | | Note 1 |

| Parameter | G/G Router A | G/G Router B | Comments |
|---|---|---|---|
| | | | |
| Total SVCs | 2 | 2 | |
| Delivery Confirmation Bit (D-bit) | Not supported | Not supported | |
| More Bit (M-bit) | Yes | Yes | |
| DTE Restart Request Timer (T20) | 180 seconds | 180 seconds | |
| DTE Call Request Timer (T21) | 200 seconds | 200 seconds | |
| DTE Reset Confirmation Timer (T22) | 180 seconds | 180 seconds | |
| DTE Clear Confirmation Timer (T23) | 180 seconds | 180 seconds | |
| DTE Window Transmission Timer (T24) | 60 seconds | 60 seconds | |
| DTE Packet Acknowledgement Timer (T25) | 200 seconds | 200 seconds | |
| DTE Interrupt Timer (T26) | 180 seconds | 180 seconds | |
| DTE Reject Timer (T27) | 180 seconds | 180 seconds | |
| Restart Request Retransmission Counter (R20) | 2 | 2 | |
| Restart Request Retransmission Count (R22) | 2 | 2 | |
| Clear Request Retransmission Count (R23) | 2 | 2 | |
| Data Packet Retransmission Count (R25) | 2 | 2 | |
| Reject Retransmission Count (R27) | 2 | 2 | |
| Restart Request Timer (T10) | | | DCE-60 seconds Note 1 |
| Call Request Timer (T11) | | | DCE-180 seconds Note 1 |
| Reset Confirmation Timer (T12) | | | DCE–60 seconds Note 1 |
| Clear Confirmation Timer (T13) | | | DCE-60 seconds Note 1 |
| Window Transmission Timer (T14) | | | DCE-60 seconds Note 1 |
| Packet Acknowledgement Timer (T15) | | | DCE-60 seconds |

| Parameter | G/G Router A | G/G Router B | Comments |
|---|---|---|---|
| | | | Note 1 |

Note 1: Selection of the values to be established by mutual agreements.

# APPENDIX B- SNDCF (ISO/IEC 8473-3) APRLS

## B.0 SNDCF (ISO/IEC 8473-3) APRLs

An implementation of the SNDCF for ISO/IEC 8208 sub-networks shall be used in ATN G/G router and the SNDCF implementation shall be in compliance with the ATN Protocol Requirements Lists (APRLs) given in this appendix.

The APRLs use the following conventions and symbols:

| | |
|---|---|
| M | [M]andatory - the capability must be supported |
| MO | Mandatory to implement but optional for use |
| O | [O]ptional - The capability may optionally be supported |
| O.<n> | [O]ptional, but support of at least one of the group of options labeled by the numeral <n> is required |
| X or P | prohibited/precluded i.e. the capability must not be supported. |
| OX or OP | Optional to implement but precluded for use |
| <pred>: | Condition item symbol, including predicate identification |
| ^ | Logical negation, applied to a condition item's predicate |
| <r> | Receive aspects of an item |
| <s> | Send aspects of an item |
| Y | [Y]es, indicates that an implementation must support the item |
| N | [N]o, indicates that there is no requirement for the an implementation |

## B.1 SNDCF for use with ISO 8208 Sub-networks - Function

Table B-1 provides the functions of SNDCF for use with ISO 8208 sub-network.

***Table B-1: SNDCF for use with ISO 8208 Sub-networks - Function***

| Item | Function | ISO/IEC 8473-3 Reference | Status | ATN Support | G/G Router Support |
|---|---|---|---|---|---|
| XSNUD | Is Sub-network User Data of at least 512 octets transferred transparently by the SNDCF ? | 5.2 | M | M | Y |
| XSNTD | Is Transit Delay determined by the SNDCF prior to the processing of user data ? | 5.2 | M | M | Y |
| | Call Setup Considerations<br>Is a new call setup: | 5.3.1 | | | |
| XCalla | a. when no suitable call exists ? | 5.3.1 a. | O.3 | O.3 | Y |

| Item | Function | ISO/IEC 8473-3 Reference | Status | ATN Support | G/G Router Support |
|---|---|---|---|---|---|
| XCallb | b. when queue threshold reached ? | 5.3.1 b. | O.3 | O.3 | N |
| XCallc | c. by systems management ? | 5.3.1 c. | O.3 | O.3 | Y |
| XCalld | d. when queue threshold reached and timer expires ? | 5.3.4 | O.3 | O.3 | N |
| XCalle | e. by other local means? | 5.3.1 | O.3 | O.3 | N |
| | Call clearing considerations<br>Are calls cleared: | 5.3.2 | | | |
| XClra | a. when idle timer expires | 5.3.2 a., 5.3.4 | O | O | Y |
| XClrb | b. when need to re-use circuit | 5.3.2 b. | O | O | N |
| XClrc | c. by systems management | 5.3.2 c. | O | O | Y |
| XClrd | d. by provider ? | 5.3.2 d. | M | M | Y |
| XClrer | e. by other local means? | 5.3.2 | O | O | N |
| XPD | X.25 Protocol Discrimination | 5.3.3 | M | M | Y |
| XVCC | Resolution of VC collisions | 5.3.5 | M | M | Y |
| XMCR | Multiple VCs responding | 5.3.6 | M | M | Y |
| XMCI | Multiple VCs initiating | 5.3.6 | O | O | N |
| Xpri | X.25 Priority procedure | 5.3.7 | O | M | N |

## B.2 SNDCF for use with ISO 8208 Sub-networks - X.25 Call User Data

Table B-2 provides the X.25 call user data requirements of SNDCF for use with ISO 8208 sub-network.

***Table B-2: SNDCF for use with ISO 8208 Sub-networks - X.25 call user data***

| Item | Parameter | ISO/IEC 8473-3 Reference | Status | ATN Support | G/G Router Support |
|---|---|---|---|---|---|
| PD-s | <s> Protocol Discriminator | 5.3.3 | M | M | Y |
| PD-r | <r> Protocol Discriminator | 5.3.3 | M | M | Y |
| LI-s | <s> Length Indication | 5.3.6 | XMCI:M | XMCI:M | N |
| LI-r | <r> Length Indication | 5.3.6 | M | M | Y |
| Ver-s | <s> SNCR Version | 5.3.6 | XMCI:M | XMCI:M | N |
| Ver-r | <r> SNCR Version | 5.3.6 | M | M | Y |
| SNCR-s | <s> SNCR Value | 5.3.6 | XMCI:M | XMCI:M | N |
| SNCR-r | <r> SNCR Value | 5.3.6 | M | M | Y |

## B.3 SNDCF for use with ISO 8208 Sub-networks - ISO 8208 SNDCF Timers

Table B-3 provides the timers of SNDCF for use with ISO 8208 sub-network.

***Table B-3: SNDCF for use with ISO 8208 Sub-networks - ISO 8208 SNDCF Timers***

| Item | Timer | ISO/IEC 8473-3 Reference | Status | Values | ATN Support | G/G Router Support |
|---|---|---|---|---|---|---|
| XIDL | X25 VC Idle | 5.3.4 | XClra:O | Any | XClra:O | Y, 0 to 72000 sec. |
| XNVC | additional VC | 5.3.4 | O | Any | M | Y, 0 to 72000 sec. |

## B.4 SNDCF for use with ISO 8208 Sub-networks - Multi Layer Dependencies

Table B-4 provides multi layer dependency requirements of SNDCF for use with ISO 8208 sub-network.

***Table B-4: SNDCF for use with ISO 8208 Sub-networks - Multi layer dependencies***

| Item | Dependency | ISO/IEC 8473-3 Reference | Status | ATN Support | G/G Router Support |
|---|---|---|---|---|---|
| XSSg-r | <r> Maximum SN data unit size (Rx) | 5.2 | >=512 | >=512 | >=512 |
| XSSg-s | <s> Maximum SN data unit size (Tx) | 5.2 | >=512 | >=512 | >=512 |
| Xvc | X.25 Virtual call service | 5.3.8 | M | M | Y |
| Xdt | X.25 Data transfer | 5.3.8 | M | M | Y |
| Xfc | X.25 flow control procedures | 5.3.8 | M | M | Y |
| Xfrp | X.25 flow control + reset packets | 5.3.8 | M | M | Y |
| Xccp | X.25 call setup and clear packets | 5.3.8 | M | M | Y |
| Xdp | X.25 DTE and DCE data packets | 5.3.8 | M | M | Y |
| Xrs | X.25 restart procedures | 5.3.8 | M | M | Y |
| XDct | X.25 DCE timeouts | 5.3.8 | M | M | Y |
| XDtT | X.25 time limits | 5.3.8 | M | M | Y |
| Xpco | X.25 network packet coding | 5.3.8 | M | M | Y |
| Xfcn | X.25 flow control parameter negotiation | 5.3.8 | O | O | Y |
| Xtd | X.25 transit delay selection and negotiation | 5.3.8 | O | O | Y |
| Xtc | X.25 throughput class negotiation | 5.3.8 | O | O | Y |
| Xoth | Other X.25 elements | 5.3.8 | O | O | N |

# APPENDIX C- CLNP APRLS

## C.0 CLNP APRLs

This appendix provides CLNP APRLs for ATN G/G router. The APRLs define the capabilities and options of the protocol that, at minimum, are required to be implemented for the ATN G/G router for ICAO Asia/Pacific regional ATN.

The APRLs in this appendix use the conventions and symbols defined in the beginning of appendix B.

## C.1 Support of ATN-Specific Network Layer Features

Table C-1 provides the requirements for CLNP network layer features.

***Table C-1: Support of ATN-specific network layer features***

| Index | Item | ATN SARPs Reference | ATN Support | G/G Router Support |
|---|---|---|---|---|
| ATN CLNP1 | Encoding and use of the Security Parameter | 5.6.2.2 | M | Y |
| ATN CLNP2 | Management of Network Priority | 5.6.2.3, 5.2.8.4 | M | Y |
| ATN CLNP4 | Echo Request Function | 5.6.3.3 | O | Y |
| ATN CLNP5 | Congestion Management | 5.6.2.4 | M | N, O |
| ATN CLNP6 | Echo Response Function | 5.6.3.4.1 | M | Y |
| ATN CLNP7 | Echo Response parameter setting | 5.6.3.4.2,5.6.3.4.3 5.6.3.4.4 | M | Y |

## C.2 Major Capabilities

Table C-2 provides the CLNP major capabilities.

***Table C-2: Major Capabilities***

| Item | Capability | ISO/IEC 8473 Reference | Status | ATN Support | G/G Router Support |
|---|---|---|---|---|---|
| ES | End System | | O.1 | O.1 | N |
| IS | Intermediate System | | O.1 | O.1 | Y |
| FL-r | <r> Full protocol | 8473-1: 6 | M | M | Y |
| FL-s | <s> Full protocol | 8473-1: 6 | M | M | Y |
| NSS-r | <r> Non-segmenting subset | 8473-1: 5.2 | M | M | Y |

| Item | Capability | ISO/IEC 8473 Reference | Status | ATN Support | G/G Router Support |
|---|---|---|---|---|---|
| NSS-s | <s> Non segmenting subset | 8473-1: 5.2 | IS:M ^IS:O | IS:M ^IS:O | Y |
| IAS-r | <r> Inactive subset | 8473-1: 5.2 | ES:O | ES:O | N |
| IAS-s | <s> Inactive subset | 8473-1: 5.2 | IAS-r:M ^IAS-r:X | IAS-r:M ^IAS-r:X | N |
| S802 | SNDCF for ISO 8802 | 8473-2: 5.4 | O.2 | O | Y |
| SCLL | SNDCF for CL Link Service | 8473-4: 5.3.1 | O.2 | O | N |
| SCOL | SNDCF for CO Link Service | 8473-4: 5.3.2 | O.2 | O | N |
| SX25 | SNDCF for ISO 8208 | 8473-3: 5.4 | O.2 | O | Y |
| ATN SNDCF | SNDCF for Mobile Sub-networks | ATN SARPs Ref: Chapter 5.7 | N/A | ISMOB:M ISGRD:O ^IS:O | N/A |

ISMOB: If ISO/IEC 8473 is used over Mobile Sub-networks, then ISMOB is true, else ISMOB is false.

ISGRD: If ISO/IEC 8473 is used over Ground Sub-networks, then ISGRD is true, else ISGRD is false.

O.1: The supported functions, NPDUs, associated parameters and timers required for Intermediate Systems are provided in the APRLs. C.3 through C.10.

O.2: APRLs for the SNDCF for use with ISO/IEC 8208 sub-networks are provided in B.1 through B.4.

### C.3 Ground-Ground Router - Supported Functions

Table C-3 specifies the ATN G/G router supported functions.

***Table C-3: G/G Router - Supported Functions***

| Item | Function | ISO/IEC 8473-1 Reference | Status | ATN Support | G/G Router Support |
|---|---|---|---|---|---|
| iPDUC | PDU Composition | 6.1 | M | M | Y |
| iPDUD | PDU Decomposition | 6.2 | M | M | Y |

| Item | Function | ISO/IEC 8473-1 Reference | Status | ATN Support | G/G Router Support |
|---|---|---|---|---|---|
| iHFA | Header Format Analysis | 6.3 | M | M | Y |
| iPDUL | <s> PDU Lifetime Control | 6.4 | M | M | Y |
| iRout | Route PDU | 6.5 | M | M | Y |
| iForw | Forward PDU | 6.6 | M | M | Y |
| iSegm | Segment PDU | 6.7 | iDSNS:M | iDSNS:M | N |
| iReas | Reassemble PDU | 6.8 | O | O | N |
| iDisc | Discard PDU | 6.9 | M | M | Y |
| iErep | Error Reporting | 6.10 | M | M | Y |
| iEdec | <s> Header Error Detection | 6.11 | M | M | Y |
| iSecu | <s>Security | 6.13 ATN SARPs Ref: 5.6.2.2 | O | M | Y |
| iCRR | <s> Complete Route Recording | 6.15 | O | OX | N |
| iPRR | <s> Partial Route Recording | 6.15 | O | M | Y |
| iCSR | Complete Source Routing | 6.14 | O | OX | N |
| iPSR | Partial Source Routing | 6.14 | O | OX | N |
| iPri | <s> Priority | 6.17, ATN SARPs Ref: 5.6.3.5 | O | M | Y |
| iQOSM | <s> QOS Maintenance | 6.16 | O | M | Y |
| iCong | <s> Congestion Notification | 6.18, ATN SARPs Ref: 5.6.2.4 | O | M | Y |
| iPadd | <s> Padding | 6.12 | M | M | N, O |
| iEreq | Echo request | 6.19, ATN SARPs Ref: 5.6.3.3 | O | O | Y |
| iErsp | Echo response | 6.20 | O | M | Y |

| Item | Function | ISO/IEC 8473-1 Reference | Status | ATN Support | G/G Router Support |
|---|---|---|---|---|---|
| iSegS | Create segments smaller than necessary | 6.8 | O | O | N |
| iDSNS | Simultaneous support of sub-networks with different SN-User data sizes | 6.7 | O | O | N |

## C.4 Supported Security Parameters

Table C-4 specifies the ATN G/G router supported security parameters.

***Table C-4: G/G Router Supported Security Parameters***

| Item | Function | ISO/IEC 8473-1 Reference | Status | ATN Support | G/G Router Support |
|---|---|---|---|---|---|
| iSADSSEC | Source Address Specific Security | 7.5.3.1 | iSecu:O.5 | iSecu:O | N |
| iDADSSEC | Destination Address Specific Security | 7.5.3.2 | iSecu:O.5 | iSecu:O | N |
| iGUNSEC | Globally Unique Security | ATN SARPs Ref. 5.6.2.2 | iSecu:O.5 | iSecu:M | Y |

O.5: The Security parameter within a single NPDU specifies a security format code indicating Source Address Specific, Destination Address Specific or Globally Unique Security.

## C.5 Quality of Service Maintenance Function

Table C-5 specifies the ATN G/G router quality of service maintenance function.

***Table C-5: Quality of Service Maintenance Function***

| Item | Function | ISO/IEC 8473-1 Reference | Status | ATN Support | G/G Router Support |
|---|---|---|---|---|---|
| IQOSNAVAIL | If requested QOS not available, deliver at different QOS | 6.16 | iQOSM:M | iQOSM:M | Y |
| IQOSNOT | Notification of failure to meet requested QOS | 6.16 | iQOSM:O | iQOSM:O | N |
| | Which of the following formats of QOS are implemented ? | | | | |
| ISADDQoS | Source Address Specific QoS | 7.5.6.1 | iQoSM:O.3 | iQOSM:O | N |
| IDADDQoS | Destination Address Specific QoS | 7.5.6.2 | iQoSM:O.3 | iQOSM:O | N |
| IGUNQoS | Globally Unique QoS | 7.5.6.3 | iQoSM:O.3 | iQOSM:M | Y |
| iSvTD | Sequencing versus Transit Delay | 7.5.6.3 | iGUNQoS:O.4 | iGUNQoS:O.4 | N |
| iCongE | Congestion Experienced | 7.5.6.3 | iGUNQoS:O.4 | iGUNQoS:M | N, O |
| iTDvCst | Transit Delay versus Cost | 7.5.6.3 | iGUNQoS:O.4 | iGUNQoS:O.4 | N |
| iREPvTD | Residual Error Probability versus Transit Delay | 7.5.6.3 | iGUNQoS:O.4 | iGUNQoS:O.4 | N |

| Item | Function | ISO/IEC 8473-1 Reference | Status | ATN Support | G/G Router Support |
|---|---|---|---|---|---|
| iREPvCst | Residual Error Probality versus Cost | 7.5.6.3 | iGUNQoS:O.4 | iGUNQoS:O.4 | N |

O.3: The Quality of Service Maintenance parameter within a single NPDU specifies a QoS format code indicating Source Address Specific, Destination Address Specific or Globally Unique QoS.

O.4: If the QoS format code indicates that the Globally Unique QoS maintenance function is employed, then each bit in the associated parameter value may be set to indicate the order of intra and inter domain routing decisions based on QoS. The parameter values which apply to inter-domain routing are provided in Table 4 of ISO/IEC 10747.

### C.6 Boundary Intermediate Systems - Supported NPDUs

Table C-6 specifies the ATN G/G router supported NPDUs.

***Table C-6: G/G Router - Supported NPDUs***

| Item | Function | ISO/IEC 8473-1 Reference | Status | ATN Support | G/G Router Support |
|---|---|---|---|---|---|
| iDT-t | DT (full protocol) transmit | 7.7 | M | M | Y |
| iDT-r | DT (full protocol) receive | 7.7 | M | M | Y |
| iDTNS-t | DT (non-segment) transmit | 7.7 | M | M | Y |
| iDTNS-r | DT (non-segment) receive | 7.7 | M | M | Y |
| IER-t | ER transmit | 7.9 | M | M | Y |
| IER-r | ER receive | 7.9 | M | M | Y |
| iERQ-t | ERQ transmit | 7.10 | iEreq:M | iEreq:M | Y |
| iERQ-r | ERQ receive | 7.10 | M | M | Y |
| iERP-t | ERP transmit | 7.11 | iErsp:M | iErsp:M | Y |
| iERP-r | ERP receive | 7.11 | M | M | Y |

### C.7 Ground-Ground Router - Supported Data PDU (DT PDU) Parameters

Table C-7 describes the ATN G/G router supported DT PDU parameters.

*Table C-7: G/G Router - Supported DT PDU Parameters*

| Item | Parameter | ISO/IEC 8473-1 Reference | Status | ATN Support | G/G Router Support |
|---|---|---|---|---|---|
| idFxPt-s | <s> Fixed Part | 7.2 | M | M | Y |
| idFxPt-r | <r> Fixed Part | 7.2 | M | M | Y |
| idAddr-s | <s> Addresses | 7.3 | M | M | Y |
| idAddr-r | <r> Addresses | 7.3 | M | M | Y |
| idSeg-s | <s> Segmentation Part | 7.4 | M | M | Y |
| idSeg-r | <r> Segmentation Part | 7.4 | M | M | Y |
| idPadd-s | <s> Padding | 7.5.2 | M | M | Y |
| idPadd-r | <r> Padding | 7.5.2 | M | M | Y |
| idSecu-s | <s> Security | 7.5.3 | iSecu:M | iSecu:M | Y |
| idSecu-r | <r> Security | 7.5.3 | iSecu:M | iSecu:M | Y |
| idCRR-s | <s> Complete Route Recording | 7.5.5 | iCRR:M | - | N |
| idCRR-r | <r> Complete Route Recording | 7.5.5 | iCRR:M | - | N |
| idPRR-s | <s> Partial Route Recording | 7.5.5 | M | M | Y |
| idPRR-r | <r> Partial Route Recording | 7.5.5 | iPRR:M | iPRR:M | Y |
| idCSR-s | <s> Complete Source Routing | 7.5.4 | iCSR:M | - | N |
| idCSR-r | <r> Complete Source Routing | 7.5.4 | iCSR:M | - | N |
| idPSR-s | <s> Partial Source Routing | 7.5.4 | M | M | Y |
| idPSR-r | <r> Partial Source Routing | 7.5.4 | iPSR:M | - | N |
| idQOSM-s | <s> QOS Maintenance | 7.5.6 | M | M | Y |
| idQOSM-r | <r> QOS Maintenance | 7.5.6 | iQOSM or iCong:M | iQOSM or iCong:M | Y |
| idPri-s | <s> Priority | 7.5.7 | M | M | Y |
| idPri-r | <r> Priority | 7.5.7 | iPRi:M | iPri:M | Y |

| Item | Parameter | ISO/IEC 8473-1 Reference | Status | ATN Support | G/G Router Support |
|---|---|---|---|---|---|
| idData-s | <s> Data | 7.6 | M | M | Y |
| idData-r | <r> Data | 7.6 | M | M | Y |
| idUnSup2 | Are received PDUs containing parameters selecting unsupported type 2 functions discarded and where appropriate an Error Report PDU generated ? | 6.19 | M | M | Y |
| idUnSup3 | Are parameters selecting unsupported Type 3 functions ignored ? | 6.19 | M | M | Y |

## C.8 Ground-Ground Router - Supported Error Report PDU (ER PDU) Parameters

Table C-8 specifies the ATN G/G router supported ER PDU parameters.

***Table C-8: G/G Router - Supported ER PDU Parameters***

| Item | Parameter | ISO/IEC 8473-1 Reference | Status | ATN Support | G/G Router Support |
|---|---|---|---|---|---|
| ieFxPt-s | <s> Fixed Part | 7.2 | M | M | Y |
| ieFxPt-r | <r> Fixed Part | 7.2 | M | M | Y |
| ieAddr-s | <s> Address | 7.3 | M | M | Y |
| ieAddr-r | <r> Address | 7.3 | M | M | Y |
| iePadd-s | <s> Padding | 7.5.2 | M | M | Y |
| iePadd-r | <r> Padding | 7.5.2 | M | M | Y |
| ieSecu-s | <s> Security | 7.5.3 | iSecu:M | iSecu:M | Y |
| ieSecu-r | <r> Security | 7.5.3 | iSecu:M | iSecu:M | Y |
| ieCRR-s | <s> Complete Route Recording | 7.5.5 | iCRR:M | iCRR:M | N |
| ieCRR-r | <r> Complete Route Recording | 7.5.5 | iCRR:M | - | N |
| iePRR-s | <s> Partial Route Recording | 7.5.5 | M | M | Y |
| iePRR-r | <r> Partial Route Recording | 7.5.5 | iPRR:M | iPRR:M | Y |
| ieCSR-s | <s> Complete Source Routing | 7.5.4 | iCSR:M | - | N |
| ieCSR-r | <r> Complete Source Routing | 7.5.4 | iCSR:M | - | N |
| iePSR-s | <s> Partial Source Routing | 7.5.4 | M | M | Y |
| iePSR-r | <r> Partial Source Routing | 7.5.4 | iPSR:M | - | N |
| ieQOSM-s | <s> QOS Maintenance | 7.5.6 | M | M | Y |
| ieQOSM-r | <r> QOS Maintenance | 7.5.6 | iQOSM or iCong:M | iQOSM or iCong:M | Y |

| Item | Parameter | ISO/IEC 8473-1 Reference | Status | ATN Support | G/G Router Support |
|---|---|---|---|---|---|
| iePri-s | <s> Priority | 7.5.7 | M | M | Y |
| iePri-r | <r> Priority | 7.5.7 | iPri:M | iPri:M | Y |
| ieDisc-s | <s> Reason for Discard | 7.9.5 | M | M | Y |
| ieDisc-r | <r> Reason for Discard | 7.9.5 | M | M | Y |
| ieData-s | <s> Data | 7.6 | M | M | Y |
| ieData-r | <r> Data | 7.6 | M | M | Y |
| ieUnsup2 | Are received PDUs containing parameters selecting unsupported type 2 functions discarded ? | 6.21 | M | M | Y |
| ieUnsup3 | Are parameters selecting unsupported Type 3 functions ignored ? | 6.21 | M | M | Y |

## C.9 Ground-Ground Router - Supported Echo Request PDU (ERQ PDU) Parameters

Table C-9 specifies the ATN G/G router supported ERQ PDU parameters.

***Table C-9: G/G Router - Supported ERQ PDU Parameters***

| Item | Parameter | ISO/IEC 8473-1 Reference | Status | ATN Support | G/G Router Support |
|---|---|---|---|---|---|
| iqFxPt-s | <s> Fixed Part | 7.2 | M | M | Y |
| iqFxPt-r | <r> Fixed Part | 7.2 | M | M | Y |
| iqAddr-s | <s> Addresses | 7.3 | M | M | Y |
| iqAddr-r | <r> Addresses | 7.3 | M | M | Y |
| iqSeg-s | <s> Segmentation Part | 7.4 | M | M | Y |
| iqSeg-r | <r> Segmentation Part | 7.4 | M | M | Y |
| iqPadd-s | <s> Padding | 7.5.2 | M | M | Y |
| iqPadd-r | <r> Padding | 7.5.2 | M | M | N, O |
| iqSecu-s | <s> Security | 7.5.3 | iSecu:M | iSecu:M | N, O |

| Item | Parameter | ISO/IEC 8473-1 Reference | Status | ATN Support | G/G Router Support |
|---|---|---|---|---|---|
| iqSecu-r | <r> Security | 7.5.3 | iSecu:M | iSecu:M | Y |
| iqCRR-s | <s> Complete Route Recording | 7.5.5 | iCRR:M | M | N |
| iqCRR-r | <r> Complete Route Recording | 7.5.5 | iCRR:M | - | N |
| iqPRR-s | <s> Partial Route Recording | 7.5.5 | M | M | Y |
| iqPRR-r | <r> Partial Route Recording | 7.5.5 | iPRR:M | iPRR:M | Y |
| iqCSR-s | <s> Complete Source Routing | 7.5.4 | iCSR:M | - | N |
| iqCSR-r | <r> Complete Source Routing | 7.5.4 | iCSR:M | - | N |
| iqPSR-s | <s> Partial Source Routing | 7.5.4 | M | M | Y |
| iqPSR-r | <r> Partial Source Routing | 7.5.4 | iPSR:M | - | N |
| iqQOSM-s | <s> QOS Maintenance | 7.5.6 | M | M | Y |
| iqQOSM-r | <r> QOS Maintenance | 7.5.6 | iQOSM or iCong:M | iQOSM or ICong:M | Y |
| iqPri-s | <s> Priority | 7.5.7 | M | M | Y |
| iqPri-r | <r> Priority | 7.5.7 | iPRi:M | iPri:M | Y |
| iqData-s | <s> Data | 7.6 | M | M | Y |
| iqData-r | <r> Data | 7.6 | M | M | Y |
| iqUnSup2 | Are received PDUs containing parameters selecting unsupported type 2 functions discarded and where appropriate an Error Report PDU generated ? | 6.19 | M | M | Y |
| iqUnSup3 | Are parameters selecting unsupported Type 3 functions ignored ? | 6.19 | M | M | Y |

## C.10 Ground-Ground Router - Supported Echo Reply PDU (ERP PDU) Parameters

Table C-10 specifies the ATN G/G router supported ERP PDU parameters.

***Table C-10: G/G Router - Supported ERP PDU Parameters***

| Item | Parameter | ISO/IEC 8473-1 Reference | Status | ATN Support | G/G Router Support |
|---|---|---|---|---|---|
| ipFxPt-s | <s> Fixed Part | 7.2 | M | M | Y |
| ipFxPt-r | <r> Fixed Part | 7.2 | M | M | Y |
| ipAddr-s | <s> Addresses | 7.3 | M | M | Y |
| ipAddr-r | <r> Addresses | 7.3 | M | M | Y |
| ipSeg-s | <s> Segmentation Part | 7.4 | M | M | Y |
| ipSeg-r | <r> Segmentation Part | 7.4 | M | M | Y |
| ipPadd-s | <s> Padding | 7.5.2 | M | M | N,O |
| ipPadd-r | <r> Padding | 7.5.2 | M | M | N,O |
| ipSecu-s | <s> Security | 7.5.3 | iSecu:M | iSecu:M | Y |
| ipSecu-r | <r> Security | 7.5.3 | iSecu:M | iSecu:M | Y |
| ipCRR-s | <s> Complete Route Recording | 7.5.5 | iCRR:M | M | N |
| ipCRR-r | <r> Complete Route Recording | 7.5.5 | iCRR:M | - | N |
| ipPRR-s | <s> Partial Route Recording | 7.5.5 | M | M | Y |
| ipPRR-r | <r> Partial Route Recording | 7.5.5 | iPRR:M | iPRR:M | Y |
| ipCSR-s | <s> Complete Source Routing | 7.5.4 | iCSR:M | - | N |
| ipCSR-r | <r> Complete Source Routing | 7.5.4 | iCSR:M | - | N |
| ipPSR-s | <s> Partial Source Routing | 7.5.4 | M | M | Y |
| ipPSR-r | <r> Partial Source Routing | 7.5.4 | iPSR:M | - | N |
| ipQOSM-s | <s> QOS Maintenance | 7.5.6 | M | M | Y |
| ipQOSM-r | <r> QOS Maintenance | 7.5.6 | iQOSM or iCong:M | iQOSM or ICong:M | Y |
| ipPri-s | <s> Priority | 7.5.7 | M | M | Y |
| ipPri-r | <r> Priority | 7.5.7 | iPRi:M | iPri:M | Y |
| ipData-s | <s> Data | 7.6 | M | M | Y |
| ipData-r | <r> Data | 7.6 | M | M | Y |

| Item | Parameter | ISO/IEC 8473-1 Reference | Status | ATN Support | G/G Router Support |
|---|---|---|---|---|---|
| ipUnsup2 | Are received PDUs containing parameters selecting unsupported type 2 functions discarded and where appropriate an Error Report PDU generated ? | 6.19 | M | M | Y |
| ipUnsup3 | Are parameters selecting unsupported Type 3 functions ignored ? | 6.19 | M | M | Y |

## C.11 Ground-Ground Router - Timer and Parameter Values

Table C-11 specifies the ATN G/G router Timer and parameter values.

***Table C-11: G/G Router - Timer and Parameter Values***

| Item | Timer | ISO/IEC 8473-1 Reference | Status | ATN Support | G/G Router Support |
|---|---|---|---|---|---|
| iReasTim | Reassembly Timer | 6.8 | iReas:M | M | Y |

# APPENDIX D - IDRP APRLS

## D.0 IDRP APRLs

This appendix provides IDRP APRLs for ATN G/G routers. The APRLs define the capabilities and options that, at a minimum, are required to be implemented for the ATN G/G router under an Asia/Pacific ATN environment.

The APRLs provided in this appendix use the conventions and symbols defined in the beginning of Appendix B.

## D.1 ATN Specific Protocol Requirements

Table D-1 describes the ATN specific protocol requirements.

***Table D-1: ATN specific protocol requirements***

| Index | Item | ATN SARPs Ref | G/G Router | G/GRouter Support |
|---|---|---|---|---|
| ATNIDRP1 | Encoding and use of the Security Path Attribute | 5.8.3.2.2, 5.8.3.2.3 | M | Y |
| ATNIDRP2 | Does this G/G ROUTER immediately re-advertise routes if the security information contained in the routes's path attribute change? | 5.8.3.2.7 | M | Y |
| ATNIDRP3 | Support of 'policy based route aggregation' | 5.8.3.2.6.2 | O | N |
| ATNIDRP4 | Support of 'policy based route information reduction' | 5.8.3.2.6.5 | O | N |
| ATNIDRP5 | Support of aggregation of routes with identical NLRI using 'true route aggregation' | 5.8.3.2.6.3 | O.1 | N |
| ATNIDRP6 | Support of aggregation of routes with identical NLRI using 'route merging' | 5.8.3.2.6.3 | O.1 | N |
| ATNIDRP7 | Support of aggregation of security path attribute information field | 5.8.3.2.6.4 | M | N |

## D.2 IDRP General

Table D-2 describes the IDRP general requirements.

***Table D-2: IDRP General Requirements***

| Item | Description | ISO/IEC 10747 Ref. | ISO Status | G/G Router | G/G Router Support |
|---|---|---|---|---|---|
| BASIC | Are all basic G/G ROUTER functions implemented? | 12.1 | M | M | Y |
| MGT | Is this system capable of being managed by the specified management information? | 11 | M | O | N |
| VER | Does this G/G ROUTER support Version Negotiation? | 7.8 | M | M | Y |
| RTSEP | Does this G/G ROUTER support the ROUTE_SEPARATOR attribute? | 7.12.1 | M | M | Y |
| HOPS | Does this G/G ROUTER support the RD_HOP_COUNT attribute? | 7.12.13 | M | M | Y |
| PATH | Does this G/G ROUTER support the RD_PATH attribute? | 7.12.3 | M | M | Y |
| CAPY | Does this G/G ROUTER support the Capacity Attribute? | 7.12.15 | M | M | Y |
| FSM | Does this G/G ROUTER manage ROUTER-ROUTER connections according to the G/G ROUTER FSM description? | 7.6.1 | M | M | Y |
| FCTL | Does this G/G ROUTER provide flow control? | 7.7.5 | M | M | Y |
| SEQNO | Does this G/G ROUTER provide sequence number support? | 7.7.4 | M | M | Y |
| INTG1 | Does this G/G ROUTER provide Data Integrity using authentication type 1? | 7.7.1 | O.1 | M | Y |

| Item | Description | ISO/IEC 10747 Ref. | ISO Status | G/G Router | G/G Router Support |
|---|---|---|---|---|---|
| INTG2 | Does this G/G ROUTER provide Data Integrity using authentication type 2? | 7.7.2 | O.1 | O | N |
| INTG3 | Does this G/G ROUTER provide Data Integrity using authentication type 3? | 7.7.3 | O.1 | O | N |
| ERROR | Does this G/G ROUTER handle error handling for IDRP? | 7.20 | M | M | Y |
| RIBCHK | Does this G/G ROUTER operate in a "fail-stop" manner with respect to corrupted routing information? | 7.10.2 | M | M | Y |

### D.3 IDRP Update Send Process

Table D-3 describes the IDRP update send process requirements.

***Table D-3: IDRP Update Send Process Requirements***

| Item | Description | ISO/IEC 10747 Ref. | ISO Status | G/G Router | G/G ROUTER Support |
|---|---|---|---|---|---|
| INT | Does the G/G ROUTER provide the internal update procedures? | 7.17.1 | M | M | Y |
| RTSEL | Does this G/G ROUTER support the MinRouteAdvertisementInterval Timer? | 7.17.3.1 | M | M | Y |
| RTORG | Does this G/G ROUTER support the MinRDOriginationInterval Timer? | 7.17.3.2 | M | M | Y |
| JITTER | Does this G/G ROUTER provide jitter on its timers? | 7.17.3.3 | M | M | Y |

## D.4 IDRP Update Receive Process

Table D-4 describes the IDRP update receive process requirements.

***Table D-4: IDRP Update Receive Process Requirements***

| Item | Description | ISO/IEC 10747 Ref. | ISO Status | G/G Router | G/G Router Support |
|---|---|---|---|---|---|
| INPDU | Does the G/G ROUTER handle inbound PDUs correctly? | 7.14 | M | M | Y |
| INCONS | Does this G/G ROUTER detect inconsistent routing information? | 7.15.1 | M | M | Y |

## D.5 IDRP Decision Process

Table D-5 describes the IDRP decision process requirements.

***Table D-5: IDRP Decision Process Requirements***

| Item | Description | ISO/IEC 10747 Ref. | ISO Status | G/G Router | G/G Router Support |
|---|---|---|---|---|---|
| TIES | Does this G/G ROUTER break ties between candidate routes correctly? | 7.16.2.1 | M | M | Y |
| RIBUPD | Does this G/G ROUTER update the Loc-RIBs correctly? | 7.16.2 | M | M | Y |
| AGGRT | Does this G/G ROUTER support route aggregations? | 7.18.2.1, 7.18.2.2, 7.18.2.3 | O | ATNIDRP3^ATNIDRP5: M | N |
| LOCK | Does this G/G ROUTER provide interlocks between its Decision Process and the updating of the information in its Adj-RIBs-In? | 7.16.4 | M | M | Y |

## D.6 IDRP Receive

Table D-6 describes the IDRP receive requirements.

***Table D-6: IDRP Receive Requirements***

| Item | Description | ISO/IEC 10747 Ref. | ISO Status | G/G Router | G/G Router Support |
|---|---|---|---|---|---|
| RCV | Does the G/G ROUTER process incoming PDUs and respond correctly to error conditions? | 7.14, 7.20 | M | M | **Y** |
| OSIZE | Does this G/G ROUTER accept incoming OPEN PDUs whose size in octets is between MinPDULength and 3000? | 6.2,7.20 | M | M | **Y** |
| MXPDU | Does the G/G ROUTER accept incoming UPDATE, IDRP ERROR and RIB REFRESH PDUs whose size in octets is between minPDULength and maxPDULength? | 6.2,7.20 | M | M | **Y** |

## D.7 IDRP CLNS Forwarding

Table D-7 describes the IDRP connectionless network service (CLNS) forwarding requirements.

***Table D-7: IDRP CLNS Forwarding***

| Item | Description | ISO/IEC 10747 Ref. | ISO Status | G/G Router | G/G Router Support |
|---|---|---|---|---|---|
| PSRCRT | Does the G/G ROUTER correctly handle ISO/IEC 8473 NPDUs that contain a partial source route? | 8 | M | O | N |
| DATTS | Does the G/G ROUTER correctly extract the NPDU-derived Distinguishing Attributes from an ISO/IEC 8473 NPDU? | 8.2 | M | M | Y |
| MATCH | Does the G/G ROUTER correctly match the NPDU-derived Distinguishing Attributes with the corresponding FIB-Atts? | 8.3 | M | M | Y |

| Item | Description | ISO/IEC 10747 Ref. | ISO Status | G/G Router | G/G Router Support |
|---|---|---|---|---|---|
| EXTF | Does the G/G ROUTER correctly forward NPDUs with destinations outside its own routing domain? | 8.4 | M | M | Y |
| INTF | Does the G/G ROUTER correctly forward NPDUs with destinations inside its own routing domain? | 8.1 | M | M | Y |

### D.8 IDRP Optional Transitive Attributes

Table D-8 describes the requirements for IDRP optional transitive attributes.

***Table D-8: IDRP Optional Transitive Attributes Requirements***

| Item | Description | ISO/IEC 10747 Ref. | ISO Status | G/G Router | G/G Router Support |
|---|---|---|---|---|---|
| MEXIT | Does this G/G ROUTER support use of the MULTI-EXIT DISC attribute? | 7.12.7 | O | O | N, O |

### D.9 Generating Well-Known Discretionary Attributes

Table D-9 describes the G/G router requirements for generating well-known discretionary attributes.

***Table D-9: Generating Well-Known Discretionary Attributes Requirements***

| Item | Description | ISO/IEC 10747 Ref. | ISO Status | G/G Router | G/G Router Support |
|---|---|---|---|---|---|
| EXTG | Does the G/G ROUTER support generation of the EXT_INFO attribute? | 7.12.2 | O | O | N |
| NHRS | Does the G/G ROUTER support generation of the NEXT_HOP attribute in support of route servers? | 7.12.4 | O | O | N |
| NHSN | Does the G/G ROUTER support generation of the NEXT_HOP attribute to advertise SNPAs? | 7.12.4 | O | O | N |

| Item | Description | ISO/IEC 10747 Ref. | ISO Status | G/G Router | G/G Router Support |
|---|---|---|---|---|---|
| DLI | Does the G/G ROUTER support generation of the DIST_LIST_INCL attribute? | 7.12.5 | O | O | N |
| DLE | Does the G/G ROUTER support generation of the DIST_LIST_EXCL attribute? | 7.12.6 | O | O | N |
| TDLY | Does the G/G ROUTER support generation of the TRANSIT DELAY attribute? | 7.12.8 | O | O | N |
| RERR | Does the G/G ROUTER support generation of the RESIDUAL ERROR attribute? | 7.12.9 | O | O | N |
| EXP | Does the G/G ROUTER support generation of the EXPENSE attribute? | 7.12.10 | O | O | N |
| LQOSG | Does the G/G ROUTER support generation of the LOCALLY DEFINED QOS attribute? | 7.12.11 | O | OX | N |
| HREC | Does the G/G ROUTER support generation of the HIERARCHICAL RECORDING attribute? | 7.12.12 | O | OX | N |
| SECG | Does the G/G ROUTER support generation of the SECURITY attribute? | 7.12.14 | O | M | Y |
| PRTY | Does the G/G ROUTER support generation of the PRIORITY attribute? | 7.12.16 | O | O | N |

### D.10 Peer Entity Authentication

Table D-10 describes peer entity authentication requirements.

***Table D-10: Peer Entity Authentication Requirements***

| Item | Description | ISO/IEC 10747 Ref. | ISO Status | G/G Router | G/G Router Support |
|---|---|---|---|---|---|
| AUTH | Does this G/G ROUTER correctly authenticate the source of a PDU? | 7.7.2 | O | M | Y |

*Note. Only support for an Authentication Code 1 is required*

### D.11 Propagating Well-Known Discretionary Attributes

Table D-11 describes requirements for propagating well-known discretionary attributes.

***Table D-11: Propagating Well-Known Discretionary Attributes***

| Item | Description | ISO/IEC 10747 Ref. | ISO Status | G/G Router | G/G Router Support |
|---|---|---|---|---|---|
| EXTGP | Does the G/G ROUTER support propagation of the EXT_INFO attribute? | 7.12.2 | M | M | Y |
| NHRSP | Does the G/G ROUTER support propagation of the NEXT_HOP attribute in support of route servers? | 7.12.4 | O | O | N |
| NHSNP | Does the G/G ROUTER support propagation of the NEXT_HOP attribute to advertise SNPAs? | 7.12.4 | O | O | N |
| DLIP | Does the G/G ROUTER support propagation of the DIST_LIST_INCL attribute? | 7.12.5 | O | M | Y |
| DLEP | Does the G/G ROUTER support propagation of the DIST_LIST_EXCL attribute? | 7.12.6 | O | M | Y |
| TDLYP | Does the G/G ROUTER support propagation of the TRANSIT DELAY attribute? | 7.12.8 | O | O | N |

| Item | Description | ISO/IEC 10747 Ref. | ISO Status | G/G Router | G/G Router Support |
|---|---|---|---|---|---|
| RERRP | Does the G/G ROUTER support propagation of the RESIDUAL ERROR attribute? | 7.12.9 | O | O | N |
| EXPP | Does the G/G ROUTER support propagation of the EXPENSE attribute? | 7.12.10 | O | O | N |
| LQOSP | Does the G/G ROUTER support propagation of the LOCALLY DEFINED QOS attribute? | 7.12.11 | O | OX | N |
| HRECP | Does the G/G ROUTER support propagation of the HIERARCHICAL RECORDING attribute? | 7.12.12 | O | OX | N |
| SECP | Does the G/G ROUTER support propagation of the SECURITY attribute? | 7.12.14 | O | M | Y |
| PRTYP | Does the G/G ROUTER support propagation of the PRIORITY attribute? | 7.12.16 | O | O | N |

### D.12 Receiving Well-Known Discretionary Attributes

Table D-12 describes the requirements for receiving well-known discretionary attributes.

***Table D-12: Receiving Well-Known Discretionary Attributes***

| Item | Description | ISO/IEC 10747 Ref. | ISO Status | G/G Router | G/G Router Support |
|---|---|---|---|---|---|
| EXTR | Does the G/G ROUTER recognise upon receipt the EXT_INFO attribute? | 7.12.2 | M | M | Y |
| NHRSR | Does the G/G ROUTER recognise upon receipt the NEXT_HOP attribute ? | 7.12.4 | M | M | Y |

| Item | Description | ISO/IEC 10747 Ref. | ISO Status | G/G Router | G/G Router Support |
|---|---|---|---|---|---|
| DLIR | Does the G/G ROUTER recognise upon receipt the DIST_LIST_INCL attribute? | 7.12.5 | M | M | N |
| DLER | Does the G/G ROUTER recognise upon receipt the DIST_LIST_EXCL attribute? | 7.12.6 | M | M | N |
| TDLYR | Does the G/G ROUTER recognise upon receipt the TRANSIT DELAY attribute? | 7.12.8 | M | M | Y |
| RERRR | Does the G/G ROUTER recognise upon receipt the RESIDUAL ERROR attribute? | 7.12.9 | M | M | Y |
| EXPR | Does the G/G ROUTER recognise upon receipt the EXPENSE attribute? | 7.12.10 | M | M | Y |
| LQOSR | Does the G/G ROUTER recognise upon receipt the LOCALLY DEFINED QOS attribute? | 7.12.11 | M | O | N |
| HRECR | Does the G/G ROUTER recognise upon receipt the HIERARCHICAL RECORDING attribute? | 7.12.12 | M | M | Y |
| SECR | Does the G/G ROUTER recognise upon receipt the SECURITY attribute? | 7.12.14 | M | M | Y |
| PRTYR | Does the G/G ROUTER recognise upon receipt the PRIORITY attribute? | 7.12.16 | M | M | Y |

### D.13 IDRP Timers

Table D-13 describes the IDRP timer requirements.

***Table D-13: IDRP Timers Requirements***

**7/2/2003**

| Item | Description | ISO/IEC 10747 Ref. | ISO Status | G/G router | G/G Router Support |
|---|---|---|---|---|---|
| Ta | KeepAlive time | 7.6.5 | M | M | Y |
| Tr | Retransmission (tr) timer | 7.6.5 | M | M | Y |
| Tmr | maxRIBIntegrityCheck timer | 7.10.2 | M | M | Y |
| Tma | MinRouteAdvertisement timer | 7.17.3.1 | M | M | Y |
| Trd | MinRDOriginationInterval timer | 7.17.3.2 | M | M | Y |
| Tcw | closeWaitDelay timer | 7.6.4 | M | M | Y |

# APPENDIX E - ACRONYMS

**E.0 Acronyms**

This appendix defines the acronyms used in this document.

| | |
|---|---|
| A/G | AIR-GROUND |
| AAC | Aeronautical Administrative Control |
| ABM | Asynchronous Balanced Mode |
| AIDC | ATS Interfacility Data Communications |
| AMHS | ATS Message Handling System |
| AOC | Aeronautical Operational Control |
| APC | Aeronautical Passenger Communication |
| APRLs | ATN Protocol Requirement Lists |
| ATN | Aeronautical Telecommunications Network |
| ATS | Air Traffic Service |
| ATSC | Air Traffic Service Control |
| CLNP | Connectionless Network Protocol |
| CLNS | Connection-Less Network Service |
| CPDLC | Controller Pilot Data Link Communications |
| DCE | Data Circuit-terminating Equipment |
| DM | Disconnected Mode |
| DTE | Data Terminal Equipment |
| E/R | Error Report |
| EIA | Electrical Industry Association |
| ERD | End Routing Domain |
| ES | End System |
| FIB | Forwarding Information Base |
| FSM | Finite State Machine |
| G-G(G/G) | Ground-Ground |
| ICAO | International Civil Aviation Organization |
| ICD | Interface Control Document |
| IDRP | Inter Domain Routing Protocol |

| | |
|---|---|
| IEC | International Electrotechnical Commission |
| ISO | International Standardization Organization |
| ITU | International Telecommunications Union |
| ITU-T | ITU Telecommunications Sector |
| LAPB | Link Access Procedure Balanced |
| NET | Network Entity Title |
| NPDU | Network Protocol Data Unit |
| NSAP | Network Service Access Point |
| OSI | Open Systems Interconnection |
| PDU | Protocol Data Unit |
| PIB | Policy Information Base |
| PICS | Protocol Implementation Compliance Statement |
| PSDN | Public Switched Data Network |
| PSN | Packet Switched Network |
| PVC | Permanent Virtual Circuit |
| QOS | Quality of Service |
| RD | Routing Domain |
| RDC | Routing Domain Confederation |
| RIB | Routing Information Base |
| SARPs | Standards and Recommended Practices |
| SNDCF | Sub Network Dependent Convergence Functions |
| SNPA | Sub Network Point of Attachment |
| SVC | Switched Virtual Circuit |
| TBD | to be Determined |
| TBR | to be Reviewed |

Appendix B to the Report

**INTERNATIONAL CIVIL AVIATION ORGANISATION**

**ASIA PACIFIC OFFICE**

# DOCUMENTATION MAP
# FOR THE
# ASIA PACIFIC ATN TRANSITION

March 2003

Version 2.0

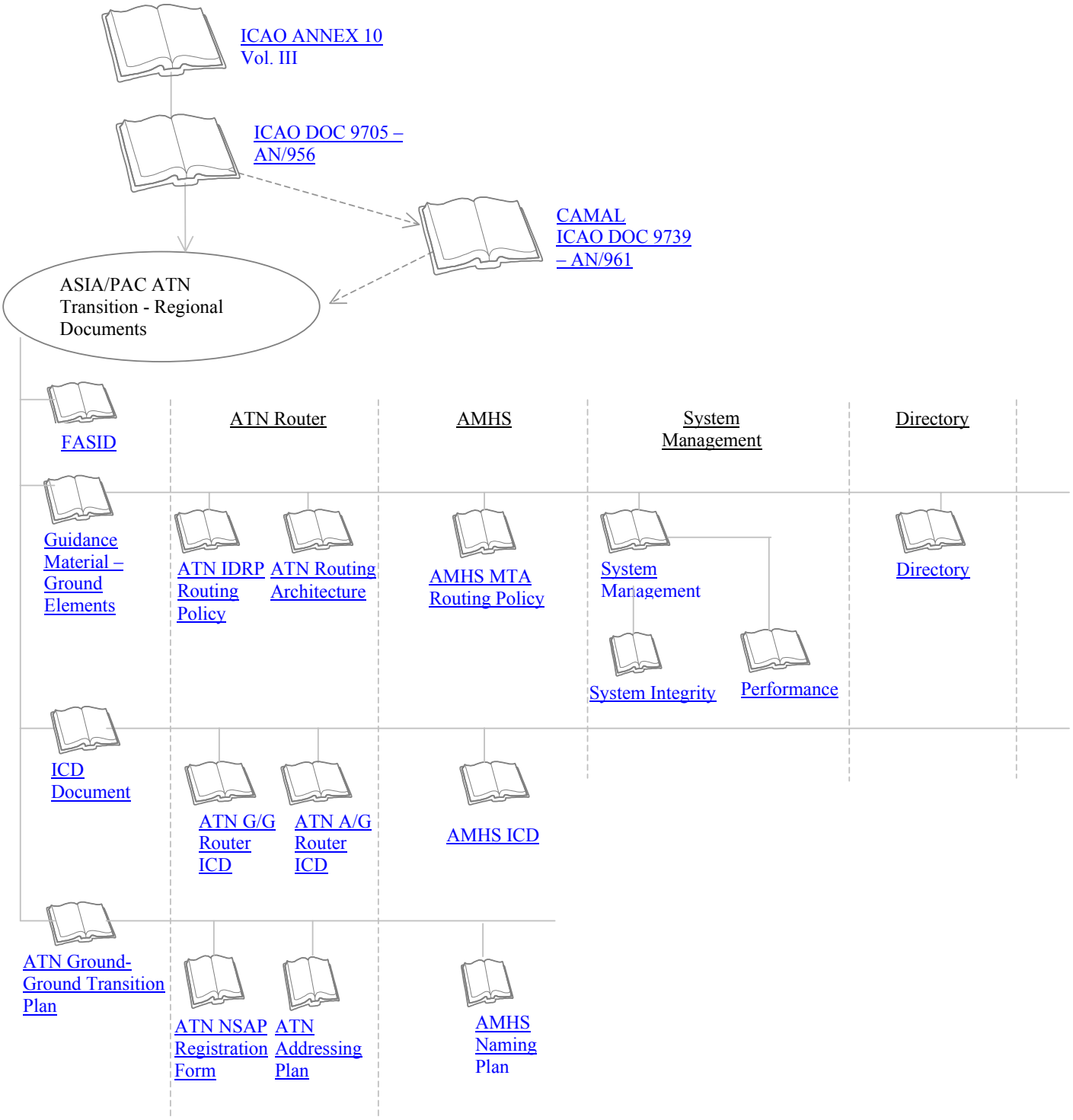
Published by the ICAO Asia and the Pacific Regional Office Bangkok

# Table of Contents

# 1 Scope

This document has been developed to serve as a catalogue of all documentation in the Asia Pacific Region. A hierarchical representation of the relationships between the various documents is presented in section 2 “Documentation Tree”, with associated document descriptions located in section 3 “Documentation Profiles”.

## 2 Documentation Tree



# 3 Documentation Profiles

## *3.1 ICAO Annex10 Vol. III*

**Title:**

International Standards and Recommended Practices, Aeronautical Telecommunications, Annex 10 Volume III.

**Latest Version:** March 2001

**Purpose:**

This ICAO document defines the Standards and Recommended Practices (SARPs) for the Aeronautical Telecommunications Network (ATN).

**Contents:**

Subjects covered by the document:

- Part I – Digital Data communication Systems.
  - Chapter 1 – Definitions.
  - Chapter 3 – Aeronautical Telecommunication Network.
  - Chapter 4 – Aeronautical Mobile-Satellite Service.
  - Chapter 6 – VHF Air-Ground Digital Link (VDL).
  - Chapter 8 – AFTN.
- Part II – Voice Communication Systems.
  - Chapter 2 – Aeronautical Mobile Service.
  - Chapter 4 – Aeronautical Speech Circuits.
  - Chapter 5 – Emergency Locator Transmitter (ELT) for search and rescue.

## *3.2 Manual of Technical Provisions for the Aeronautical Telecommunication Network - ICAO DOC 9705 – AN/956*

**Title:**

Manual of Technical Provisions for the Aeronautical Telecommunication Network (ATN).

**Latest Version:** 3rd Edition

**Purpose:**

This ICAO manual contains detailed technical information and serves to further elaborate on the ATN standards as defined in Chapter 3 of Annex 10, Volume III, Part I.

**Contents:**

Subjects covered by the document:

- Sub-Volume I – Introduction and System Level Requirements.
- Sub-Volume II – Air-Ground Applications.
- Sub-Volume III – Ground-Ground Applications.
- Sub-Volume IV – Upper Layer Communications Services (ULCS).
- Sub-Volume V – Internet Communications Services (ICS).
- Sub-Volume VI – ATN Systems Management Provisions.
- Sub-Volume VII – ATN Directory Service.
- Sub-Volume VIII – ATN Security Service.
- Sub-Volume IX – ATN Identifier Registration.

## 3.3 Comprehensive Aeronautical Telecommunications Network Manual (CAMAL) - ICAO DOC 9739 – AN/961

**Title:**

Comprehensive Aeronautical Telecommunications Network (ATN) Manual.

**Latest Version:** 2nd Edition - 2002

**Purpose:**

This document provides guidance material in support of the ATN SARPS as defined in Annex 10, Vol. III and Doc. 9705.

**Contents:**

Subjects covered by the document:

- Components, functionality and concepts of the ATN.
- ATN Internet lower layer routing protocols.
- ATN Upper layer application protocols.
- ATN subnetworks and corresponding SNDCF's layers.
- Air-ground applications, ADS, CPDLC, CM, FIS.
- Ground-Ground applications ATSMHS, AIDC.

## 3.4 ATN IDRP Routing Policy

**Title:**

Asia/Pacific ATN IDRP Routing Policy.

**Latest Version:** To be developed

**Purpose:**

**Contents:**

## 3.5 AMHS MTA Routing Policy

**Title:**

Asia/Pacific AMHS MTA Routing Policy.

**Latest Version:** To be developed

**Purpose:**

**Contents:**

## 3.6 Directory

**Title:**

Asia/Pacific Technical Document on Use of Directory Services.

**Latest Version:** To be developed

**Purpose:**

**Contents:**

## 3.7 System Management

**Title:**

Asia/Pacific Regional System Management Transition Guideline Document.

**Latest Version:** To be developed

**Purpose:**

**Contents:**

## 3.8 Performance

**Title:**

Asia/Pacific Technical Document on ATN Performance.

**Latest Version:** To be developed

**Purpose:**

**Contents:**

## 3.9 System Integrity

**Title:**

Asia/Pacific Policy for ATN System Integrity.

**Latest Version:** To be developed

**Purpose:**

**Contents:**

## 3.10 ATN G/G Router ICD

**Title:**

Asia/Pacific Regional Interface Control Document for ATN Ground to Ground Router for ISO/IEC 8208 sub network.

**Latest Version:** Version 1.0

**Purpose:**

This document provides ICD for interconnecting ATN G/G routers between states/organizations for ISO/IEC 8208 sub network.

**Contents:**

Subjects covered by the document:

- ATN G/G Router Overview.
- Physical Layer.

- Data Link Layer.
- Network Layer.

## 3.11 ATN A/G Router ICD

**Title:**

Asia/Pacific Regional Router Interface Control Document for ATN Air to Ground Router.

**Latest Version:** To be developed

**Purpose:**

**Contents:**

## 3.12 ATN Ground-Ground Transition Plan

**Title:**

ASIA/PAC ATN Transition Plan.

**Latest Version:** 1.0

**Purpose:**

This document describes the transition activities that are to be performed by States in the region for a coordinated migration from AFTN to the new ATN environment.

**Contents:**

Subjects covered by the document:

- Existing ground infrastructure.
- ATN End system applications.
- ATN Traffic, both ground-ground and air-ground communication paths.
- ATN routing architecture.
- ATN backbone trunks.
- Interconnection of ATN routers.
- Transition activities.

**Remarks:**

Subsequent to discussions stemming from the CNS/MET SG/5 meeting much of the document's contents has been included into the CNS FASID. This document will under go no further revisions.

## 3.13 ATN Routing Architecture

**Title:**

Asia/Pacific ATN Routing Architecture.

**Latest Version:** 1.0

**Purpose:**

This document presents the routing architecture for the ground-ground infrastructure to eventually replace the existing AFTN. It is intended that this architecture will also be suitable for the accommodation of the air-ground communications traffic at some later time.

**Contents:**

Subjects covered by the document:

- Routing Domain Fundamentals.
- Router Fundamentals.
- Asia/Pacific regional routing architecture.
- Routing domains.
- ATN Transition.

## *3.14 ATN NSAP Addressing Plan*

**Title:**

Asia/Pacific ATN Addressing Plan.

**Latest Version:** 1.0

**Purpose:**

This document presents recommendations for the assignment of ATN NSAP addresses within the region. It also defines the methods by which values are assigned to each field of the NSAP Address and specifies the assumptions upon which the addressing format has been defined.

**Contents:**

Subjects covered by the document:

- NSAP Address structure to be adopted by states of the Asia/Pacific Region.
- Recommendations for the values of each field of the NSAP address.
- Authority responsible for NSAP field assignments.

## *3.15 AMHS Naming Plan*

**Title:**

Asia/Pacific AMHS Naming Plan.

**Latest Version:** 1.0

**Purpose:**

This document presents recommendations for the AMHS naming conventions to be adopted by AMHS users within the region.

**Contents:**

Subjects covered by the document:

- MF-Addressing scheme.
- XF-Addressing scheme.
- Conventions for use of MF-Addressing Format.
- Conventions for use of XF-Addressing Format.
- General use of X.400 O/R Addresses.

## *3.16 ATN NSAP Registration Form*

**Title:**

Asia/Pacific ATN NSAP Registration Form.

**Latest Version:** 1.0

**Purpose:**

This document specifies the information that is required for registration of devices that are to connect to the ATN environment within the Region.

**Contents:**

Subjects covered by the document:

- Registration of NSAP Addresses for ATN Routers and ATN End-System.
- Registration of Communication Circuits for ATN Routers and ATN End-Systems.

## *3.17 Guidance Material for Ground Elements in ATN Transition*

**Title:**

Guidance Material for Ground Elements in ATN Transition.

**Latest Version:** 2.0

**Purpose:**

This document contains guidance material for ATN transition planning within the Asia/Pacific region.

**Contents:**

Subjects covered by the document:

- ATN overview
  - Ground-ground service components.
  - Air-ground service components.
  - ATN security service.
  - ATN system management.
  - ATN directory.
- Planning Issues to be considered
  - ATM operational concept.
  - Transition planning.
  - Implementation planning.
  - Proposed regional planning activities for transition.
  - Proposed State planning activities for transition.
- Guidance material for ground based elements
  - Integration of new and existing infrastructure.
  - Message service definition, benefit and procedure in inter-domain operation.
  - Guidance for administrative domain definition.
  - Guidance for architectural design of ATN ground elements.
  - Connection for inter-domain operation and guidance material.
  - Identification of traffic type, quality of service with respect to inter-domain operation.
  - Performance issues of reliability, maintainability, and reliability with respect to inter-domain operation.
  - Transition paths and transitional procedure in inter-domain operation.
  - Cost analysis of ATN ground elements in transitional development for inter-domain operation.
  - ATN security solution.

## *3.18 AMHS ICD*

**Title:**

ICD for ATS Message Handling System (AMHS) in Asia/Pacific Region

**Latest Version:** 1.0

**Purpose:**

This ICD has been developed in order to facilitate interoperability between States in the deployment of AMHS within the Asia/Pacific region.

**Contents:**

Subjects covered by the document:

- AMHS functions.
- Network configuration.
- Protocol specification overview.
- AMHS specifications.
- Upper layer specifications.
- Lower layer specifications.
- AHMS PICS.

## *3.19 Facilities and Services Implementation Document (FASID)*

**Title:**

Facilities and Services Implementation Document.

**Latest Version:** To be advised.

**Purpose:**

This document contains elements of Part IV, CNS of the Asia/Pacific FASID.

**Contents:**

Subjects covered by the document:

- Table 1A, AFTN/Data Circuit Plan.
- Table 1B, ATN Router Plan.
- Table 1C, ATSMHS Routing Plan.
- Table 1D, AIDC Circuit Plan.

Appendix C to the Report

# Asia /Pacific
# ATN IDRP Routing Policy

**Prepared by:**
**Federal Aviation Administration**
**(ACB-250)**

**SUMMARY**

This paper is an update to the ATN IDRP Routing Policy for the Asia and Pacific region, which was presented at the previous meetings of the ATN Transition Task Force (ATNTTF) Ad Hoc Working Group B. This document incorporates general comments from previous task force meetings and includes diagrams to illustrate routing policies.

# Table of Contents

## Executive Summary

This document provides global policy for Aeronautical Telecommunication Network (ATN) routers operating in the Asia and Pacific Region in support of Air Traffic Services Message Handling Services (ATSMHS) and other ATN services.

### Background

The ATN Transition Task Force (ATNTTF) has been assigned a number of tasks to prepare the region for the introduction of the ATN. At the third meeting of the ATNTTF Working Group B meeting held in Bangkok, Thailand on 27 through 30 August 2001, a specific action item was identified to develop documentation on Routing Policy. This document is in response to that action.

### Overview

This document presents relevant background information on routing and provides a general discussion of policy-based routing. With this background, policy is specified for ATN routers in support of inter-regional, intra-regional and local connectivity.

# 1. INTRODUCTION

The Aeronautical Telecommunication Network Transition Task Force is preparing a series of documents, which will govern the introduction of the ATN into the Asia and Pacific region. This document is to be the basis of ATN routing policy for the region.

## 1.1 OBJECTIVES

The objective of this document is to specify global policy for Aeronautical Telecommunication Network (ATN) routers operating in the Asia and Pacific Region in support of Traffic Service Communications (ATSC) and Aeronautical Industry Service Communications (AINSC).

## 1.2 SCOPE

The scope of the document includes:

- An introduction to relevant routing concepts;
- An overview of the Inter-domain Routing Protocol (IDRP) and the rational for its use in the ATN
- Routing policy requirements for ATN routers in the Asia and Pacific Region.

## 1.3 REFERENCES

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

Reference 2 Asia/Pacific ATN Routing Architecture

Reference 3 ISO/IEC TR 9575, Information technology – Telecommunications and information exchange between systems – OSI Routeing Framework

Reference 4 ISO/IEC 10747, Information technology – Telecommunications and information exchange between systems – Protocol for Exchange of Inter-domain routeing Information among Intermediate Systems to Support Forwarding of ISO 8473 PDUs.

Reference 5 Asia/Pacific ATN Addressing Plan

## 1.4 TERMS USED

***Backbone Router*** – A backbone router (in the Asia and Pacific region) is a Class 4 Ground/Ground ATN router which has been designated by the operating state/organization to provide an appropriate level of performance and support the routing policies for inter-regional and intra-regional connectivity, and whose operation as a

backbone router has been approved by the ICAO regional office as agreed-to by all other member states/organizations.

***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)*** – Point within the ISO protocol architecture at which global end users may be uniquely addressed on an end-to-end basis.

***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.

## 1.4 ROUTING CONCEPTS

In this document the primary concern is routing through the ATN at the network layer. In order to establish a common framework, certain fundamental concepts are described. See Reference 3 for more detailed information.

The routing process in any network involves a forwarding function and a route maintenance function. Forwarding refers to those actions, which result in actual relaying of network packet data units (NPDUs) through nodes in the network. From a simplified perspective, forwarding is the process of accepting an incoming NPDU, accessing the routing database to determine the next network node or locally attached system, and sending the NDPU on to that node or system. Route maintenance refers to the update of the routing database. Route maintenance may be static, in which case, it is performed through management operations in either an on-line or off-line mode, or it may be dynamic (also known as adaptive routing). Dynamic route maintenance involves the exchange of routing packet data units (RPDUs). RPDUs may be received from a single source such as a Network Control Center, in which case, routing is said to be centralized. Alternatively, RPDUs may be exchanged among the nodes in a network, in which case routing is said to be distributed. See Figure 2-1. In the ATN a distributed adaptive routing procedure is adopted.

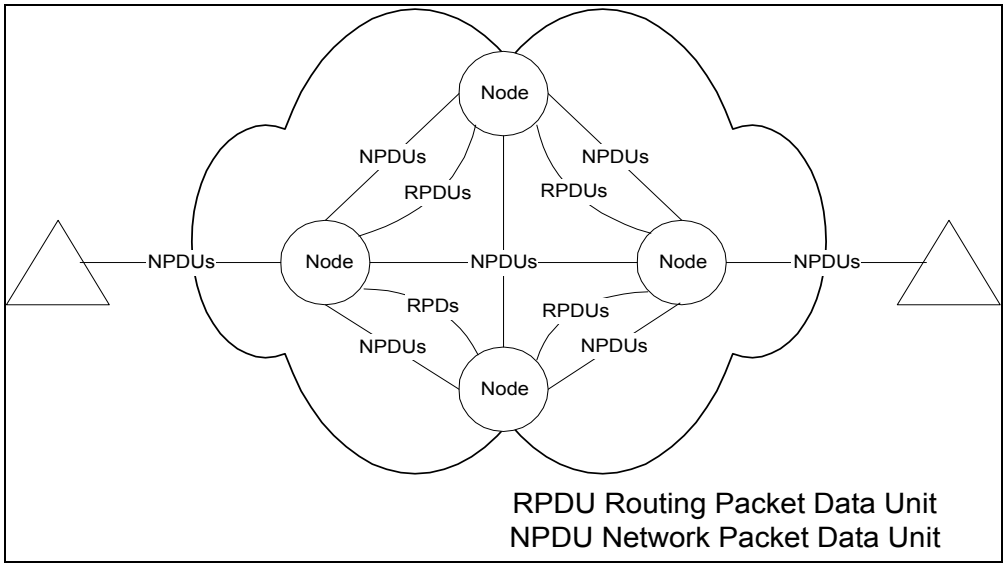



**Figure 2-1. Exchange of NPDUs and RPDUs in Generic Network Environment**

The route maintenance and forwarding functions under a distributed adaptive routing procedure are depicted generically in Figure 2-2. The routing database is partitioned into a Routing Information Base, which is the primary concern of the Route Maintenance Function, and a Forwarding Information Base, which is the primary concern of the Forwarding Function. The Route Maintenance and Forwarding Functions are conceptually connected through a Decision Process. The Decision Process determines:

1. Which routes are accepted into the Routing Information Base,
2. Which routes are placed into the Forwarding Information Base in support of the forwarding function, and
3. Which routes are to be advertised to other nodes in the network.

As will be described in more detail below, the decision process is affected by policy.

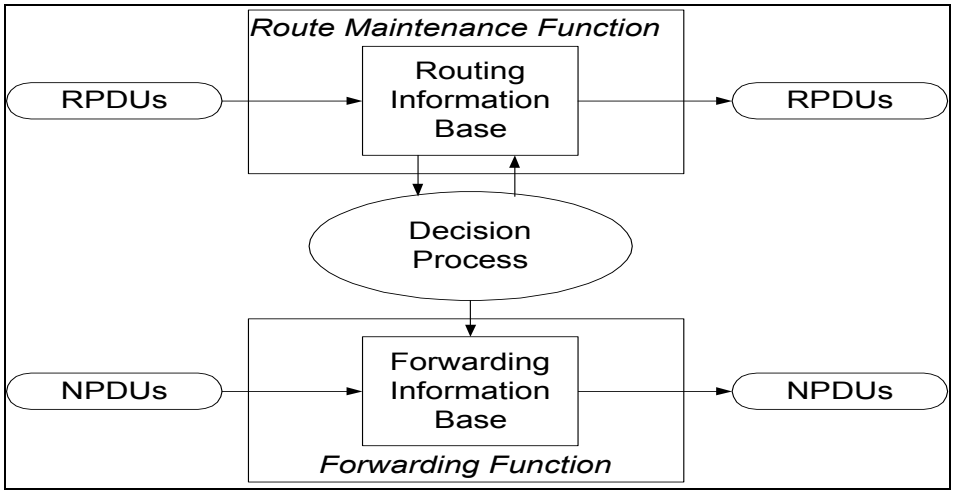



**Figure 2-2 Generic Routing Functions**

## 1.5 INTER-DOMAIN ROUTING PROTOCOL (IDRP)

In this section the rational for the use of IDRP in the ATN is summarized. The three general reasons for using IDRP are support for mobility, support for policy-based routing, and support for secure exchange of routing information.

### 1.5.1 SUPPORT FOR MOBILITY

A fundamental objective of the ATN is to maintain connectivity from ground-based ATSC and AINSC end systems to their airborne counterparts. This is to be accomplished over multiple subnetworks, that is, over the various VHF Digital Links, over Mode_S and over AMSS. This objective is essentially a routing problem. If we consider the general approaches to routing, it is immediately obvious that static routing would not work. This is because routes to an aircraft are inherently dynamic, that is, aircraft traverse multiple subnetworks and within each subnetwork they traverse multiple ground stations. Thus we are left with some type of adaptive routing. A centralized approach to adaptive routing has the problem that the central control center where changes would be reported becomes a bottleneck, especially in a global environment. Even if enough capacity could be provided, there are associated timing considerations, that is, a reported change in an aircraft's location must be available to communicating ground systems in real time. There are also administrative considerations with centralized adaptive routing. These considerations include determining which administration (a particular CAA, service provider, etc.) would operate the central control center and what are the liabilities associated with such an operation. Accordingly, since neither static routing nor centralized adaptive routing would be appropriate, we are led to some type of distributed adaptive routing approach as the solution to mobility.

There are two general approaches to distributed adaptive routing. The first is called *link state* routing and the second is called *distance vector* routing. Under link state routing, each change in the network topology (in connectivity to an aircraft in the context of support for mobility) is broadcast to every other node in the network. Upon receipt of each change message, each node updates its image of the network topology and calculates the complete (shortest) path to the destination in the change message. The main problem with this approach is that the number of messages required to report changes in network topology becomes quite large in a global environment. Thus we arrive at a distance vector approach to distributed adaptive routing approach in the ATN. Under distance vector routing, a change in connectivity is propagated (i.e., advertised) to affected ATN routers throughout the network. The RPDU consists of a vector containing a destination prefix and a distance metric, which is generically a measure of the cost associated with the path being advertised to a particular destination.[1] The difference

[1] In the context of the OSI Routeing Framework (Reference 3) IDRP would be classified as a distance vector routing protocol. However, in the technical literature, IDRP is often called *path vector* routing protocol. This is because IDRP can advertise multiple metrics called path attributes associated with a particular route to a destination rather than a single distance metric.

however (from link state routing) is that not all routers need be affected. In other words, not every router needs to know about every change. Particular changes need only be propagated to a point where a choice of routes is to be made. Beyond that point either an aggregate route may be advertised to other routers or these routers may be configured with a default path to that point. For example, a service provider with a ground-ground router connected to a CAA's ATN router on one side and with connections to multiple service provider air-ground routers on the other side may not need to advertise a new route each time an aircraft connects to a new air-ground router. The service provider ground-ground router may rather only advertise an aggregate route to the ATN router when the aircraft connects with the first air-ground router and withdraw the aggregate route when the aircraft is no longer connected to any air-ground router. At the same time, non-backbone routers belonging to the CAA need not receive routes to individual aircraft but rather may be configured to forward all aircraft NPDUs to the backbone router.

### 1.5.2 SUPPORT FOR POLICY-BASED ROUTING

#### 1.5.2.1 IDRP Model of Operation

ATN routers execute a particular distributed adaptive routing protocol for route maintenance. The protocol is labeled IDRP, which stands for Inter-domain Routing Protocol (Reference 4). Figure 2-3 depicts a simplified model of IDRP route maintenance and CLNP forwarding.[2]

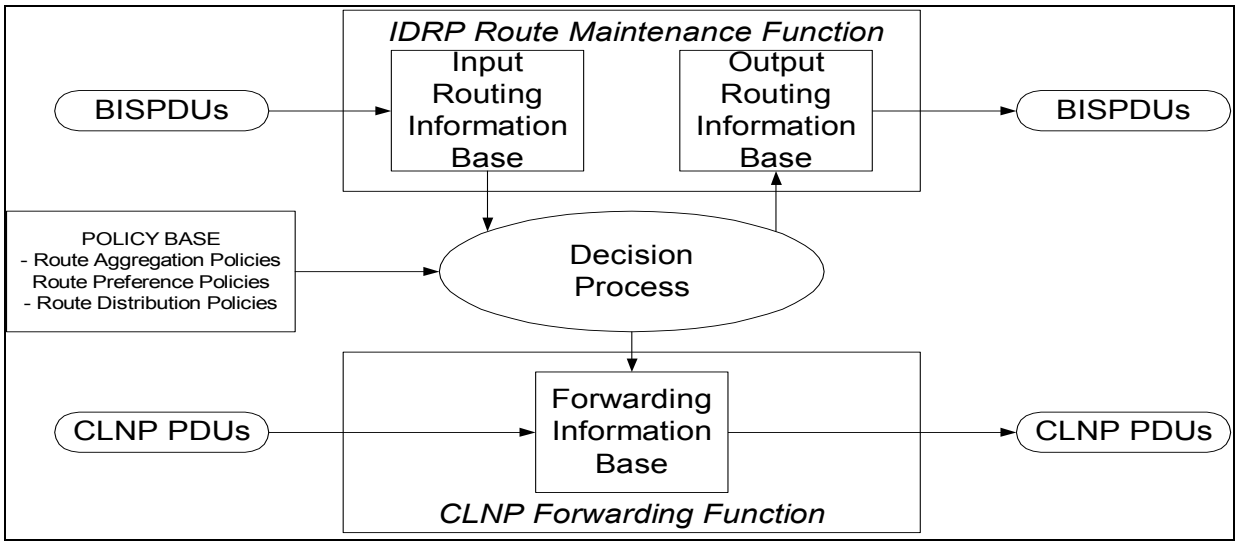



**Figure 2-3. IDRP Route Maintenance and CLNP Forwarding**

[2] The model of routing components in this document is a simplified form of the IDRP model. The IDRP specification (Reference 4) contains a more detailed model involving the concept of a multiple local RIBs for combinations of path attributes.

In the context of IDRP, an ATN router is a Boundary Intermediate System (BIS), and accordingly the routing PDUs exchanged are called BISPDUs. Similarly, in the context of CLNP, the forwarded NPDUs are called CLNP PDUs. As depicted in the figure and described in the following section, the IDRP decision process is conditioned by a policy base.

#### 1.5.2.2 Types of Policy

The IDRP decision process (and thus ATN routing policy) is conditioned by three types of policy concerns.

- *Route Aggregation* policies permit ATN routers to reduce the amount of routing information propagated throughout the ATN.
- *Route Preference* policies determine which routes received in BISBPUs will be installed in the Forwarding Information Base. Route preference policies thus determine which path an ATN router will select to forward CLNP NPDUs on.
- *Route Distribution* policies determine which routes an ATN router will advertise to other ATN routers. Route distribution policies are a key aspect of a domain's transit policy in that they determine which routes will be permitted in a domain. An ATN router will not propagate a route, which it does not wish to support. By selective advertisement of routing information ATN routers control the use of their own resources since other routers cannot choose a route they do not know about.

### 1.5.3 SUPPORT FOR SECURE EXCHANGE OF ROUTING INFORMATION

A final general advantage of using IDRP in the ATN is that it has a mechanism for the secure exchange of routing information. The mechanism takes advantage of a transport protocol built in to IDRP operation. When an IDRP connection is established (through the exchange of OPEN BISPDUs), the type of security to be applied to subsequent BISPDUs is signaled. In Edition 3 of the SARPs, procedures for performing *Type 2* authentication are specified. With type 2 authentication each ATN router can be assured that the routing updates it receives are from a peer ATN router whose identity has been confirmed using strong (cryptographic) authentication.

## 2. ROUTING POLICY GOAL FOR ATN ROUTERS

The ATN infrastructure and each region of the infrastructure must support a consistent set of routing policies to provide paths to ground systems at an inter-regional, intra-regional and local level and paths to airborne systems without an inordinate number of routing protocol updates. Accordingly, the detailed policy requirements and recommendations specified in section 4 are derived from the following general routing policy goal:

**a. Asia and Pacific region ATN routers will provide global shortest path connectivity with a minimal exchange of routing information.**

### 2.1 NETWORK ORGANIZATION FOR ROUTING TO GROUND SYSTEMS

For ground ATSC and AINSC applications the ATN infrastructure may be partitioned into various levels of organization. See Figure 3-1, which depicts routing domains supporting for three states in the Asia Region. Routing domains at the highest level are associated with an ICAO region. As depicted in Figure 3-1, the NSAP address prefix for ATSC applications in this region is 4700278181. Within a particular region, routing domains are next associated with a particular state or organization. Figure 3-1 depicts three arbitrary states (s1, s2, and s3). Note that in accordance with the regional addressing plan s1, s2, and s3 would actually be a two-byte field with the two ASCII characters assigned to the state or organization. Finally, within a particular state or organization there may be multiple local routing domains. Figure 3-1 depicts one routing domain in states s1 and s2 and three routing domains in state s2. Within this framework ATN ground routers may be characterized and their policy requirements specified according to the type of connectivity they have to adjacent ATN ground routers. ATN routers connecting to adjacent routers in another region are said to have "inter-regional" connectivity. ATN routers connecting to adjacent routers in another state or organization within a particular region are said to have "intra-regional" connectivity. ATN routers connecting to adjacent routers within a particular state or organization are said to have "local" connectivity, i.e. intra-state or intra-organizational connectivity.

### 2.2 NETWORK ORGANIZATION FOR ROUTING TO AIRBORNE SYSTEMS

For air-ground ATSC and AINSC applications the ATN it is useful to distinguish ground state domains from ground domains operated by Service Provider organizations. See Figure 3-1. This figure depicts two distinct Air-Ground subnetwork Service Provider domains, which are connected to the regional backbone. Note that a state may operate its own Air-Ground subnetwork, in which case the concepts that apply to Service Providers apply to the state-operated subnetwork.

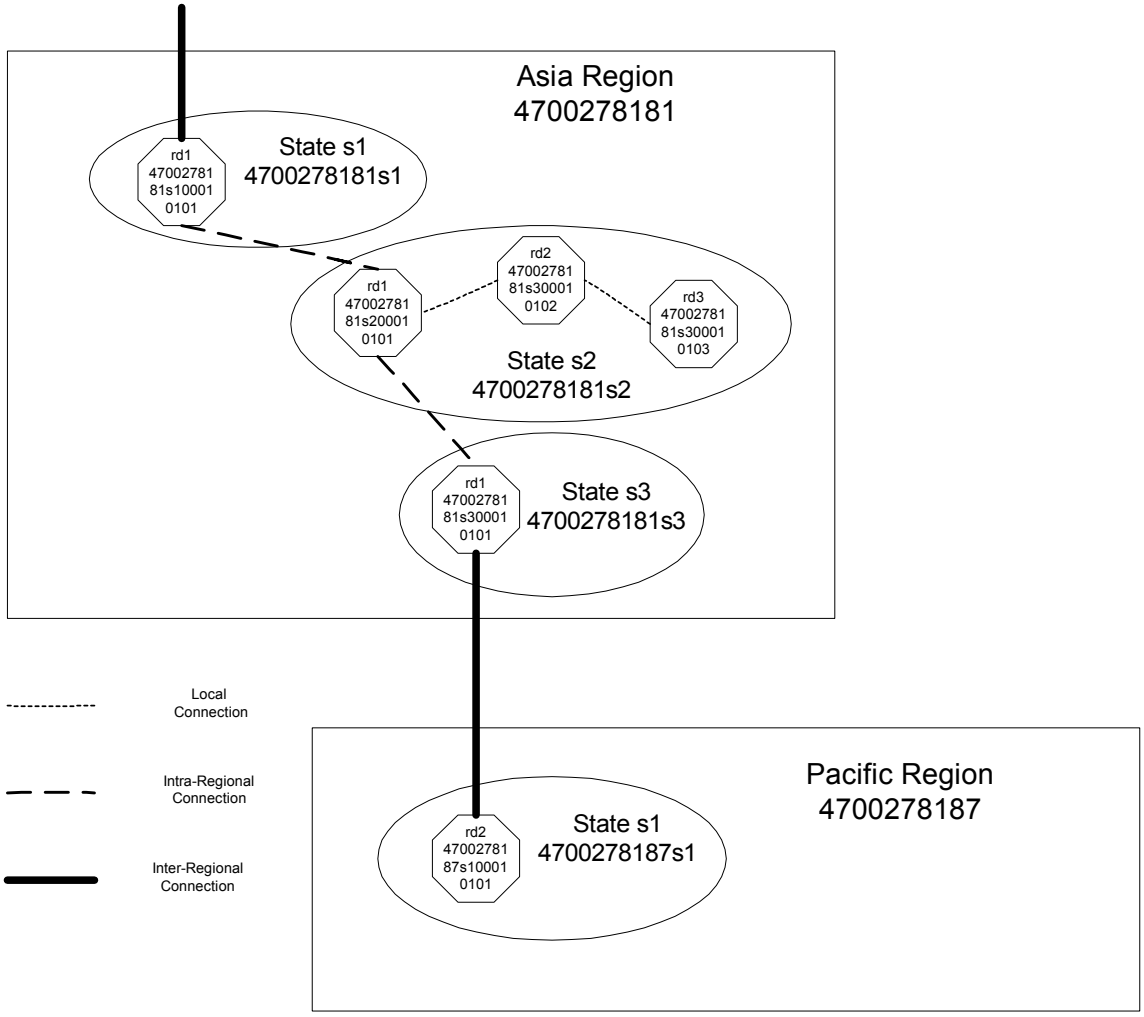



**Figure 3-1. Connectivity of Ground Routing Domains**

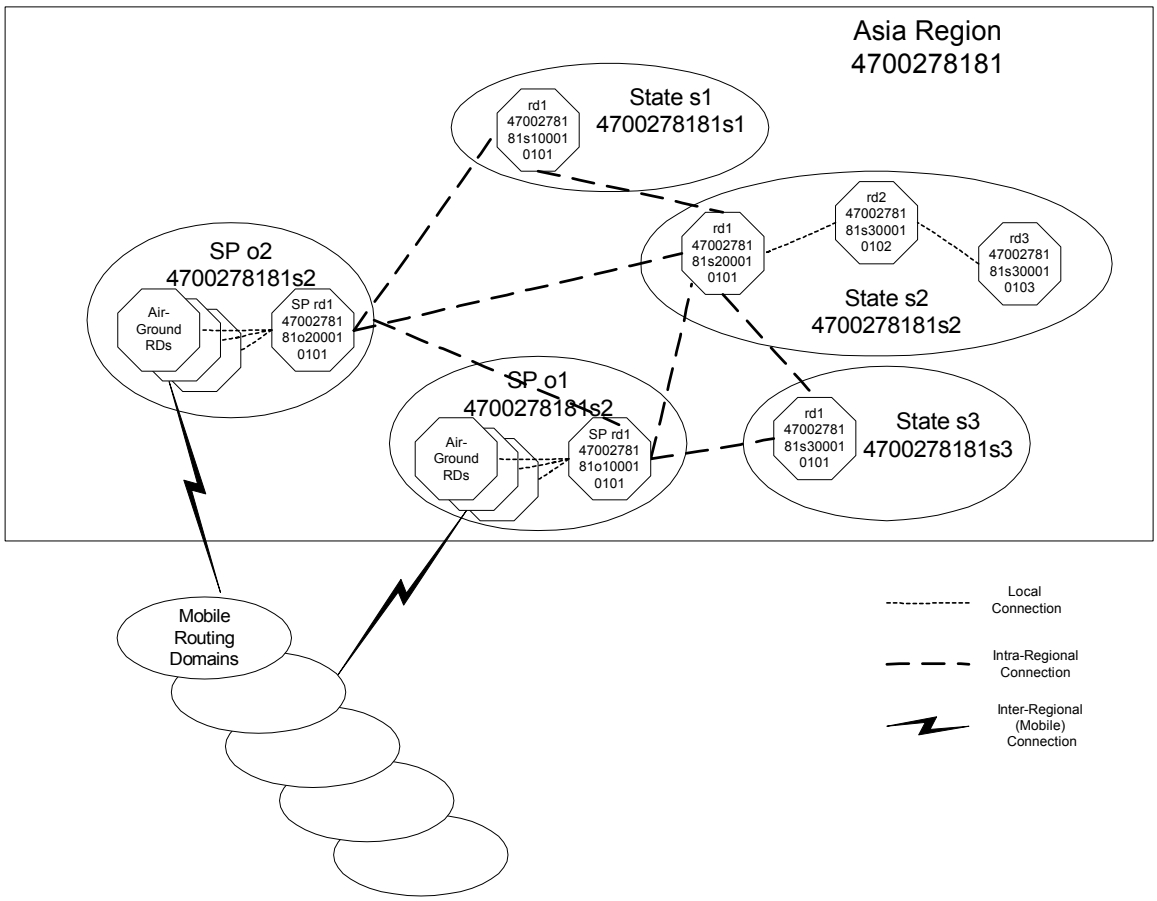



**Figure 3-2. Connectivity of Air-Ground Service Providers to Regional Backbone**

# 3. POLICY REQUIREMENTS FOR ATN ROUTERS

The policy for ATN routers in the Asia and Pacific region is specified in this section 4. The policy requirements are partitioned at a first level into policy for routes to ground (i.e., fixed) systems in section 4.1 and to policy for routes to airborne (i.e., mobile) systems in section 4.2. Within each of these first-level sections, policy requirements are next partitioned into policy for inter-regional routes, policy for intra-regional routes, and policy for local routes. Within these second-level sections policy requirements are partitioned at a third level according to the types of policy concerns identified in section 2.2, that is, policy requirements are partitioned at a third level into aggregation policies, preference policies, and distribution policies.

*Note 1. – This section specifies routing policy requirements for backbone routers in the Asia/Pacific region. A backbone router is a Class 4 Ground/Ground ATN router which has been designated by the operating state/organization to provide an appropriate level of performance and support the routing policies for inter-regional and intra-regional connectivity, and whose operation as a backbone router has been approved by the ICAO regional office as agreed-to by all other member states/organizations. This section also contains a number of recommended policies non-backbone routers.*

*Note 2. – This document and companion documents specify requirements for ATN routers in the "Asia/Pacific region"; however, from the perspective of the ATN NSAP Addressing Planthere is not a single "Asia/Pacific region" but rather there is a distinct Asia region and a distinct Pacific region each with a unique region identifier.*

## 3.1 POLICY FOR ROUTES TO GROUND SYSTEMS

### 3.1.1 GENERAL POLICY

a) If a backbone router receives multiple routes to an aggregate or specific destination, the route with the shortest path (i.e., lowest value of RD Hop Count) shall be selected.

b) All ATN routers in the Asia and Pacific shall authenticate the identity of peer ATN routers.

*Note. – Authentication may be accomplished via IDRP Type 2 Authentication as specified in Edition 3 of ICAO Doc 9705 or via local means via Bilateral Agreement between the responsible organizations.*

### 3.1.2 POLICY FOR INTER-REGIONAL AGGREGATE ROUTES TO GROUND SYSTEMS

Inter-regional route aggregation permits advertisement of a single aggregate route, which identifies all systems in an ICAO region. Aggregation at an inter-regional level refers to aggregating NLRI fields to an NSAP prefix up through the first octet of the ADM field. (Reference 5)

#### 3.1.2.1 Route Aggregation Policies for Inter-Regional Routes

a) Backbone routers with inter-regional connectivity shall be configured with aggregate routes to ground systems for ATSC and AINSC applications at an inter-regional level.

#### 3.1.2.2 Route Preference Policies for Inter-Regional Aggregate Routes

a) Backbone routers with inter-regional connectivity shall accept inter-regional aggregate routes to ground systems for ATSC and AINSC applications from adjacent ATN routers.

b) **Recommendation. -** Backbone routers with inter-regional connectivity should only accept inter-regional aggregate routes on these connections.

*Note 1. - A simple method is to not accept routes with an NSAP prefix longer than the first octet of the ADM field. An alternative is to only accept inter-regional aggregate routes, which have been pre-configured (using a so-called access control list).*

*Note 2. – This policy statement is a recommendation since in the future other routes such as routes to an airline's "home" routing domain may need to be supported.*

c) Backbone routers with intra-regional connectivity shall accept inter-regional aggregate routes to ground systems for ATSC and AINSC applications from adjacent ATN routers.

d) Backbone routers with local connectivity (i.e., intra-state or intra-organization) shall accept inter-regional aggregate routes to ground systems for ATSC and AINSC applications from adjacent ATN routers.

#### 3.1.2.3 Route Distribution Policies for Inter-Regional Aggregate Routes

a) Backbone routers with inter-regional connectivity shall distribute inter-regional aggregate routes to ground systems for ATSC and AINSC applications to adjacent ATN routers.

b) Backbone routers with intra-regional connectivity shall distribute inter-regional aggregate routes to ground systems for ATSC and AINSC applications to adjacent ATN routers.

c) Backbone routers with local connectivity shall distribute inter-regional aggregate routes to ground systems for ATSC and AINSC applications to adjacent ATN routers.

### 3.1.3 POLICY FOR INTRA-REGIONAL AGGREGATE ROUTES TO GROUND SYSTEMS

Intra-regional route aggregation permits advertisement of a single aggregate route, which identifies all systems in a particular state or organization of an ICAO region. Aggregation at an intra-regional level refers to aggregating NLRI fields to an NSAP prefix up through the complete ADM field. (Reference 5)

#### 3.1.3.1 Intra-Regional Route Aggregation Policies

a) Backbone routers with intra-regional connectivity shall be configured with aggregate routes to ground systems for ATSC and AINSC applications at an intra-regional level.

#### 3.1.3.2 Intra-Regional Route Preference Policies

a) Backbone routers with intra-regional connectivity shall accept intra-regional aggregate routes to ground systems for ATSC and AINSC applications from adjacent ATN routers.

b) **Recommendation.** Backbone routers with intra-regional connectivity should only accept inter-regional or intra-regional aggregate routes on these connections.

c) Backbone routers with local connectivity shall accept intra-regional aggregate routes to ground systems for ATSC and AINSC applications from adjacent ATN routers.

d) **Recommendation.** Non-Backbone routers with local connectivity accept intra-regional aggregate routes to ground systems for ATSC and AINSC applications from adjacent ATN routers.

#### 3.1.3.3 Intra-Regional Route Distribution Policies

a) Backbone routers with intra-regional connectivity shall distribute intra-regional aggregate routes to ground systems for ATSC and AINSC applications to adjacent ATN routers.

b) Backbone routers with local connectivity shall distribute intra-regional aggregate routes to ground systems for ATSC and AINSC applications to adjacent ATN routers.

c) **Recommendation.** Non-Backbone routers with local connectivity should distribute intra-regional aggregate routes to ground systems for ATSC and AINSC applications to adjacent ATN routers.

### 3.1.4 POLICY FOR AGGREGATE ROUTES TO GROUND SYSTEMS FOR DISTINCT ROUTING DOMAINS WITHIN A STATE/ ORGANIZATION

Distinct Routing Domain-level aggregation permits advertisement of a single aggregate route, which identifies all systems in a specific routing domain of a particular state or organization of an ICAO region. Aggregation at this level refers to aggregating NLRI fields to an NSAP prefix up through the complete ARS field. (Reference 5) ATN routers connecting to adjacent routers within a particular state or organization, i.e., with intra-state or intra-organizational connectivity, are said to have “local” connectivity.

#### 3.1.4.1 Distinct Routing Domain Route Aggregation Policies

a) **Recommendation.** ATN routers serving individual routing domains should be configured with aggregate routes to all ground systems for ATSC and AINSC applications.

#### 3.1.4.2 Distinct Routing Domain Route Preference Policies

a) **Recommendation.** ATN routers with local connectivity should accept state/organizational-level aggregate routes to ground systems for ATSC and AINSC applications from adjacent ATN routers within the same state or organization.

#### 3.1.4.3 Distinct Routing Domain Route Distribution Policies

a) **Recommendation.** ATN routers with local connectivity should distribute state/organizational-level aggregate routes to ground systems for ATSC and AINSC applications to adjacent ATN routers within the same state or organization.

### 3.2 POLICY FOR ROUTES TO AIRBORNE SYSTEMS

### 3.2.1 POLICY FOR AGGREGATE ROUTES TO AIRBORNE SYSTEMS

Aggregation of routes to airborne (i.e. mobile) systems permits advertisement of a single aggregate route to airborne systems rather than advertisement of individual routes to each airborne system. Aggregation of routes to mobile systems may occur at a coarse level to "all mobile" or may occur at a "home domain" level of all aircraft belonging to an airline or the General Aviation aircraft of a given country of registration.

#### 3.2.1.1 Route Aggregation Policies for Routes to Airborne Systems

a) **Recommendation. -** ATN routers in an Air-Ground subnetwork with intra-regional connectivity (to the regional backbone routers) should be configured with aggregate routes to airborne systems for ATSC and AINSC applications at a "home domain" level.

*Note –The basic assumption of this recommendation is there are multiple service providers operating in a region and that an airline will contract with one service provider as the primary provider of air-ground service and optionally contract with a second service provider for back-up service. It is also assumed that the state is not operating its own air-ground subnetwork in which case it may be preferred to receive routing updates for individual aircraft.*

b) **Recommendation. -** ATN routers in the regional backbone with local connectivity should be configured with aggregate routes to airborne systems for ATSC and AINSC applications at an "all mobile" level.

#### 3.2.1.2 Route Preference Policies for Routes to Airborne Systems

a) **Recommendation. -** ATN ground routers in the regional backbone with intra-regional connectivity to ATN routers in an Air-Ground subnetwork should accept aggregate routes to airborne systems for ATSC and AINSC applications from adjacent ATN routers at a "home domain" level.

b) **Recommendation. -** ATN ground routers with local connectivity to ATN routers should accept aggregate routes to airborne end systems for ATSC and AINSC applications from adjacent ATN routers at an "all mobile" level.

#### 3.2.1.3 Route Distribution Policies for Routes to Airborne Systems

a) **Recommendation. -** ATN ground routers with intra-regional connectivity to ATN routers should distribute aggregate routes to airborne systems for ATSC and AINSC applications at a "home domain" level to adjacent ATN ground routers.

b) **Recommendation.** ATN ground routers with local connectivity to ATN routers should distribute aggregate routes to airborne systems for ATSC and AINSC applications at an "all mobile" level to adjacent ATN ground routers.

### 3.3 LOCAL STATE/ORGANIZATIONAL ROUING POLICYS

Individual states/organizations may have additional routing policies consistent with the above general policies for routes to ground systems and airborne systems. Such policies may include various local preferences or Quality of Service based routing, for example, routing based on line error rates, expense, delay, capacity, and priority.

# 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:<br>BBIS - Backbone Boundary Intermediate System<br>BIS - Boundary Intermediate System |
| 4 | Type of Interconnection:<br>Inter – Regional<br>Intra – Regional<br>Sub – Regional |
| 5 | Interconnection, Connected to router of: name of the 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 |
| 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 | Sub-Regional | United States | 9600bps | X.25 | 2005 | |
| **Australia** | Brisbane | BIS | Sub-Regional | East Timor | 9600 bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Fiji | 9600bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Indonesia | 9600bps | X.25 | 2005 | |
| | | BBIS | Intra-Regional | Japan | 64000bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Nauru | 9600bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | New Zealand | 9600bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Papua New Guinea | 9600bps | X.25 | 2005 | |
| | | BBIS | Intra-Regional | Singapore | 64000bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Solomon Islands | 9600bps | X.25 | 2005 | |
| | | BBIS | Inter-Regional | United States | 64000bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Vanuatu | 9600bps | X.25 | 2005 | |
| **Bangladesh** | Dhaka | BIS | Sub-Regional | India | 9600bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Thailand | 9600bps | X.25 | 2005 | |
| **Bhutan** | Paro | BIS | Sub-Regional | India | 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 |
| **Brunei Darussalam** | Brunei | BIS | Sub-Regional | Malaysia | 9600bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Singapore | 9600bps | X.25 | 2005 | |
| **Cambodia** | Phnom Penh | BIS | Sub-Regional | Thailand | 9600bps | X.25 | 2003 | |
| **China** | Beijing | BIS | Sub-Regional | DPR Korea | 9600bps | X.25 | 2005 | |
| | | BBIS | Intra-Regional | Hong Kong, China | 64000bps | X.25 | 2005 | |
| | | BBIS | Intra-Regional | India | 64000bps | X.25 | 2005 | |
| | | BBIS | Intra-Regional | Japan | 64000bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Macau, China | 9600bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Mongolia | 9600bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Myanmar | 9600bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Nepal | 9600bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Pakistan | 9600bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Republic of Korea | 9600bps | X.25 | 2005 | |
| | | BBIS | Inter-Regional | Russian Federation | 19200bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Taibei | 9600bps | X.25 | 2005 | |
| | | BBIS | Intra-Regional | Thailand | 64000bps | X.25 | 2005 | |
| | Taibei | BIS | Sub-Regional | Hong Kong, China | 9600bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Japan | 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 |
| **Hong Kong, China** | Hong Kong | BBIS | Intra-Regional | China | 64000bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Macau, China | 9600bps | X.25 | 2005 | |
| | | BBIS | Intra-Regional | Japan | 64000bps | X.25 | 2004 | |
| | | BIS | Sub-Regional | Philippines | 9600bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Taibei | 9600bps | X.25 | 2005 | |
| | | BBIS | Intra-Regional | Thailand | 64000bps | X.25 | 2003 | |
| | | BIS | Sub-Regional | Viet Nam | 9600bps | X.25 | 2005 | |
| **Macau, China** | Macau | BIS | Sub-Regional | China | 9600bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Hong Kong, China | 9600bps | X.25 | 2005 | |
| **Cook Islands** | Rarotonga | BIS | Sub-Regional | New Zealand | 9600bps | X.25 | 2005 | |
| **DPR Korea** | Pyongyang | BIS | Sub-Regional | China | 9600bps | X.25 | 2005 | |
| **East Timor** | Dili | BIS | Sub-Regional | Australia | 9600bps | X.25 | 2005 | |
| **Fiji** | Nadi | BBIS | Sub-Regional | Australia | 9600bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Kiribati | 9600bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | New Caledonia | 9600bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Tuvalu | 9600bps | X.25 | 2005 | |
| | | BBIS | Inter-Regional | United States | 9600bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Wallis Islands | 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 |
| **French Polynesia** | Papeete | BIS | Sub-Regional | New Zealand | 9600bps | X.25 | 2005 | |
| **India** | Mumbai | BIS | Sub-Regional | Bangladesh | 9600bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Bhutan | 9600bps | X.25 | 2005 | |
| | | BBIS | Intra-Regional | China | 64000bps | X.25 | 2005 | |
| | | BBIS | Inter-Regional | Kenya | 19200bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Nepal | 9600bps | X.25 | 2005 | |
| | | BBIS | Inter-Regional | Oman | 19200bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Pakistan | 9600bps | X.25 | 2005 | |
| | | BBIS | Intra-Regional | Singapore | 64000bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Sri Lanka | 9600bps | X.25 | 2005 | |
| | | BBIS | Intra-Regional | Thailand | 64000bps | X.25 | 2005 | |
| **Indonesia** | Jakarta | BIS | Sub-Regional | Australia | 9600bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Singapore | 9600bps | X.25 | 2005 | |
| **Japan** | Tokyo | BBIS | Intra-Regional | Australia | 64000bps | X.25 | 2005 | |
| | | BBIS | Intra-Regional | China | 64000bps | X.25 | 2005 | |
| | | BBIS | Intra-Regional | Hong Kong, China | 64000bps | X.25 | 2004 | |
| | | BBIS | Inter-Regional | Europe | 64000bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Republic of Korea | 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 |
| **Japan (Cont'd)** | Tokyo | BIS | Sub-Regional | Republic of Korea | 9600bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Republic of Korea | 9600bps | X.25 | 2005 | |
| | | BBIS | Inter-Regional | Russia Federation | 64000bps | X.25 | 2005 | |
| | | BBIS | Intra-Regional | Singapore | 64000bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Taibei | 9600bps | X.25 | 2005 | |
| | | BBIS | Inter-Regional | United States | 64000bps | X.25 | 2004 | |
| **Kiribati** | Tarawa | BIS | Sub-Regional | Fiji | 9600bps | X.25 | 2005 | |
| **Lao PDR** | Vientiane | BIS | Sub-Regional | Thailand | 9600bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Viet Nam | 9600bps | X.25 | 2005 | |
| **Malaysia** | Kuala Lumpur | BIS | Sub-Regional | Brunei | 9600bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Singapore | 9600bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Thailand | 9600bps | X.25 | 2005 | |
| **Maldives** | Male | BIS | Sub-Regional | Sri Lanka | 9600bps | X.25 | 2005 | |
| **Marshall Islands** | Majuro | BIS | Inter-Regional | United States | 9600bps | X.25 | 2005 | |
| **Micronesia Federated State of** | Chuuk | BIS | Inter-Regional | United States | 9600bps | X.25 | 2005 | |
| | Kosrae | BIS | Inter-Regional | United States | 9600bps | X.25 | 2005 | |
| | Ponapei | BIS | Inter-Regional | United States | 9600bps | X.25 | 2005 | |
| | Yap | BIS | Inter-Regional | United States | 9600bps | X.25 | 2005 | |
| **Mongolia** | Ulaanbaatar | BIS | Sub-Regional | China | 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 |
| **Myanmar** | Yangon | BIS | Sub-Regional | China | 9600bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Thailand | 9600bps | X.25 | 2005 | |
| **Nauru** | Nauru | BIS | Sub-Regional | Australia | 9600bps | X.25 | 2005 | |
| **Nepal** | Kathmandu | BIS | Sub-Regional | China | 9600bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | India | 9600bps | X.25 | 2005 | |
| **New Caledonia** | Noumea | BIS | Sub-Regional | Fiji | 9600bps | X.25 | 2005 | |
| **New Zealand** | Christchurch | BIS | Sub-Regional | Australia | 9600bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Cook Is | 9600bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Fiji | 9600bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | French Polynesia | 9600bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Niue | 9600bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Tonga | 9600bps | X.25 | 2005 | |
| **Niue Islands** | Niue | BIS | Sub-Regional | New Zealand | 9600bps | X.25 | 2005 | |
| **Pakistan** | Karachi | BIS | Sub-Regional | China | 9600bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | India | 9600bps | X.25 | 2005 | |
| **Palau** | Koror | BIS | Inter-Regional | United States | 9600bps | X.25 | 2005 | |
| **Papua New Guinea** | Port Moresby | BIS | Sub-Regional | Australia | 9600bps | X.25 | 2005 | |
| **Philippines** | Manila | BIS | Sub-Regional | Hong Kong, China | 9600bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Singapore | 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 |
| **Republic of Korea** | Seoul | BIS | Sub-Regional | China | 9600bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Japan | 9600bps | X.25 | 2005 | |
| **Samoa** | Apia | BIS | Inter-Regional | United States | 9600bps | X.25 | 2005 | |
| **Singapore** | Singapore | BBIS | Intra-Regional | Australia | 64000bps | X.25 | 2005 | |
| | | BBIS | Inter-Regional | Bahrain | 19200bps | X.25 | 2005 | Updating AFTN by 2005 |
| | | BIS | Sub-Regional | Brunei | 9600bps | X.25 | 2005 | |
| | | BBIS | Intra-Regional | India | 64000bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Indonesia | 9600bps | X.25 | 2005 | |
| | | BBIS | Intra-Regional | Japan | 64000bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Malaysia | 9600bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Philippines | 9600bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Sri Lanka | 9600bps | X.25 | 2005 | |
| | | BBIS | Intra-Regional | Thailand | 64000bps | X.25 | 2005 | |
| | | BBIS | Inter-Regional | United Kingdom | 19200bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Viet Nam | 9600bps | X.25 | 2005 | |
| **Solomon Islands** | Honiara | BIS | Sub-Regional | Australia | 9600bps | X.25 | 2005 | |
| **Sri Lanka** | Colombo | BIS | Sub-Regional | India | 9600bps | X.25 | 2005 | 64 Kbps |
| | | BIS | Sub-Regional | Maldives | 9600bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Singapore | 9600bps | X.25 | 2005 | Already implemented 9600 bps circuit |

| 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 |
| **Thailand** | Bangkok | BIS | Sub-Regional | Bangladesh | 9600bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Cambodia | 9600bps | X.25 | 2003 | |
| | | BBIS | Intra-Regional | China | 64000bps | X.25 | 2005 | |
| | | BBIS | Intra-Regional | Hong Kong, China | 64000bps | X.25 | 2003 | |
| | | BBIS | Intra-Regional | India | 64000bps | X.25 | 2005 | |
| | | BBIS | Inter-Regional | Italy | 19200bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Lao PDR | 9600bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Malaysia | 9600bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Myanmar | 9600bps | X.25 | 2005 | |
| | | BBIS | Intra-Regional | Singapore | 64000bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Viet Nam | 9600bps | X.25 | 2005 | |
| **Tonga** | Tongatapu | BIS | Sub-Regional | New Zealand | 9600bps | X.25 | 2005 | |
| **Tuvalu** | Funafuti | BIS | Sub-Regional | Fiji | 9600bps | X.25 | 2005 | |
| **United States** | Oakland | BIS | Inter-Regional | American Samoa | 9600bps | X.25 | 2005 | |
| | | BBIS | Inter-Regional | Australia | 64000bps | X.25 | 2005 | |
| | | BIS | Inter-Regional | Fiji | 9600bps | X.25 | 2005 | |
| | | BBIS | Inter-Regional | Japan | 64000bps | X.25 | 2004 | |
| | | BIS | Inter-Regional | Marshall Islands | 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 |
| **United States (Cont'd)** | Oakland | BIS | Inter-Regional | Micronesia, Federated State of | 9600bps | X.25 | 2005 | |
| | | BIS | Inter-Regional | Palau | 9600bps | X.25 | 2005 | |
| | | BIS | Inter-Regional | Samoa | 9600bps | X.25 | 2005 | |
| **Vanuatu** | Port Vila | BIS | Sub-Regional | Australia | 9600bps | X.25 | 2005 | |
| **Viet Nam** | Ho-Chi-Minh | BIS | Sub-Regional | Hong Kong, China | 9600bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Lao PDR | 9600bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Singapore | 9600bps | X.25 | 2005 | |
| | | BIS | Sub-Regional | Thailand | 9600bps | X.25 | 2005 | |
| **Wallis Islands** | Wallis | BIS | Sub-Regional | Fiji | 9600bps | X.25 | 2005 | |


**INTERNATIONAL CIVIL AVIATION ORGANIZATION**
**ASIA AND PACIFIC OFFICE**

# DRAFT

# ASIA/PACIFIC REGIONAL GUIDANCE MATERIAL FOR THE USE OF THE PUBLIC INTERNET FOR THE AFTN

**ISSUE 1.0**

**JUNE 2003**

# CONTENTS

**EXECUTIVE SUMMARY**

This document presents the various issues that need to be addressed before implementing a system that uses the Public Internet to support low speed AFTN. These areas include conducting a safety case analysis that identifies risks and mitigation plans, ensuring that security measures are implemented in order to protect the integrity of the AFTN from external unauthorized sources. The use of appropriate logging and audit reporting required ensuring conformity and integrity of the service.

The document also covers the need for appropriate contract agreements to be put in place with end users to ensure that they do not abuse or allow the system to be misused.

Examples of a safety case and a contract agreement documents are also included in appendices to the document to illustrate the sort of subject matter that should be considered.

## 1 Introduction

The purpose of this document is to provide guidance for the use of the public Internet technology to support low speed AFTN, where required.

## 2 Purpose

There are a number of States where dedicated low speed AFTN facilities are either not available or unaffordable. Such stations have been receiving and sending AFTN by fax or phone.

The costs associated with using the above method are high because the connection calls are charged at ISD rates. The process also is labor intensive and may result in a higher than necessary workload for staff. Such stations are ideally suited for which this Internet type of service delivery is more convenient and economical until the operational requirement dictates a need for a dedicated AFTN/ATN links.

## 3 Assessment Process

There are several assessments that should be followed to ensure that the system is implemented in a safe and secure manner. These are outlined in the following sections.

### 3.1 Risk Assessment

Before considering the development and implementation of a system that utilizes the internet for delivery of AFTN, a * Safety Hazard Analysis must be conducted. The Safety Hazard Analysis should identify hazards and the risks associated with the hazards. Once the risks are identified they must be mitigated against. The following table illustrates the minimum hazards that will need addressing. Additional hazards may be realized depending on the situation.

| Safety Requirement | Hazards | Safety Requirement Explanation | Met/Yet to be met |
|---|---|---|---|
| 1. Customer contract specifications | 1. Risk of Customer of failure to receive data.<br>2. Risk to Customer due to corrupted or missing data.<br>3. Risk to Customer due to bogus data.<br>4. Risk to Customer due to delayed data<br>5. Risk to Customer due to flooding of data.<br>6. Risk to Customer due to messages sent to incorrect address<br>7. Risk to Customer due to Virus in system (internal or external generated).<br>9 Inbound messages. System failure or degraded operations from the Provider | Customers will be made aware, through the contract, of the limitations of this service due to outside ISP issues. This will include user contingency arrangements during outages or if corrupted data is received on a regular basis. | Met |
| 2. Anti-hacking strategy | 8. INBOUND- Hacking into System. | 1.URL for send screen - limited distribution- as per contract restrictions.<br>2. Must have registered user name & password.<br>3. A user name and password can not have duplicate sessions running at a time.<br>4. Access is through main | Met |

| Safety Requirement | Hazards | Safety Requirement Explanation | Met/Yet to be met |
|---|---|---|---|
| | | web server with an ASP page front end. Prevents direct TCP-IP connection from end-user to server.<br>5. AFTN Protocol (async) between switch and Server.<br>6. All IP addresses are logged. | |
| 3. Server parameters to limit number of incoming messages per minute | 8. Inbound Hacking into System | The AFTN/Internet Server parameter will limit the number of incoming messages from the customer to the server to a factor of 'X' messages at time. This factor will be checked over a period of mili- seconds to ensure the X factor is not reached | Met |
| 4. Encryption of data from customer | 8. Inbound Hacking into System | The system uses SSL (Secure Socket Layer) to encrypt any data sent from the user to the server. This ensures that the data sent from the user cannot be read.<br>SSL is used by the banking industry to secure transactions | Met |
| 5. HTML page | 10. Inbound - Incorrect users data received by The Provider | HTML pages are designed to ensure correct AFTN format for messages.<br><br>Use of preformatted templates eliminates errors in the AFTN message format. | met |
| 6. Users AFTN training | 10. Inbound - Incorrect users data received by system | All contracted users of the gateway will have been trained in AFTN message handling procedures or will be provided with appropriate training prior to using the system.<br>A user Operating procedures manual will also be provided for quick reference of the user. | Met |

* See Appendix A for an outline of a Hazard Analysis.

### 3.2 Security

To maintain the integrity of the AFTN the following security measures must be employed as a minimum to protect against abuse of the system by unauthorized user.

- The system server must maintain a database of authorized web users.
- Usernames and passwords must consist of no less than six alphanumeric characters and no greater than eight alphanumeric characters.
- Usernames and passwords must be treated confidentially in the same way as pin numbers are for bank cards. The security codes shall not be disclosed to any unauthorized user.
- There shall be only one user session allowed at one time for individual user accounts. Any attempt to logon to the system by more than one session for a user will result in that attempt being disallowed by the web server.
- The URL for the website must be hidden from public view. It is not to be published and no hyperlinks from home pages or other web sites are to be used allowed.
- The site must use a secure connection (Secure Sockets Layer or SSL protocol 128 bit encryption) utilising an SSL server.
- The user must type in the URL starting with 'https' otherwise the user will receive a message warning that 'https' must be used.
- Session authentication must be implemented on either the client (using cookies etc) or client and web server (session tracking).
- The web server must provide a 'lockout' facility that locks a web user out from the system when excessive amounts of AFTN messages have been received by a web user. This protects against flooding of the system by a potential hacker.
- The web server should be protected from direct exposure from the internet. The main ATC web server should direct any AFTN web requests to a middle proxy server which then on forwards requests to the AFTN web server. This protects the AFTN web server from direct TCP-IP connections from the Internet.
- Internet firewall protection shall be utilised.
- All transactions must be logged. IP addresses, user names and transaction information are to be logged for each transaction and time stamped by the web server.

### 3.3 Logging and Auditing

A system that supports AFTN over the internet must maintain a log of all the different types of transactions that occur between the server system and web user, mail server and AFTN switch. The following points indicate the various areas that system logging should cover.

- The system shall maintain an AFTN message transaction log file.
- The system must archive all received and transmitted AFTN messages for 30 days.
- The AFTN message transaction log file must contain the original message information that is received or transmitted by the system.
- Each transaction stored in the database must be time stamped with the server time.
- Each Web transaction stored must be stamped with the identification of the user (obtained from their original logon) and user IP address.
- Additional a system log shall be kept to store system related messages.

### 3.4 Formulation of Contract Agreements

Because there are security issues involved with setting up an internet based system that connects to the AFTN, *contractual agreements need to be formally established between the party supplying the AFTN Internet Gateway access and any external party's utilising the facility. These contract agreements are to be put in place with end users to ensure that they do not abuse or allow the system to be misused. When formulating a contract agreement besides the normal contractual information the contract must address the

following areas that are specific to setting up a system that allows access to AFTN via the internet.
The customer must:

- ensure that the services are only accessed from the designated sites;
- ensure that the procedures for AFTN circuit that conform to the requirements specified in International Standards and Recommended Practices, Annex 10 to the Convention on International Civil Aviation, are used at all times;
- not cause or authorize any Internet site to be linked with the AFTN Internet Gateway Internet sites without prior consent of the AFTN Internet Gateway provider;
- treat all Security Information as confidential and should not, without prior written consent of the provider, disclose the Security Information to any person (including persons within Its own organisation) or not use the security information for any purpose other than the purpose for which it is provided by the provide;
- ensure that only users at a Designated Site have access to, and knowledge of, the Security Information specific to that Site;

- lodge, through the Help Desk, a request for a new Security Information when the membership of a user group changes in any way;

* See Appendix B for an example of a Contract agreement.

# 4 System Recommendations

## 4.1 Acronyms

| | |
|---|---|
| AFTN | Aeronautical Fixed Telecommunications Network |
| AFTN Gateway | The gateway sever that provides the Internet email/web conversion between the AFTN switching device and the internet/intranet |
| ASP | Active Server Pages |
| ATS | Air Traffic Services |
| COOKIE | A small text file kept on the client computer that is used to track user's activity |
| CGI | Common Gateway Interface |
| CSN | Channel Sequence Number (AFTN Message CSN) |
| DTG | Date Time Group |
| GUI | Graphical User Interface |
| HTTP | Hypertext Transfer Protocol |
| IP | Internet Protocol |
| ISP | Public Internet Service Provider |
| ISD | International Subscriber Dialing |
| PC | Personal Computer |
| PERL | Program Language |
| SSL | Secure Sockets Layer protocol |
| TCP-IP | Transmission Control Protocol-Internet Protocol |

## 4.2 System software

The system should consist of the following software components:

- Operating system
- Web server
- Web server program to handle and process web form submissions (Eg: CGI, ASP, PERL etc)
- Program/s to handle AFTN switch to Email conversion and web form to AFTN format conversion including message error handling and logging.

## 4.3 Equipment Hardware Specifications

### 4.3.1 Hardware

The AFTN Gateway system hardware for the Operational System shall be Commercial off the Shelf (COTS).

The hardware should be proven hardware, which is demonstrably suitable for use in a critical system with the reliability requirements of the AFTN Gateway system.

It shall consist of at least the following minimum components:

(a) Pentiumn III CPU

(b) 264 Mb of RAM

(c) LAN Card.

(d) Two standard Serial Ports

(e) CD Drive.

(f) 20 G Hard Drive

The system shall consist of two servers, an on-line server and an off-line server.

The on-line server keeps an up to-date message database and is connected to both the AFTN and intranet/internet.

The off-line server is not connected to the AFTN or intranet/internet. It contains the same configuration information as the on-line server but the message database will not be current or may be empty.

Upon complete failure of the on-line server the AFTN and network connection may then be transferred to the backup server which will become on-line.

### 4.3.2 System Interfaces

- AFTN interface
- Optional station clock (UTC time reference)
- Network connection (TCP/IP) Internet/Intranet connectivity.

**AFTN Interface**

(a) interfaces to the AFTN through an asynchronous connection (RS232 port)

(b) ensures the availability of the connection both to and from the AFTN host;

(c) controls the flow of data to and from the AFTN host;

(d) receive messages from, and transmit messages to, the AFTN host;

(e) checks received AFTN message Channel Sequence Numbers (CSNs) for consistency;

(f) utilises SVC QTA MIS for missed messages;

(g) has the abilty to retrive transmitted missed message/s from the message database;

(h) provides transmission of CH messages every 20 minutes;

(i) should be able receive and process CH and test messages from the AFTN host;

**Optional Station Clock Interface**

(a) time synchronisation, be connected to the UTC time reference, interface to the Station Clock.

(b) In the absence of a station clock, the system clock shall have an accuracy of 10 seconds for a period of 1 week.

(c) The clock will be within 1 second of the station clock when the station clock is available.

**Network Interface**

(a) Controls the conection to the mailserver/internet

### 4.4 Reception of AFTN Web messages

The Web User interface consists of a series of web pages.

(a) A Web page for username and password verification and login.

(b) The AFTNGateway web site must have a number of web forms that allow the input of various types of standard ICAO AFTN messages FreeText ,FPL, ARR, CHG, DEP, CNL, DLA,EST, Notam, etc.

(c) The web site may also support AFTN message templates that can be saved and recalled at a later time.

(d) The origin address must be automatically generated based on user login.

(e) Upon reception of an AFTN web message the AFTNGateway server will insert the date time group (DTG) into the AFTN message.

(f) Form field validation must be supported on both the client side and server side.

(g) An AFTN Web form submission confirmation page, verifying receipt of web message at the web server.

(h) A number of Web pages the warn the user of logon errors, database errors etc.

(i) The AFTNGateway web server will generate a four (4) digit web sequence number that is associated with the AFTN message submitted that can be used to identify and track the message submited by individual AFTNGateway web users.

(j) The AFTNGateway web server will automatically generate a email as receipt message for the web user submission which will be sent to the web user as a record for the transaction.

(k) The web server must support Internet Explorer and Netscape browsers.

### 4.5 Transmission of AFTN Email messages

(a) The AFTNGateway server must provide a database with a table of AFTN to Email address translations.

(b) Email messages generated from AFTN messages will be allocated an individual Email Sequence Number for each user consisting of four (4) digits.

(c) There must be a provision for e-mail 'CH' messages to be sent to the user every 20 minutes.

(d) A change of day message must be sent at 0000 to all e-mail users notifying users of change of day and reset of e-mail sequence number back to one (0001).

(e) An AFTN SVC message shall be sent to the AFTN COM centre/station in the event that the AFTNGateway server cannot connect to the mail server.

(f) An AFTN SVC message shall be sent to the AFTN COM centre/station in the event that the AFTNGateway server cannot find an e-mail address for the AFTN address.

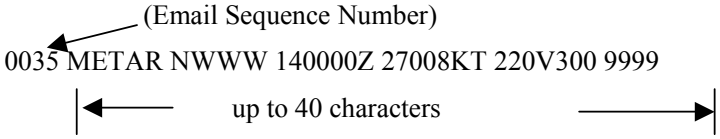
(g) The e-mail sequence number shall be reset at start of day.

(h) The e-mail sequence number shall be reset when the server is re-started.

(i) The sender field of the generated AFTN e-mail message shall be the e-mail address of the AFTN COM centre/station.

(j) The subject field of the generated AFTN e-mail message shall consist firstly of the four digit e-mail sequence number followed by up to forty character of the first line of text of the AFTN message.

Example:




(k) It is the responibility of the end user to check the email account for missed messages.

### 4.6 Security

(a) The AFTNGateway server must maintain a database of authorised web users.

(b) Usernames and passwords must consist of no less than six alphanumeric characters and no greater than eight alphanumeric characters.

(c) Usernames and passwords must be treated confidentially in the same way as pin numbers are for bank cards. The security codes shall not be disclosed to any unathorised user.

(d) There shall be only one user session allowed at one time for individual user accounts. Any attempt to logon to the system by more than one session for a user will result in that attempt being disallowed by the web server.

(e) The URL must be hidden for the AFTNGateway website. It is not to be published and no hyperlinks from home pages or other web sites are to be used allowed.

(f) The site must use a secure connection (Secure Sockets Layer or SSL protocol 128 bit encryption) utilising an SSL server.

(g) The user must type in the URL starting with 'https' otherwise the user will receive a message warning that 'https' must be used.

(h) Session authentication must be implemented on either the client (using cookies etc) or client and web server (session tracking).

(i) The AFTNGateway web server must provide a 'lockout' facility that locks a web user out from the system when excessive amounts of aftn messages have been received by a web user. This protects against flooding of the system by a potential hacker.

(j) The AFTNGateway web server should be protected from direct exposure from the internet. The main ATC web server should direct any AFTN web requests to a middle proxy server which then on forwards requests to the AFTNGateway web server. This protects the AFTNGateway web server from direct TCP-IP connections from the Internet.

(k) Internet firewall protection shall be utilised.

(l) All transactions must be logged. IP addresses, user names and transaction information are to be logged for each transaction and time stamped by the web server.

### 4.7 Archiving and Reviewing Data

(a) The AFTNGateway system shall maintain an AFTN message transaction log file.

(b) The AFTNGateway system must archive all received and transmitted AFTN messages for 30 days.

(c) The AFTN message transaction log file must contain the original message information that is received or transmitted by the AFTN Gateway system.

(d) Each transaction stored in the database must be time stamped with the AFTNGateway server time.

(e) Each Web transaction stored must be stamped with the identification of the user (obtained from their original logon) and user IP address.

**An example of the format of the AFTN message transaction log file is shown here:**

14/11/2001 00:10:19
---INCOMING---
THE FOLLOWING AFTN MESSAGE WAS RECEIVED:
TEE0002 140010
GG ABCDYSYX
140010 NWBBYMYX
SANC20 NWBB 140000
METAR NWWW 140000Z 27008KT 220V300 9999 SCT023 BKN056 30/21
Q1015
NOSIG=

14/11/2001 00:10:20
---OUTGOING---
EMAIL FOR Pacific FIS(Pacific@yahoo.com.au)
WITH SEQ NO OF 0002 SUCCESSFULLY SENT FOR FOLLOWING
AFTN MESSAGE:
TEE0002 140010
GG ABCDYSYX
140010 NWBBYMYX
SANC20 NWBB 140000
METAR NWWW 140000Z 27008KT 220V300 9999 SCT023 BKN056 30/21
Q1015 NOSIG=

The system must log user login and system information.

Examples of the format of these types of messages that may appear in the transaction log file are shown here:

8/11/2001 00:35:35
EMAIL Connect Failed
--- Welcome to a new day ---
Your last Email Sequence Number was 0023.
This message has reset your sequence number to 0001.

8/11/2001 00:37:45
AFTN PROCESS TERMINATED
---

8/11/2001 00:37:45
EMAIL PROCESS TERMINATED
---

8/11/2001 00:37:45
LOGGER PROCESS TERMINATED
---

8/11/2001 00:59:30
AFTN SVC Message - EMAIL NOW SENT AFTER PROBLEMS
SVC Message from AFTNGATEWAY.
Email with sequence number: 0023
was Successfully sent.

### 4.8 System Start up and Recovery

At system start up the AFTNGateway system shall automatically notify all users via e-mail that the system has been restarted and all user e-mail sequence number shall be reset to one (0001).

The following illustrates the contents of a typical e-mail restart message.

The system has RESTARTED.
Your last e-mail Sequence Number was 0356.
This message has reset your sequence number to 0001.

### 4.9 End User Equipment and software

- Standard PC
- Any email program or web based mail
- Internet Explorer or Netscape browser
- Email account dedicated to reception of AFTN messages

# APPENDIX A - USE OF AFTN OVER THE PUBLIC INTERNET HAZARD ANALYSIS

The following sections should be considered and included in the Hazard Analysis.

**INTRODUCTION**
**EXECUTIVE SUMMARY**
**SCOPE**
**CONFIGURATION DESCRIPTION**
- Provide a full description on how the system is to be configured.

**SYSTEM OPERATION**
- Provide details on how the system operation will work.

**ASSUMPTIONS**
- List all assumptions associated with how the system will be implemented.

**SAFETY REQUIREMENTS DERIVATION**
- State how the safety requirements were derived.

**SAFETY REQUIREMENTS**
- Outline the safety requirements identified for this system.

**DESIGN PROCESS**
- Outline the design process that will be applied to develop the system.
- This should include System Test Plans, Engineering Readiness Checklist, Operational Readiness checklist, Commissioning process and Service Agreements.

**DESIGN AUTHORITY**
- Identify who is the design authority for the system.

**STATUTARY AND REGULATORY REQUIREMENTS**
- Identify the regulations that will apply to various parts of the system.

**DEPENDENCIES, LIMITATIONS AND SHORTCOMINGS**
- List all dependencies, limitations and shortcomings that are known about the system.

**INSTALLATION, INTEGRATION COMMISSIONING AND TRANSITION INTO SERVICE PROCESS**
- Detail the process that will be followed for the installation, integration commissioning and transition into service criteria.

**OPERATION, MAINTENANCE AND PERFORMANCE MONITORING**
- Identify who will be carrying out the operation, maintenance and performance monitoring of the system.

**OPERATIONAL PROCEDURES**
- List the operational procedures documents that will be used to operate the system.

**ENGINEERING PROCEDURES**
- List the engineering procedures documents that will be used to maintain and manage the system.

**CHANGE CONTROL**
- Identify the change control process that will be used to manage the configuration and engineering changes to the system.

**SUPPORT**
- Identify the support arrangements that will be put in place to manage and maintain the support of the system.

**STAFF**
- Identify the staff responsible for supporting the system and their level of technical certification for the system.

**CONCLUSION**
- List the conclusions about whether or not the system is low risk to the safety of the National Airways System and that all risks identified have been mitigated to a reasonable level that is practical.

**REVIEW**

- Identify if a review of the hazard analysis will be ongoing and if so the period in which a review must take place.

**APPENDIX A - Hazard Report**

- Contains the detail report on the hazards that have been identified and the plan on how they will be mitigated, the safety requirements and the effect on customers and operations.
- The report may be in the form of a table as shown below.

**Project** *The Project Name*

**Status:** Active

| Description | Hazard Initiation | Mitigation Plans | Effect | Safety Requirement | Comments |
|---|---|---|---|---|---|
| | | | | | |

**APPENDIX B - Safety Management and Methodology**

- Contains the methodology in how the safety management process works in your organisation.

# APPENDIX B – EXAMPLE OF A CONTRACT AGREEMENT

**THE PROVIDER'S NAME**

**THE USER'S NAME**

**[Product Name] AGREEMENT**

AGREEMENT made **BETWEEN**

**The Provider**

**AND:**

**The User ('You')**

1. **INTRODUCTION**
2. **DEFINITIONS**
3. **TERM OF CONTRACT**
4. **PROVISION OF THE SERVICES**
5. **RESPONSIBILITIES OF THE CUSTOMER**
6. **FEE**
7. **TAXES**
8. **INTELLECTUAL PROPERTY**
9. **LIABILITY**
10. **LIMITATION OF LIABILITY**
11. **SECURITY INFORMATION**
12. **IMMEDIATE TERMINATION**
13. **TERMINATION FOR CONVENIENCE**
14. **FORCE MAJEURE (such as** The Provider will not be liable for any loss, damage, expense or charge of any kind for failure to perform the Services due to any event beyond its reasonable control, such events to include, but not be limited to, unsuitable weather conditions; fire; storm, flood, earthquake or any other Act of God; labour dispute or transportation embargo; act or omission of a government or other competent authority; viruses, catastrophic hardware failures, usage spikes, attacks on The Provider servers, an inability to transit or receive information over the Internet, and changes to any laws or regulations or the making of any legally enforceable orders frustrating the effectual performance of this Contract**)**
15. **PRESERVATION OF RIGHTS**
16. **ASSIGNMENT AND NOVATION**
17. **ENTIRE CONTRACT AND VARIATION**
18. **SEVERABILITY**
19. **WAIVER**
20. **GOVERNING LAW**

**SIGNED AS AN AGREEMENT**

**EXECUTED** by **THE PROVIDER** )
by its authorized officer )
)

| | |
|---|---|
| Signature of witness | Signature of authorized officer |
| Name of witness | Name of authorized officer |

**EXECUTED** by **The User** by its Authorized officer )
)
)

| | |
|---|---|
| Signature of witness | Signature of authorized officer |
| Name of witness | Name of authorized officer |

# SCHEDULE

# CONTRACT DETAILS

| Clause No. | Issue | Information |
|---|---|---|
| 1 | **Commencement Date** | |
| 1 | **Services** | |
| 1 | **Message** | |
| 1, 6 | **Fee** | |
| 1, 5.1 | **Customer's Information** | ***The User's Address*** |
| 11 | **Designated Sites** | **The Designated Sites are:** ***The User's site address*** |
| 20 | **Notices** | **The Provider** |

## TABLE CNS 1A - AFTN PLAN

*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 RTT | High frequency radio teletype |
| LTT | landline teletypewriter |
| 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 hubs 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.

| | |
|---|---|
| COP-B | Character oriented data link control procedure – System Category - B |
| X. 25 | X.25 protocol |

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 (7 - unit code) |

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.

| State/Station | Cat. | CURRENT | | | | PLANNED | | | | Target date of implementation | 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 | LDD/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/AGGC | S | | | | | LTT | 75 baud | None | IA-5 | | Internet as interim measure |
| Jakarta/WIII | S | SAT/d | 9600 bps | X.25 | IA-5 | | | | | | Note 1,2 |
| ~~Mauritius/FIMP~~ | ~~S~~ | ~~LTT~~ | ~~50 baud~~ | ~~None~~ | ~~ITA-2~~ | | | | | | Proposed to be replaced with Johannesbur |
| Nadi/NFFN | M | LDD/d | 2400 bps | X.25 | IA-5 | | | | | | Note 2 |
| Nauru/ANAU | S | | | | | SAT/d | 2400 bps | X.25 | IA-5 | | Internet as interim measure |
| Port Moresby/AYPM | S | SAT/d | 9600 bps | X.25 | IA-5 | | | | | | Note 2 |
| Port Vila/NVVV | S | LTT | 300 baud | None | ITA-2 | | | | | | Internet as interim measure |
| Santiago/SCSC | M | | | | | LDD/d | 2400 bps | X.25 | IA-5 | 12/03 | Current routing via USA |
| Singapore/WSSS | M | LDD/d | 2400 bps | X.25 | IA-5 | | | | | | |
| United States/KSLC | M | SAT/d | 2400 bps | X.25 | IA-5 | | | | | | |
| Johannesburg | | | | | | SAT/d | 64 Kbps | X.25 | IA-5 | 09/03 | |
| **BANGLADESH** | | | | | | | | | | | |
| DHAKA - S/VGZR | | | | | | | | | | | |
| Bangkok/VTBB | S | SAT/d | 300 baud | None | IA-5 | | | | | | |
| Kolkata/VECC | S | | | | | LDD/d | 9600 bps | X.25 | IA-5 | 09/03 | Current is via VTBB/VABB |
| **BHUTAN** | | | | | | | | | | | |
| PARO - S/VQPR | | | | | | | | | | | |
| Mumbai/VABB | S | | | | | SAT/a | 300 baud | None | ITA-2 | 09/03 | Dial-up |
| **BRUNEI DARUSSALAM** | | | | | | | | | | | |
| BRUNEI - S/WBSB | | | | | | | | | | | |
| Singapore/WSSS | S | LDD/d | 2400 bps | X.25 | IA-5 | | | | | | |
| Kuala Lumpur/WMKK | S | LTT | 75 baud | None | ITA-2 | LDD/d | 2400 bps | X.25 | IA-5 | 12/03 | Note 1,2 |
| **CAMBODIA** | | | | | | | | | | | |
| PHNOM PENH - S/VDPP | | | | | | | | | | | |
| Bangkok/VTBB | S | SAT/d | 300 baud | None | IA-5 | | | | | | Note 2 |
| **CHINA** | | | | | | | | | | | |
| BEIJING - M/ZBBB | | | | | | | | | | | |
| Guangzhou/ZGGG | S | LDD/d | 9600 bps | X.25 | IA-5 | | | | | | |
| Karachi/OPKC | M | LTT | 50 baud | None | ITA-2 | LDD/a | 300 baud | None | IA-5 | 12/03 | |
| Kathmandu/VNKT | S | SAT/d | 300 baud | None | IA-5 | | | | | | |
| Russian Fedration/UHHH | M | SAT/d | 2400 bps | None | IA-5 | | | | | | (Khabarovsk) |
| Pyongyang/ZKKK | S | SAT/d | 300 baud | None | IA-5 | | | | | | |
| Seoul/RKSS | S | SAT/d | 9600 bps | X.25 | IA-5 | | | | | | |
| Tokyo/RJAA | M | LDD/d | 9600 bps | X.25 | IA-5 | | | | | | |
| Ulaan Baatar/ZMUB | S | SAT/d | 300 baud | None | IA-5 | | | | | | Note 2 |
| Yangon/VYYY | S | | | | | SAT/d | 300 baud | None | IA-5 | 12/03 | |

| 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 |
| GUANGZHOU-M/ZGGG | | | | | | | | | | | |
| Beijing/ZBBB | M | LDD/d | 9600 bps | X.25 | IA-5 | | | | | | |
| Hanoi/VVNB | S | | | | | SAT/d | 2400 bps | None | IA-5 | 09/03 | |
| Hong Kong/VHHH | M | LDD/d | 2400 bps | None | IA-5 | | | | | | Note 1 |
| Macau/VMMC | S | LDD/d | 2400 bps | None | IA-5 | | | | | | |
| Sanya/ZJSY | S | LDD/d | 2400 bps | None | IA-5 | | | | | | |
| SANYA-S/ZJSY | | | | | | | | | | | |
| Guangzhou/ZGGG | S | LDD/d | 2400 bps | None | IA-5 | | | | | | |
| Hong Kong/VHHH | S | LDD/d | 2400 bps | None | IA-5 | | | | | | |
| 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 | ITA-2 | 12/03 | 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 | S | LDD/d | 2400 bps | None | IA-5 | | | | | | Note 1 |
| Ho-Chi-Minh/VVTS | S | SAT/d | 2400 bps | None | IA-5 | | | | | | |
| Macau/VMMC | S | LDD/d | 2400 bps | None | IA-5 | | | | | | |
| Manila/RPLL | S | LDD/d | 300 baud | None | ITA-2 | | | | | | |
| Sanya/ZJSY | S | LDD/d | 2400 bps | None | IA-5 | | | | | | Note 1 |
| Taibei/RCTP | S | LDD/d | 4800 bps | X.25 | IA-5 | | | | | | |
| Tokyo/RJAA | M | LDD/d | 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 | LDD/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 | | | | | | | | | | | |
| 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 |
| Funafuti/NGFU | S | | | | | LDD/d | 2400 bps | None | IA-5 | 12/03 | Dial-up |
| Noumea/NWWW | S | LDD/d | 2400 bps | X.25 | IA-5 | | | | | | Note 2 |
| Tarawa/NGTT | S | LDD/d | 2400 bps | None | IA-5 | | | | | | |

| State/Station | Cat. | CURRENT | | | | PLANNED | | | | Target date of implementation | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Type | Signalling Speed | Protocol | Code | Type | Signalling Speed | Protocol | Code | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| United States/KSLC | M | SAT/d | 2400 bps | X.25 | IA-5 | | | | | | Note 2 |
| Wallis Is./NLWW | S | | | | | LDD/a | 2400 bps | None | IA-5 | when traffic justifies | Current routing via Noumea |
| **FRENCH POLYNESIA (FRANCE)** | | | | | | | | | | | |
| PAPEETE/NTAA | | | | | | | | | | | |
| Christchurch/NZCH | S | LDD/d | 2400 bps | X.24 | IA-5 | | | | | | |
| **INDIA** | | | | | | | | | | | |
| MUMBAI - M/VABB | | | | | | | | | | | |
| Bangkok/VTBB | M | LDD/d | 2400 bps | X.25 | IA-5 | | | | | | |
| Kolkata/VECC | S | LDD/d | 9600 bps | X.25 | IA-5 | | | | | | |
| Colombo/VCCC | M | LDD/d | 64 kbps | X.25 | IA-5 | | | | | | |
| 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 | | | | | | Note 2 |
| Nairobi/HKNC | M | SAT/a | 50 baud | None | ITA-2 | | | | | | |
| Paro/VQPR | S | | | | | SAT/a | 300 baud | None | ITA-2 | 09/03 | Dial-up |
| KOLKATA - S/VECC | | | | | | | | | | | |
| Dhaka/VGZR | S | | | | | LDD/d | 9600 bps | X.25 | IA-5 | 09/03 | Current is via VTBB/VABB |
| Mumbai/VABB | S | LDD/d | 9600 bps | X.25 | IA-5 | | | | | | |
| DELHI - S/VIDD | | | | | | | | | | | |
| Tashkent/UTTT | S | SAT/a | 50 baud | None | ITA-2 | | | | | | |
| CHENNAI - S/VOMM | | | | | | | | | | | |
| Kuala Lumpur/WMKK | S | LDD/d | 9600 bps | X.25 | IA-5 | | | | | | 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 | 2400 bps | X.25 | IA-5 | | | | | | Note 2 |
| **JAPAN** | | | | | | | | | | | |
| TOKYO - M/RJAA | | | | | | | | | | | |
| Beijing/ZBBB | M | LDD/d | 9600 bps | X.25 | IA-5 | | | | | | |
| Hong Kong/VHHH | M | LDD/d | 9600 bps | X.25 | IA-5 | | | | | | |
| Russian Federation/UHHH | M | LTT | 2400 bps | None | IA-5 | | | | | | (Khabarovsk) |
| Russian Federation/UUUU | M | LTT | 200 baud | None | IA-5 | LDD | 2400 bps | None | IA-5 | 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/d | 9600 bps | X.25 | IA-5 | | | | | | |
| 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 | | | | | | |

| 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 |
| **KIRIBATI** | | | | | | | | | | | |
| TARAWA - S/NGTT | | | | | | | | | | | |
| Nadi/NFFN | S | LDD/d | 2400 bps | None | IA-5 | | | | | | |
| **LAO PDR** | | | | | | | | | | | |
| VIENTIANE - S/VLVT | | | | | | | | | | | |
| Bangkok/VTBB | S | SAT/d | 300 baud | COP-B | IA-5 | | | | | | Note 2 |
| Hanoi/VVNB | S | SAT/d | 9600 bps | None | IA-5 | | | | | | |
| **MALAYSIA** | | | | | | | | | | | |
| KUALA LUMPUR-S/WMKK | | | | | | | | | | | |
| Bangkok/VTBB | S | SAT/d | 2400 bps | X.25 | IA-5 | | | | | | Note 1, 2 |
| Brunei/WBSB | S | LTT | 75 baud | None | ITA-2 | LDD/d | 2400 bps | X.25 | IA-5 | 12/03 | Note 1, 2 |
| Chennai/VOMM | S | LDD/d | 9600 bps | X.25 | IA-5 | | | | | | Note 1, 2 |
| Singapore/WSSS | S | SAT/d | 1200 bps | X.25 | IA-5 | | | | | | Note 2 |
| **MALDIVES** | | | | | | | | | | | |
| MALE - S/VRMM | | | | | | | | | | | |
| Colombo/VCCC | S | LTT | 50 baud | None | ITA-2 | SAT/d | 9600 bps | X.25 | IA-5 | 12/03 | Note 2 |
| **MARSHALL 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 | | | | | | |
| 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 | S | LTT | 50 baud | None | ITA-2 | | | | | | (Irkutsk) |
| **MYANMAR** | | | | | | | | | | | |
| YANGON - S/VYYY | | | | | | | | | | | |
| Bangkok/VTBB | S | SAT/d | 300 baud | COP-B | IA-5 | | | | | | Note 2 |
| Beijing/ZBBB | S | | | | | SAT/d | 300 baud | None | IA-5 | 12/03 | Note 1,2 |

| 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 |
| **NAURU** | | | | | | | | | | | |
| NAURU - S/ANAU | | | | | | | | | | | |
| Brisbane/YBBE | S | | | | | SAT/d | 2400 bps | X.25 | IA-5 | | Internet as interium measure |
| **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 | LDD/d | 2400 bps | X.25 | IA-5 | | | | | | Note 2 |
| **NEW ZEALAND** | | | | | | | | | | | |
| CHRISTCHURCH-T/NZCH | | | | | | | | | | | |
| Brisbane/YBBE | 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 | SAT/d | 2400 bps | X.25 | IA-5 | | | | | | |
| Rarotonga/NCRG | S | LDD/d | 2400 bps | None | IA-5 | | | | | | |
| Tongatapu/NFTF | S | LDD/d | 2400 bps | None | IA-5 | | | | | | |
| USA/KSLC | S | LDD/d | 9600 bps | X.25 | IA-5 | | | | | | Under test. Planned implementation by 7/03 |
| **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 | 12/03 | |
| Mumbai/VABB | M | SAT/a | 200 baud | None | ITA-2 | | | | | | Note 2 |
| 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/YBBE | S | SAT/d | 9600 bps | X.25 | IA-5 | | | | | | Note 2 |
| **PHILIPPINES** | | | | | | | | | | | |
| MANILA - S/RPLL | | | | | | | | | | | |
| Hong Kong/VHHH | S | LDD/d | 300 baud | None | ITA-2 | | | | | | Note 2 |
| Singapore/WSSS | S | LDD/d | 300 baud | None | ITA-2 | | | | IA-5 | | Note 1, 2 |
| Taibei/RCTP | S | LTT | 75 baud | None | ITA-2 | LDD/d | 300 baud | None | IA-5 | 12/03 | Note 1, 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 |
| **REPUBLIC OF KOREA** | | | | | | | | | | | |
| SEOUL - S/RKSS | | | | | | | | | | | |
| Beijing/ZBBB | **S** | SAT/d | 9600 bps | X.25 | IA-5 | | | | | | |
| Tokyo/RJAA | S | LDD/d | 9600 bps | X.25 | IA-5 | | | | | | Note 2 |
| **SAMOA** | | | | | | | | | | | |
| APIA - S/NSFA | | | | | | | | | | | |
| USA/KSLC | S | LDD/d | 2400 | X.25 | IA-5 | | | | | | |
| **SINGAPORE** | | | | | | | | | | | |
| SINGAPORE-M/WSSS | | | | | | | | | | | |
| Bahrain/OBBI | M | LTT | 200 baud | None | ITA-2 | SAT/a | 2400 bps | None | IA-5 | 09/03 | |
| Bangkok/VTBB | M | LDD/d | 1200 bps | X.25 | IA-5 | | | | | | Note 2 |
| Brisbane/YBBB | M | LDD/d | 2400 bps | X.25 | IA-5 | | | | | | |
| Brunei/WBSB | S | LDD/d | 2400 bps | X.25 | IA-5 | | | | | | |
| Colombo/VCCC | M | LDD/d | 9600 bps | X.25 | IA-5 | | | | | | |
| Ho-Chi-Minh/VVTS | S | SAT/a | 300 baud | None | IA-5 | | | | | | |
| Jakarta/WIII | S | SAT/d | 2400 bps | X.25 | IA-5 | | | | | | Note 2 |
| Kuala Lumpur/WMKK | S | SAT/d | 1200 bps | X.25 | IA-5 | | | | | | Note 1,2 |
| London/EGGC | M | LDD/d | 1200 bps | X.25 | IA-5 | | | | | | |
| Manila/RPLL | S | LDD/d | 300 baud | None | ITA-2 | | | | IA-5 | | |
| Tokyo/RJAA | M | LDD/d | 9600 bps | X.25 | IA-5 | | | | | | |
| **SOLOMON IS.** | | | | | | | | | | | |
| HONIARA - S/AGGG | | | | | | | | | | | |
| Brisbane/YBBB | S | | | | | LTT | 75 baud | None | IA-5 | | Internet as intermedium measur |
| **SRI LANKA** | | | | | | | | | | | |
| COLOMBO - M/VCCC | | | | | | | | | | | |
| Mumbai/VABB | M | LDD/d | 64 kbps | X.25 | IA-5 | | | | | | |
| Male/VRMM | S | LTT | 50 baud | None | ITA-2 | SAT/d | 2400 bps | X.25 | IA-5 | 09/03 | Note2 |
| Singapore/WSSS | M | LDD/d | 9600 bps | X.25 | IA-5 | | | | | | |
| **THAILAND** | | | | | | | | | | | |
| BANGKOK - M/VTBB | | | | | | | | | | | |
| Mumbai/VABB | M | LDD/d | 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 | IA-5 | | | | | | Note 2 |
| Rome/LII | M | LDD/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 | S | | | | | | | | | | |
| Cristchurch/NZCH | | LDD/d | 2400 bps | None | IA-5 | | | | | | |

| State/Station | Cat. | CURRENT | | | | PLANNED | | | | Target date of implementation | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Type | Signalling Speed | Protocol | Code | Type | Signalling Speed | Protocol | Code | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| **TUVALU** | | | | | | | | | | | |
| FUNAFUTI - S/NGFU | | | | | | | | | | | |
| Nadi/NFFN | S | | | | | LDD/d | 2400 bps | None | IA-5 | 12/03 | Dial-up |
| **UNITED STATES** | | | | | | | | | | | |
| USA-M/KSLC | | | | | | | | | | | |
| Apia/NSFA | S | LDD/d | 2400 bps | X.25 | IA-5 | | | | | | |
| Brisbane/YBBE | M | SAT/d | 2400 bps | X.25 | IA-5 | | | | | | |
| Christchurch | S | LDD/d | 9600 bps | X.25 | IA-5 | | | | | | Under test. Planned implementation by 7/03 |
| 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/YBBE | S | LTT | 300 baud | None | ITA-2 | | | | | | Internet as interim measure |
| **VIET NAM** | | | | | | | | | | | |
| HANOI-S/VVNB | | | | | | | | | | | |
| Vientiane/VLVT | S | SAT/d | 9600 bps | None | IA-5 | | | | | | |
| Ho-Chi-Minh/VVTS | S | SAT/d | 9600 bps | None | IA-5 | | | | | | |
| Guangzhou/ZGGG | S | | | | | SAT/d | 2400 bps | None | IA-5 | 09/03 | |
| HO-CHI-MINH - S/VVTS | | | | | | | | | | | |
| Bangkok/VTBB | S | SAT/d | 2400 bps | None | IA-5 | | | | | | |
| Hanoi/VVNB | | SAT/d | 9600 bps | None | IA-5 | | | | | | |
| Hong Kong/VHHH | S | SAT/d | 2400 bps | None | IA-5 | | | | | | |
| Singapore/WSSS | S | SAT/a | 300 baud | None | IA-5 | | | | | | |
| **WALLIS IS. (FRANCE)** | | | | | | | | | | | |
| WALLIS - S/NLWW | | | | | | | | | | | |
| Nadi/NFFN | S | | | | | LDD/A | 2400 bps | None | IA-5 | | Current routing via Noumea<br>Circuit will be implemented when traffic justifies. |

## Appendix G to the Report

## Updated version of CNS/ATM Implementation Planning Matrix

| State/ Organization | ATN G/G Boundary Intermediate System (BIS) Router/AMHS | AIDC | CPDLC | GNSS | | ADS-B | ADS-C | Remarks |
|---|---|---|---|---|---|---|---|---|
| | | | | **NPA Supplemental Means (S) Primary means (P)** | **En-route Supplemental Means (S) Primary means (P)** | | | |
| **AUSTRALIA** | ATN tests were conducted. BIS Router and Backbone BIS Router will be implemented by 2005 and AMHS in 2005. | AFTN based AIDC Implemented between Brisbane and Auckland. | Implemented to support FANS1/A equipped aircraft. | Implemented (S) 260 GPS NPA Final 26 aerodromes to be completed 2002. | Developed en-route as (P) for approval to use in domestic airspace. | ADS-B trial being conducted. | FANS 1/A ADS-C implemented. | |
| **BANGLADESH** | ATN BIS Router and AMHS planned for 2005 | | | | | | | |
| **BHUTAN** | ATN BIS Router planned for 2005 | | | Procedures developed for NPA as (S) | | | | |
| **BRUNEI DARUSSALAM** | ATN BIS Router planned for 2005 | | | | | | | |
| **CAMBODIA** | | | | | | | | |
| **CHINA** | ATN BIS Router will be implemented by 2005. | A IDC between ACCs within China are being implemented. | Implemented to support ATS Route L888 and polar routes. Trial on HF data link conducted for use in western China. | | Implemented in certain airspace as (S). | | FANS 1/A ADS-C implemented to support L888 and polar routes. | |

Appendix G - 2

| State/ Organization | ATN G/G Boundary Intermediate System (BIS) Router/AMHS | AIDC | CPDLC | GNSS | | ADS-B | ADS-C | Remarks |
|---|---|---|---|---|---|---|---|---|
| | | | | NPA Supplemental Means (S) Primary means (P) | En-route Supplemental Means (S) Primary means (P) | | | |
| **HONG KONG, CHINA** | -AMHS trial with Australia conducted in late 2002;<br>- Tripartite BBIS trial with Beijing and Bangkok conducted in end of 2002;<br>-BBIS/AMHS trials with Thailand and Japan are conducted in 2003. Implementation in 2003/2004;<br>- An operational AMHS planned for commissioning by end of 2003. | Trial on the AFTN based AIDC with Guangzhou China commenced.<br><br>Implementation planned for 2003/2004.<br><br>AIDC trial with Sanya planned for 2003. | Trials continuing for CPDLC.<br>D-ATIS<br>D-VOLMET and PDC implemented.<br><br>VDL Mode-2 trial planned commenced Sep. 2002 and further trials being conducted. | | Implemented in certain airspace as (S). | ADS-B trial scheduled for 2004. | FANS 1/A Trials continuing for ADS-C. | |
| **MACAO, CHINA** | | | | | | | | |
| **COOK ISLANDS** | | | | | | | | |
| **DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA** | | | | | | | | |
| **FIJI** | ATN in-house trials planned for 2003.<br><br>ATN BIS Router will be implemented in 2005. | Implementation of AFTN based AIDC with Brisbane and Auckland in 2003. | FANS-1. Implemented since 1997. | NPA procedures for (S) to be completed in Dec. 2002. | Implemented as (S). | ADS-B trials planned for 2003/2004.<br><br>Implementation in 2004. | ADS-C implemented in oceanic airspace using EUROCAT 2000 X. | |

| State/ Organization | ATN G/G Boundary Intermediate System (BIS) Router/AMHS | AIDC | CPDLC | GNSS | | ADS-B | ADS-C | Remarks |
|---|---|---|---|---|---|---|---|---|
| | | | | NPA Supplemental Means (S) Primary means (P) | En-route Supplemental Means (S) Primary means (P) | | | |
| **FRANCE French Polynesia Tahiti** | | Implementation of limited message sets with adjacent centres under discussion. | FANS-1. Implemented since 1996. | | | | FANS 1/A ADS-C implemented since March 1999. | |
| **INDIA** | ATN BIS router and BBIS router planned for implemented at Mumbai in 2005. | | FANS-1 limited Implemented at Kolkata and Chennai. Planned for Mumbai and Delhi. | | SBAS (S). Planned for 2005. | | FANS 1/A ADS-C implemented at Kolkata and Chennai. Plan to implement in Delhi and Mumbai. | |
| **INDONESIA** | ATN BIS router planned implementation in 2005. | AFTN based AIDC planned for implementation between Brisbane and Jakarta in 2004. | FANS-1/A. CPDLC in Jakarta, Ujung Pandang FIRs planned for 2004. | Procedure to be completed in 2006 for NPA (S). | | | FANS 1/A ADS-C trial planned for Jakarta and Ujung Pandang FIRs for 2004. | |
| **JAPAN** | ATN BBIS already implemented. AMHS implementation between Japan, USA and Hong Kong planned for 2004. | AIDC based. AFTN procedure implemented with Oakland USA. | FANS1/A system Implemented in Tokyo FIR. | | | | FANS 1/A. ADS-C implemented in Tokyo FIR. | |
| **KIRIBATI** | | | | | | | | |

| State/ Organization | ATN G/G Boundary Intermediate System (BIS) Router/AMHS | AIDC | CPDLC | GNSS | | ADS-B | ADS-C | Remarks |
|---|---|---|---|---|---|---|---|---|
| | | | | **NPA Supplemental Means (S) Primary means (P)** | **En-route Supplemental Means (S) Primary means (P)** | | | |
| **LAO PDR** | ATN BIS Router planned for implementation with Bangkok in 2005. | | FANS-1/A Planned for Bay of Bengal and South China Sea areas. Equipment is under test operation. | | Implemented as (S). | | FANS-1/A. ADS-C planned for Bay of Bengal and South China Sea areas. Equipment under test operation. | |
| **MALAYSIA** | ATN BIS Router planned for 2005. | | Planned for Bay of Bengal and South China Sea areas. | NPA (S) at KLIA planned for 2003. | | | FANS 1/A ADS-C planned for Bay of Bengal and South China Sea areas. | |
| **MALDIVES** | | | | | | | | |
| **MARSHALL ISLANDS** | | | | NPA (S) implemented at Majuro Atoll. | | | | |
| **MICRONESIA FEDERATED STATES OF** | | | | | | | | |
| Chuuk | | | | NPA(S) implemented | | | | |
| Kosrae | | | | NPA(S) implemented | | | | |
| Pohnpei | | | | NPA(S) implemented | | | | |
| Yap | | | | NPA(S) implemented | | | | |

| State/ Organization | ATN G/G Boundary Intermediate System (BIS) Router/AMHS | AIDC | CPDLC | GNSS | | ADS-B | ADS-C | Remarks |
|---|---|---|---|---|---|---|---|---|
| | | | | NPA Supplemental Means (S) Primary means (P) | En-route Supplemental Means (S) Primary means (P) | | | |
| **MONGOLIA** | ATN BIS Router planned for 2005. | | Function available. Regular trials are conducted. | GPS procedures are being developed. | Implemented as (P). | ADS-B trial in progress implementation planned for 2002/2003. | FANS 1/A ADS-C implemented since August 1998. | |
| **MYANMAR** | Trial for ATN BIS Router with Thailand planned for 2003. Test with China planned for 2005. | | Implemented since August 1998 | | | | Implemented since August 1998 | |
| **NAURU** | | | | | | | | |
| **NEPAL** | BIS Router planned for 2005. | | | Development of arrival procedure and NPA as (S) completed. Departure procedure is being developed. | Implemented as (S). | | | |
| **NEW ZEALAND** | BIS Router planned for 2005 | AFTN based AIDC implemented between New Zealand and Australia. Tests with Fiji and USA planned. | FANS/1A. Implemented | | | | FANS 1/A Implemented ADS-C. | |
| **PAKISTAN** | Implementation of ATN considered for Phase II (2005-2010). | | | | | | | RADAR coverage provided in Karachi and Lahore FIRs. |

| State/ Organization | ATN G/G Boundary Intermediate System (BIS) Router/AMHS | AIDC | CPDLC | GNSS | | ADS-B | ADS-C | Remarks |
|---|---|---|---|---|---|---|---|---|
| | | | | NPA Supplemental Means (S) Primary means (P) | En-route Supplemental Means (S) Primary means (P) | | | |
| **PAPUA NEW GUINEA** | | | | | | | | |
| **PHILIPPINES** | ATN BIS Router planned for 2005. Implementation for AMHS also planned. | | D-ATIS and CPDLC Planned for 2006. | | | | FANS 1/A ADS-C planned for 2006. | |
| **REPUBLIC OF KOREA** | ATN BIS planned for 2005. | FTN based AIDC implemented between Incheon ACC and Seoul APP. | | | | | FANS 1/A ADS-C planned for 2003. | |
| **SINGAPORE** | ATN BBIS Router trial with Hong Kong is progressing. | | Implemented since 1997. Integrated in the ATC system in 1999. D-ATIS implemented since February 2000. | NPA (S) procedure developed and is being published in the AIP. | Implemented (S). | Trial in 2003 and 2004 planned. | FANS 1/A ADS-C implemented since 1997. Integrated with ATC system in 1999. | |
| **SRI LANKA** | ATN BIS Router Planned for 2005. AMHS planned along with BIS in 2005. | | CPDLC implemented since November 2000. | NPA (S) planned for 2005. | | | FANS 1 /A ADS-C implemented since November 2000. | GPS based domestic route structure being developed. |

| State/ Organization | ATN G/G Boundary Intermediate System (BIS) Router/AMHS | AIDC | CPDLC | GNSS | | ADS-B | ADS-C | Remarks |
|---|---|---|---|---|---|---|---|---|
| | | | | NPA Supplemental Means (S) Primary means (P) | En-route Supplemental Means (S) Primary means (P) | | | |
| **THAILAND** | ATN G/G system implemented for domestic services. BBIS/BIS Routers already implemented. AMHS 2005. | ATN based AIDC Implemented in Domestic Sector. | FANS-1/A Implemented. | | Implemented as (S). | | FANS 1/A ADS-C Implemented. | |
| **TONGA** | | | | | | | | |
| **UNITED STATES** | | | | | | | | |
| Anchorage | | | | NPA(S) implemented | En-route (P) implemented | ADS-B trials continuing. | FANS/1-ADS-C 2004. | |
| Fairbanks | | | | NPA(S) implemented | | | | |
| Guam (Agana NAS) | | | | NPA(S) implemented | | | | |
| Guam (Anderson) | | | | NPA(S) implemented | | | | |
| Honolulu Intl. | | | | NPA(S) implemented | En-route (P) implemented | | FANS 1/A ADS-C planned for Dec. 2004 | |
| Johnston Atoll | | | | NPA(S) implemented | | | | |
| Kahului | | | | NPA(S) implemented | | | | |

| State/ Organization | ATN G/G Boundary Intermediate System (BIS) Router/AMHS | AIDC | CPDLC | GNSS | | ADS-B | ADS-C | Remarks |
|---|---|---|---|---|---|---|---|---|
| | | | | **NPA Supplemental Means (S) Primary means (P)** | **En-route Supplemental Means (S) Primary means (P)** | | | |
| Oakland | ATN BBIS will be implemented in 2002. Router Tests are progressing. AMHS implementation between Japan and USA in 2004. | Implemented using AFTN procedure. ATN AIDC planned for 2005. | FANS-1 2001. Phase I ATN CPDLC implemented in Sept 2001. Phase IA planned for implementation at 20 en-route centres in USA for en-route function in 2006/2007 time frame. | NPA (S) implemented | En-route (P) implemented | | FANS-1/A ADS-C planned for Dec. 2004. | |
| Saipan | | | | NPA (S) implemented | | | | |
| **VANUATU** | | | | | | | | |
| **VIETNAM** | ATN BIS Router planned for 2005 and AMHS in 2005. | ATN based AIDC planned between Ho-Chi-Minh and Bangkok in 2005. | Planned for 2005. | Planned for NPA (S) for 2004. | Implementation as (S) planned for 2004. | | FANS 1/A ADS-C planned for 2005. | Most of air space in Hanoi and Ho-Chi-Minh FIRs covered by RADAR. |

## TITLE AND TERMS OF REFERENCE

**TITLE: ATN Transition Task Force**

**TERMS OF REFERENCE:**

Plan for implementation of the Aeronautical Telecommunication Network (ATN) in the ASIA/PAC region to meet performance and capacity requirements of CNS/ATM Systems. The planning also addresses the ongoing development of the AFS including digital speech communication.

## Subject/Tasks List of the ATN Transition Task Force

| No. | Ref. | Task | Priority | Action Proposed/In Progress | Target |
|---|---|---|---|---|---|
| 1 | RAN/3<br>C 10/12<br>C 10/11d | Subject: ATN Transition Guidance Material.<br><br>Task: Develop Regional ATN Transition Guidance Material. | | 1) Development of detailed guidance material. | Completed |
| 2 | RAN/3<br>C 10/11d | Subject: ATN Transition Plan<br><br>Task: Develop an ATN Transition Plan to provide seamless transition to ATN. | | 1) Develop Ground Transition Plan taking into account Air-to-Ground aspects.<br><br>2) Develop a set of planning documents covering:<br>i) ATN Regional Routing Architecture<br>ii) ATN Naming and Addressing Conventions, and<br>iii) Documentation of the Assigned ATN Names and Addresses. | Completed |
| 3 | | Subject: ATN major elements.<br><br>Task: Provide performance and functional requirements of ATN. | A | 1) Develop ATN Technical Documents.<br><br>- Security<br>- Performance<br>- System Management | ~~2003~~ 2004<br>~~2003~~ 2004<br>~~2003~~ 2004 |
| 4 | RAN/3<br>C 10/11b | Subject: AFTN related issues<br><br>Task: Review operation of AFTN. | B | 1) Evaluate and review the effect of increases or decreases in capacity and network changes, on circuit loading.<br><br>2) Plan network changes for support of OPMET and AIS databases, automated VOLMET broadcast. | On-going<br><br>~~2003~~ completed |
| 5 | | Subject: Planning and implementation information in ANP.<br><br>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.<br><br>1) Table CNS 1B – ATN Router Plan<br>2) Table CNS 1C – ATS MHS<br>3) Table CNS 1D – AIDC Routing Plan | <br><br>Completed<br>~~2003~~ 2004<br>~~2003~~ 2005 |

| No. | Ref. | Task | Priority | Action Proposed/In Progress | Target |
|---|---|---|---|---|---|
| 6 | | Subject: ATN Documentation<br><br>Task: Development of ATN Routing Documentations and ICDs. | A | Development of ATN Documents:<br>1) A Router ICD<br>2) A Routing policy for IDRP<br>3) A Routing policy for MTA<br>4) Directory of Service<br>5) An AMHS ICD<br>6) An AIDC ICD | ~~2003~~ completed<br>completed<br>~~2003~~ 2004<br>2004<br>completed<br>2004 |
| 7 | | Subject: Use of the public Internet<br><br>Task: Develop guidance material for the use of the public internet technology to support AFTN, where required. | A | Study the possibility of using the public Internet and develop guidance material for its use to support low speed AFTN stations, as an interim measure, with particular emphasis on security and reliability. | ~~2003~~<br>completed |
| 8 | | Subject: Use of IP<br><br>Task: Develop guidance material for the use of IP as a Sub-Network for ATN | B | In accordance with the work being performed by ATNP, develop guidance material for the support of IP as a Sub-Network of the ATN, with particular emphasis on system compatibility between adjacent centers and security. | (2005)<br>(Monitor development in ACP) |
| 9 | | Subject: AMHS Naming Registration<br><br>Task: Develop registration forms for assigning AMHS address for the region | A | To develop an AMHS Naming Registration Planning Document for registering the AMHS naming conventions and assignments to be used within the region. | 2004 |
| 10 | | Subject: AFTN/AMHS Operational Procedures<br><br>Tasks: Revise and develop operational procedures applicable to the use of the AMHS. | A | To review existing AFTN proceduress and adopt or develop new procedures applicable to the operation and use of the AMHS. | 2004 |

**Fifth Meeting of Aeronautical Telecommunication (ATN)**
**Transition Task Force of APANPIRG**
**Phuket, Thailand, 9 – 13 June 2003**

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*International Civil Aviation Organization*

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

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| WP/No. | Agenda Item | Subject | Presented by |
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| 1 | - | Provisional Agenda | Secretariat |
| 2 | 4 | Technical Document on ATN Performance | Ad Hoc WG |
| 3 | 4 | ATN AMHS System Description | USA |
| 4 | 4 | ATN Qualification Programme | Ad Hoc WG |
| 5 | 3 | ATN Ground-to-Ground Router Description | USA |
| 6 | 3 | Asia/Pacific Regional ATN G/G router ICD for ISO/IEC 8208 Sub-Network | Ad Hoc WG |
| 7 | 4 | Modifications to the ATN Documentation Tree | Ad Hoc WG |
| 8 | 4 | Status of Asia /Pacific ATN IDRP Routing Policy | Ad Hoc WG |
| 9 | 4 | Status on Development of Document on the Use of Directory Services | Ad Hoc WG |
| 10 | 4 | Status on Development of Document on the AMHS Message Routing Between Message Transfer Agents | Ad Hoc WG |
| 11 | 4 | Need for the ICAO (Asia/Pacific Region) ATN System Intergrity Policy | Ad Hoc WG |
| 12 | 4 | Asia/Pacific ATN Sytem Intergrity Policy | Ad Hoc WG |
| 13 | 5 | Status on the Guidance Material for IP as a Sub Network for the ATN | Ad Hoc WG |
| 14 | 9 | AMHS Implementation Issues | FAA/JCAB |
| 15 | 4 | Proposed Initial Draft of Asia/Pacific Regional ATN/AMHS System Management Transition Guideline Document | Ad Hoc WG |
| 16 | 7 | Delivery of AFTN Traffic Using the Public Internet | Ad Hoc WG |
| 17 | 10 | Proposal for the Future | Ad Hoc WG |
| 18 | 8 | Review Status of Implementation of the Asia/Pac AFTN Plan | Secretariat |
| 19 | 6 | Review of Table CNS-1B and Chart CNS-2 of ASIA/PAC FASID | Secretariat |
| 20 | 9 | AMHS Routing Issues | Japan |
| 21 | 9 | ATN Trial and Implementatin Plan | Fiji |

| WP/No. | Agenda Item | Subject | Presented by |
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| 22 | 8 | Review Ground-Ground Circuits Improvement | Secretariat |
| 23 | 8 | Issues Discussed at COM Co-ordination Meeting | Secretariat |
| 24 | 9 | AFTN AMHS Transitional Issues | Secretariat |
| 25 | 10 | Terms of Reference (TOR) and Subject/Tasks List of the ATN Transition Task Force | Secretariat |
| 26 | 9 | CNS/ATM Implementation and Planning Matrix | Secretariat |
| 27 | 8 | Status Report of Colombo's International AFTN Circuit and Proposed Amendment to AFTN Routing Directory | Sri Lanka |
| 28 | 6 | Review of Table CNS-1C of ASIA/PAC FASID | Secretariat |

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|---|---|---|---|
| 1 | - | Meeting bulletin | Secretariat |
| 2 | 1 | Review Latest Development in the Aeronautical Telecommunication Network Panel (ATNP) and in the Aeronautical Mobile Communications Panel (AMCP) | Australia |
| 3 | 1 | Report of the Last Meeting of ATNP Joint WG | Japan |
| 4 | 8 | Status Report on Australia's AFTN International Circuits | Australia |
| 5 | 2 | Report on the ATNTTF Ad Hoc Working Group Activities | Ad hoc WG |
| 6 | 7 | Establishment of the Aviation Use of the Public Internet Study Group (AUPISG) | Secretariat |
| 7 | 8 | FAA AFTN Message Traffic Analysis | USA |
| 8 | 9 | Introduction to R & D of AFTN/AMHS Gateway By CAAC | China |
| 9 | 9 | The Preparation for Establishing Jakarta and Ujung Pandang Communications Centres | Indonesia |
| 10 | 8 | AFTN Circuit Statistics of Tokyo | Japan |
| 11 | 9 | Supplement to Header Compression in Mobile Subnetwork | China |
| 12 | 9 | A New Flow Control Algorithm in ATN Based on ISIS Protocol | China |
| 13 | 1 | Report of the 1st Meetikng of ACP WG N | Japan |
| 14 | 9 | AFS Planning Activities in the European Region | Secretariat |
| 15 | 4 | Status of Technical Document on ATN Performance | Ad Hoc WG |
| 16 | 9 | ATN Development in Hong Kong China | Hong Kong China |
| 17 | 5, 7 | Information for Internet Protocol in ATN | Japan |