INTERNATIONAL CIVIL AVIATION ORGANIZATION

REPORT OF THE NINETEENTH MEETING OF THE ASIA/PACIFIC AIR NAVIGATION PLANNING AND IMPLEMENTATION REGIONAL GROUP (APANPIRG/19)

Bangkok, Thailand, 1 to 5 September 2008

The views expressed in this Report should be taken as those of the APANPIRG and not of the Organization. This Report will be presented to the Air Navigation Commission/Council and any formal action taken will be published in due course as a supplement to the Report.

Approved by the Meeting
and published by the ICAO Asia and Pacific Office

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PART I — HISTORY OF THE MEETING

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1.1 **Introduction**

1.1.1 The Nineteenth Meeting of the Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG/19) was held in Bangkok, Thailand from 1 to 5 September 2008 at the ICAO Asia/Pacific Regional Office.

1.2 **Attendance**

1.2.1 The meeting was attended by 113 participants from 25 Member States and 5 International Organizations (IATA, IFALPA, IFATCA, CANSO and IBAC).

1.2.2 A list of participants is given at **Attachment 1** to the Report.

1.3 **Opening of the meeting**

Welcome address by Mr. Mokhtar A. Awan, Regional Director, ICAO Asia/Pacific Office

1.3.1 Mr. Awan welcomed the participants from the APANPIRG Member States, new APANPIRG Member States and the International Organizations and recalled the Council Decision on the changes to the membership of the Group to ensure maximum participation in the planning and implementation activity.

1.3.2 Mr. Awan acknowledged the continued support extended by the Royal Thai Government to the Regional Office and expressed gratitude for the recent contributions. He noted that this year is very significant for the ICAO Regional Office as it completes 60 years since it was established in Melbourne in 1948. He further added that the 60th anniversary will be celebrated in a big way on the 8th and 9th December 2008 to coincide with International civil aviation day.

1.3.3 In highlighting some of the regional issues from ICAO's perspective, he mentioned that ICAO had organized two PBN seminars to provide information and guidance to States on implementation issues and an ADS-B seminar in the surveillance field. The Regional Office supported the OPMET Databank coordination, implementation of RVSM and RNP routes and air traffic flow management. He also mentioned that consequent to the Council decision, the Air Navigation Commission has initiated a study on the merits of PIRGs.

1.3.5 He reiterated that the Group should be the guiding and coordinating organ for all activities conducted within ICAO concerning the Air Navigation System for the Asia/Pacific Region.

Opening remarks by Mr. W. L. Wong, Senior Director, Changi Airport Advisory Group, Civil Aviation Authority of Singapore and Chairman of APANPIRG

1.3.6 In his opening remarks Mr. W. L. Wong, Chairman of APANPIRG recalled the Council Decision on APANPIRG membership and welcomed the new members. He emphasized that the aviation industry continued to face new challenges as the air traffic growth in the region put greater demand on civil aviation administrations, regulatory authorities, air navigation services providers, airports and airlines to enhance their efficiency while ensuring safety and security of their business and operations are not compromised. He said that the rising cost of aviation fuel is posing a great challenge to air navigation service providers and aircraft operators to enhance efficiency of their services and help airlines reduce operating costs. In addition the growing environmental concerns have added more pressures to reduce the carbon foot print.

1.3.7 The Chairman noted further that under the able leadership of the ICAO Asia/Pacific Regional Office and with the commitment of States, APANPIRG and its Sub-Groups and Task Forces had made notable progress in many areas over the last year. These are highlighted below:

- Implementation of RVSM by China in its airspace. This is an important milestone for the region. The expected increase in capacity and efficiency will enable operators to reduce operating costs.

- The implementation of RVSM in the region brought about benefits to both air traffic services providers and airspace users.

- Implementation of reduced horizontal separation based on RNP10 operations in the South China Sea and revised flight allocation scheme.

- Implementation of the Performance Based Navigation (PBN) in the near future to enhance safety, capacity and efficiency. The use of the ADS-B for surveillance would further enhance safety.

1.3.8 Mr. Wong acknowledged that, although much had been achieved since APANPIRG/18, there was still a lot to do. There were also areas of concern. For example, there remained an urgent need to upgrade communications facilities and services in some parts of the region. Without good communications between pilots and controllers, it would be difficult to implement the next phase of improvements. Hence, it was important for States in the Region to ensure that good communications facilities were available. He also touched upon the ICAO Annex 11 requirements for States to develop and implement contingency plans in the event of disruption of air traffic services and related supporting services in the airspace.

1.4 **Officers and Secretariat**

1.4.1 Mr. W. L. Wong, Senior Director, Changi Airport Advisory Group, CAA Singapore, Chairman of the APANPIRG, presided over the meeting.

1.4.2 Mr. Mokhtar A. Awan, ICAO Regional Director, Asia/Pacific Office, was the Secretary of the meeting, assisted by Mr. N. C. Sekhar, Regional Officer/AGA.

1.4.3 The meeting was also assisted by Mr. H. V. Sudarshan, Regional Planning Officer, ICAO Headquarters, Mr. Rod Graff, Deputy Regional Director, Asia and Pacific Office, Mr. Andrew Tiede and Mr, Kyotaro Harano, Regional Officers/ATM, Mr. Li Peng and Mr. S. Saraswati, Regional Officers/CNS, Capt. Fareed Shah, Regional Officer/FS, Mr. Christopher F. Keohan, Regional Officer/ MET and Ms. Sarangtip Sundarachampaka, Administrative officer, ICAO Asia/Pacific Regional Office.

1.5 **Agenda of the Meeting**

1.5.1 The meeting adopted the following agenda:

Agenda Item 1 Follow-up on the out come of APANPIRG/18 Meeting

1.1 Review of the action taken by the ANC and the Council on the Report of APANPIRG/18

1.2 Review Status of Implementation of APANPIRG/18 Conclusions and Decisions

1.3 Review Status of Implementation of APANPIRG Outstanding Conclusions and Decisions

Agenda Item 2 Global and Inter Regional Activities

2.1 Global Air Navigation Plan

2.2 Global Aviation Safety Plan

Agenda Item 3 Regional Air Navigation Planning and Implementation Issues

3.1 AOP

3.2 ATM/AIS/SAR

3.3 RASMAG

3.4 CNS/MET

3.5 ATS Coordination Group Activities

3.6 Other Air Navigation Matters

Agenda Item 4 Regional Air Navigation Deficiencies

Agenda Item 5 Future Work Programme

Agenda Item 6 Any other business

1.6 **Working Arrangements, Language and Documentation**

1.6.1 The working language of the meeting was English inclusive of all documentation and this Report. Information Papers (IP) and Working Papers (WP) considered by the meeting are listed in the **Attachment 2** to this Report.

1.7 **Conclusions and Decisions - Definition**

1.7.1 The APANPIRG records its actions in the form of Conclusions and Decisions with the following significance:

1) Conclusions deal with matters which, in accordance with the Group's Terms of Reference, require the attention of States or actions by ICAO in accordance with established procedures; and

2) Decisions deal with matters of concern only to the APANPIRG and its contributory bodies.

1.7.2 Lists of Conclusions and Decisions are given on pages i-6 to i-9.

1.8 **Terms of Reference of APANPIRG**

1.8.1 The Terms of Reference of APANPIRG was approved by the Council of ICAO (6th Meeting of its 171st Session on 27 February 2004). Consequent to the decision of the Council [C-DEC 183/9, March/April 2008] the terms of reference have been amended as follows:

1. Membership

All ICAO Contracting States, who are service providers in an air navigation region and part of that region's ANP, should be included in the membership of that region's PIRG. Furthermore user States are entitled to participate in any other PIRG meetings as a non member. International Organisations recognised by the Council may be invited as necessary to attend PIRG meetings as observers.

2. The Terms of Reference of the Group are

a) to ensure continuous and coherent development of the Asia/Pacific Regional Air Navigation Plan and other relevant regional documentation in a manner that is harmonized with adjacent regions, consistent with ICAO SARPs and Global Air Navigation Plan for CNS/ATM systems (DOC 9750) and reflecting global requirements;

b) to facilitate the implementation of air navigation systems and services as identified in the Asia/Pacific Regional Air Navigation Plan with due observance to the primacy of air safety, regularity and efficiency; and

c) to identify and address specific deficiencies in the air navigation field.

3. In order to meet the Terms of Reference, the Group shall:

a) review, and propose when necessary, the target dates for implementation of facilities, services and procedures to facilitate the coordinated development of the Air Navigation Systems in the Asia/Pacific region;

b) assist the ICAO Asia/Pacific Regional Office in fostering the implementation of the Asia/Pacific Regional Air Navigation Plan;

c) in line with the Global Aviation Safety Plan (GASP), facilitate the conduct of any necessary systems performance monitoring, identify specific deficiencies in the air navigation field, especially in the context of safety, and propose corrective action;

d) facilitate the development and implementation of action plans by States to resolve identified deficiencies, where necessary;

e) develop amendment proposals to update the Asia/Pacific Regional Air Navigation Plan to reflect changes in the operational requirements;

f) monitor implementation of air navigation facilities and services and where necessary, ensure interregional harmonization, taking due account of organizational aspects, economic issues (including financial aspects, cost/benefit analyses and business case studies) and environmental matters;

g) examine human resource planning and training issues and propose where necessary human resource development capabilities in the region that are compatible with the Asia/Pacific regional Air Navigation Plan;

h) review the Statement of Basic Operational Requirements and Planning Criteria and recommend to the Air Navigation Commission such changes as may be required in the light of new developments in the air navigation field;

i) request financial institutions, on a consultative basis as appropriate to provide advice in the planning process;

j) maintain close cooperation with relevant organizations and State grouping to optimize the use of available expertise and resources; and

k) conduct the above activities in the most efficient manner possible with a minimum of formality and documentation and call meetings of the APANPIRG when deemed necessary to do so.

[Additions shown as underlined].

List of Conclusions

Conclusion 19/1	–	Regional performance framework
Conclusion 19/2	–	National performance framework
Conclusion 19/3	–	Assistance in South West Pacific Small Island States and Mongolia, Myanmar and Timor Leste in implementing the requirements of aerodrome certification and SMS.
Conclusion 19/7	-	RNP 4 capability for operators
Conclusion 19/8	–	Conduct regional runway safety seminar/workshop.
Conclusion 19/9	–	Support for Ad-Hoc GOLD Working Group.
Conclusion 19/10	–	Future date-time for NOTAMC and NOTAMR
Conclusion 19/11	–	Update SAR Matrix including guidance material.
Conclusion 19/12	–	Accelerated Data Link Implementation in the Manila Flight Information Region (FIR).
Conclusion 19/14	–	Approval of China RMA as Asia Pacific RMA
Conclusion 19/15	–	Enhanced communications between States and RVSM RMAs
Conclusion 19/17	–	Asia/Pacific Aeronautical Telecommunication Network System Security Policy
Conclusion 19/18	–	ATS Message Management Center (AMC) Software
Conclusion 19/19	–	Implementation of AIDC in Asia and Pacific Regions
Conclusion 19/20	–	Adoption of ATN over IPS in addition to ATN over OSI
Conclusion 19/21	–	Amendment to Asia/Pacific Regional AMHS MTA Routing Policy
Conclusion 19/22	–	Amendment to FASID Tables CNS – 1B and CNS – 1C
Conclusion 19/23	–	Amendment to Asia/Pacific AMHS Manual
Conclusion 19/24	–	Satellite Communications Service Performance
Conclusion 19/25	–	ASIA/PAC PBN Implementation Plan
Conclusion 19/26		Agreement for sharing DME Infrastructure
Conclusion 19/27	–	Flight Procedure Design Office
Conclusion 19/28	–	Continuous Descent Final Approach (CDFA) and Baro-VNAV
Conclusion 19/29	–	Separation Standards for PBN

Conclusion 19/31	–	Revision of the Strategy for the Provision of Navigation Services in the Asia/Pacific Region
Conclusion 19/32	–	Testing of Navigation and Surveillance facilities Seminar
Conclusion 19/34	–	Guidance Material on Implementation of ADS-B
Conclusion 19/35	–	Guidelines for the development of ADS-B Implementation Plan
Conclusion 19/36	–	Sample Agreement for ADS-B Data Sharing
Conclusion 19/37	–	Revised Mandate Regional ADS-B Out Implementation
Conclusion 19/38	–	Support provision of VHF radio voice communication associated with ADS-B data sharing between adjacent States
Conclusion 19/39	–	Regional Surveillance Strategy for Asia/Pacific Region
Conclusion 19/40	–	Coordination for SSR Mode S Interrogator Identifier Code
Conclusion 19/41	–	Contact Person for WRC-11 and active participation by the States in WRC-11 related national and regional activities
Conclusion 19/42	–	Providing ASIA/PAC States with information on recent and forthcoming developments to WAFS
Conclusion 19/43	–	Training for the new WAFS gridded forecasts
Conclusion 19/44	–	Use of administrative messages for errors in the WAFS SIGWX forecasts
Conclusion 19/45	–	Transition to ISCS 3rd Generation
Conclusion 19/46	–	Amendment proposal to TAF-related provisions in the ASIA/PAC Basic ANP and FASID (Doc 9673)
Conclusion 19/47	–	Regional preparedness for timely implementation of the new TAF provisions
Conclusion 19/48	–	Test Website for the transition to the new TAF format
Conclusion 19/49	–	Guidance on the period of validity of TAF included in the HF VOLMET broadcasts
Conclusion 19/50	–	Issues related to TAF code
Conclusion 19/51	–	Coordination and Implementation of the Volcanic Ash Notification for Aviation
Conclusion 19/52	–	Update of ASIA/PAC Regional SIGMET Guide
Conclusion 19/53	–	Convening MET/ATM TF meeting and organizing MET/ATM seminar

Conclusion 19/54 – Improvements to aeronautical climatological information provision

Conclusion 19/56 – Common methodology for environmental benefits

List of Decisions

Decision 19/4	–	Dissolution of the Regional Performance Framework Task Force.
Decision 19/5	–	Dissolution of the RVSM/TF
Decision 19/6	–	Establishment of an ICAO Flight Plan & ATS Message Implementation Task Force
Decision 19/13	–	ATM/AIS/SAR Task List
Decision 19/16	–	Revision to the Subject/Tasks List of ATNICG
Decision 19/30	–	Revision to the Terms of Reference of the PBN Task Force
Decision 19/33	–	Subject/Tasks List of ADS-B Study and Implementation Task Force
Decision 19/55		Updated Terms of Reference and Subject/Tasks List of the CNS/MET Sub-group
Decision 19/57	-	Amendments to the Terms of Reference of the ATM/AIS/SAR SG

PART II — REPORT ON AGENDA ITEMS

AGENDA ITEM 1: FOLLOW-UP ON THE OUTCOME OF APANPIRG/18 MEETING

Agenda Item 1.1:	Review of the action taken by the ANC and the Council on the Report of APANPIRG/18
Agenda Item 1.2:	Review status of implementation of APANPIRG/18 Conclusions and Decisions
Agenda Item 1.3:	Review status of implementation of APANPIRG outstanding Conclusions and Decisions

Agenda Item 1: Follow-up on the Outcome of APANPIRG/18 Meeting

1.1 Review of Action taken by ANC and the Council on the Report of APANPIRG/18 Meeting and Status of implementation of APANPIRG/18 Conclusions and Decisions

1.1.1 The meeting reviewed the actions taken by the Air Navigation Commission on the Report of the Eighteenth Meeting of the Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG) held in Bangkok from 3 -7 September 2007. The meeting also noted the follow-up actions by the States and the Secretariat on Conclusions and Decisions of the meeting as contained in **Appendix A** to the Report on Agenda Item 1.2.

1.1.2 Regarding Large Height Deviation (LHD), APANPIRG Conclusion 18/3, the meeting noted the Commission's concern on the poor coordination between area control centres which generates the majority of errors in LHD and that APANPIRG had recommended the implementation of compatible ATS interfacility data communications (AIDC) capabilities as soon as possible. Consequent to the third special RMA meeting held in Montreal from 13 to 15 May 2008 which explored the ways to better define and consider LHD in the risk analysis, the meeting was informed that ICAO will introduce explanatory text in the revised RMA Manual due to be released in February 2009.

1.1.3 The meeting noted that the ANC supported the proposal in Conclusion 18/14 that the NOTAM format be reviewed in light of the various terminologies in common use to determine appropriate provisions for Annex 15 — *Aeronautical Information Services* and requested the Secretariat to include this task in its work programme. Expected date of completion is 2010.

1.1.4 With reference to ADS-B out implementation, the meeting noted that the Commission commended the initiative of APANPIRG to urge States to implement requirements for ADS-B out avionics for aircraft operating in their airspace with a target date of 2010 and requested the Secretary General to advise the remaining PIRGs to promote ADS-B implementation.

1.1.5 As regards ATM requirements for MET services, the meeting noted that the Commission supported APANPIRG Conclusion 18/49 to extend the guidance material in the *Manual on Coordination between Air Traffic Services, AIS and AMS* and called upon ICAO to undertake this task as part of the forthcoming regular amendment to Document 9377 which is expected to be completed by end of 2008.

1.1.6 The meeting was informed that Commission supported APANPIRG Conclusion 18/50 on replacing 'km/h' with 'm/s' in wind speed and called upon ICAO to prepare a corresponding amendment to ICAO provisions. The expected date of completion is 2010.

1.1.7 With regard to development of the deficiency database, the meeting was pleased to note that the Commission had complimented APANPIRG for this initiative and acknowledged that the database in addition to providing transparency would enable information to be current.

1.1.8 Concluding the review, the meeting thanked the Air Navigation Commission for their valuable guidance on various activities of the APANPIRG which would be taken into account in the development of ongoing performance planning of the region.

1.2 Review of Status of Implementation of APANPIRG/18 Conclusions and Decisions

1.2.1 The meeting reviewed the progress made on the APNPIRG/18 Conclusions and Decisions.

1.2.2 The actions taken by States and the Secretariat on the above mentioned Conclusions and Decisions were reviewed and the updated list is provided in **Appendix A** to the Report on Agenda Item 1.2. This updated list is in the new format in line with the ICAO Business Planning and Performance based approach

1.2.3 The meeting noted that out of the 54 Conclusions and 8 Decisions action has been taken to close/complete 47 Conclusions and 8 Decisions. Action on the remaining 7 Conclusions is ongoing.

1.2.4 The meeting acknowledged that significant progress had been made in completing required action on the APANPIRG/18 Conclusions and Decisions and recommended continued action for completion of the few outstanding items in the list.

1.3 Review of Status of Implementation of APANPIRG Outstanding Conclusions and Decisions

1.3.1 The meeting reviewed the progress made on the APANPIRG Outstanding Conclusions and Decisions up to its seventeenth meeting.

1.3.2 The actions taken by States and the Secretariat on the above mentioned Conclusions and Decisions were reviewed and the updated list is provided in **Appendix A and Appendix B** to the Report on Agenda Item 1.3.

1.3.3 The meeting noted that out of the 13 outstanding items, the follow-up action on the 12 Conclusions/ Decisions has been completed and action on 1 Conclusion is ongoing. The meeting acknowledged that significant progress had been made in completing required action on the Outstanding APANPIRG Conclusions and Decisions.

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Follow-up to APANPIRG/18 Conclusions/Decisions – Action Plan

Concl/ Dec No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date	Status
C 18/1 **A**	**Bird Control Committee**	That, States, establish by July 2008 a national bird control committee i) to study, analyze and adopt measures to prevent bird hazards in its aerodromes and their vicinity, and ii) monitor the implementation of bird control programme by the aerodrome operator, to find out its effectiveness and suggest measures.	Invite States to establish a national bird control committee	ICAO APAC Office, States	State letter Report to APANPIRG/19	September 2007 July 2008	**COMPLETED** State letter issued on 26/9/07
C 18/2 **A D**	**Non-provision of safety-related data by States**	That, as a result of the non-provision of safety-related data to approved regional safety monitoring agencies as required by APANPIRG Conclusion 16/4, Fiji, Lao PDR, Myanmar, Papua New Guinea and Tahiti be included in the APANPIRG List of Deficiencies in the ATM/AIS/SAR Fields in accordance with APANPIRG Conclusion 16/6.	Include concerned States in the Deficiency List	ICAO APAC Office	Updated List of Deficiencies	October 2007	**COMPLETED** Included on List of Deficiencies for ATM/AIS/ SAR RASMAG/9 recommended Fiji, Lao PDR and Tahiti be removed from the list due adequate submission of safety data since last APANPIRG

TBD = To be determined

Concl/ Dec No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date	Status
C 18/3 **A D**	**Prevalence of LHDs from ATC Unit-to-ATC Unit Coordination Errors**	That, in noting the continued prevalence of RVSM Large Height Deviation (LHD) occurrences resulting from ATC Unit-to-ATC Unit coordination errors, as reported by RMAs assessing RVSM operations within Asia Pacific Region, the Regional Office:					State Letter AP115 issued, dated 19 October 2007
		a) draws to the attention of States that investigations into LHD should concentrate in this area, and	Invite States to investigate	ICAO APAC Office	State Letter	Dec.2007	**COMPLETED**
			Address the issue globally	ICAO HQ-ANB/ATM	Updated RMA Manual	June 2008	**CLOSED**-Agreed by ANC
		b) highlight the APANPIRG recommendation that States work towards the implementation of compatible AIDC capabilities based on the Asia/Pacific AIDC ICD between ATC units as soon as possible.	Invite States to implement	ICAO APAC Office	State letter	Dec.2007	**COMPLETED**

TBD = To be determined

Concl/ Dec No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date	Status
C 18/4 **A D**	**Consequences of Global RVSM Long Term Height Monitoring**	That, the Regional Office draw to the attention of the RVSM airspace safety monitoring agencies within the Asia Pacific Region the provisional global RVSM long-term height monitoring requirements recently proposed by the ICAO Separation and Airspace Safety Panel (ICAO SASP), and request that those agencies prepare a regional impact statement summarizing the estimated consequences for the Region, including consideration of numbers of airframes required to be monitored, for initial review by RASMAG/8 in late 2007.	Inform RMAs of long term height monitoring requirements and request they prepare impact statements	ICAO APAC Office	Report to RASAMAG	Revised target date – June 09	**ONGOING** RASMAG/8 addressed these issues in detail and raised 6 Long Term Height Monitoring Actions Items. State letter issued on 31/1/08. ***RASMAG/10 & 11 (Dec 08/ June 09) will continue this work.***
C 18/5 **D**	**Adopt Guidance Material for the Asia/Pacific Region ADS/CPDLC/ AIDC Ground Systems Procurement and Implementation**	That, the *Guidance Material for the Asia/Pacific Region ADS/CPDLC/AIDC Ground Systems Procurement and Implementation* as shown in **Appendix C** to the APANPIRG/18 Report on Agenda Item 3.2 be adopted and circulated as regional guidance material.	Circulate guidance material to States	ICAO APAC Office	State Letter	Dec.2007	**COMPLETED** State Letter AP108 dated 11 October 2007, on website

TBD = To be determined

Concl/ Dec No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date	Status
C 18/6 **A D**	**Establishment of the Japan RMA**	That, subject to review by RASMAG/8, JCAB be approved as an APANPIRG Regional Monitoring Agency (RMA) for the Fukuoka FIR.	Process approval	ICAO APAC Office	Report to RASMAG	Revised target date is March 2008	**COMPLETED** RASMAG/8completed review, JCAB RMA approved, announced on website, State ***Letter AP019/08 dated 31 January circulated to APANPIRG members and Asia/Pacific RMAs.***
C 18/7 **D**	**Conduct Regional ATFM Seminar**	That, noting the provisions of GPI- 6 *Air Traffic Flow Management* and the increasing numbers of actual and planned ATFM implementations occurring in the Asia/Pacific Region, the ICAO Asia/Pacific Regional Office conduct, with assistance from States experienced in ATFM, a 3-day Air Traffic Flow Management Seminar during 2008.	Conduct seminar	ICAO APAC Office/States with the experience of ATFM	Seminar	Revised target date is October 2008	**ON GOING** ATFM Workshop scheduled in Fukuoka, Japan from 7-9 October 2008
C 18/8 **D**	**Adopt Version 3 Asia/Pacific AIDC ICD**	That, the Version 3 *Asia/Pacific Regional Interface Control Document for ATS Interfacility Ground/Ground Data Communications* as shown in **Appendix G** to the APANPIRG/18 Report on Agenda Item 3.2 be adopted and circulated as regional guidance material.	Circulate guidance material to the States	ICAO APAC Office	State Letter	Dec.2007	**COMPLETED** State Letter AP107 dated 11 October 2007, on website

TBD = To be determined

Concl/ Dec No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date	Status
D 18/9 **D**	**Dissolution of AIDC Review Task Force**	That, having completed the Version 3 of the Asia/Pacific AIDC ICD in accordance with the APANPIRG Decision 17/13, the AIDC Task Force be dissolved. Any residual tasks with respect to ATN/AMHS transition support be dealt with by the ATNICG and CNS/MET Sub Group of APANPIRG	Notify member states	ICAO APAC Office	Notification by letter	October 2007	**COMPLETED** AIDC Review task force dissolved. The residual tasks are included in the tasks of ATNICG
C 18/10 **D**	**Clarification of intent of Annex 2 in relation to variations in true airspeed**	That, noting the importance of full ATC awareness of actual aircraft speed differentials in the application of reduced longitudinal separation and that a 5 percent variation in speed meant the difference between M.080 and M.084, ICAO be invited to:					**CLOSED – *work will be progressed*** by ICAO HQ- noted by ANC
		a) clarify the intent of paragraph 3.6.2.2 of Annex 2 – *Rules of the Air* in relation to the terminology "inadvertent changes"; and	Provide clarification	ICAO HQ-ANB/ATM	Appropriate provisions	June 2008	SASP addressing the issue.
		b) review the 5 percent parameter as applicable to variations in true airspeed described in paragraph 3.6.2.2 b) of Annex 2 to establish whether this parameter should be reduced in areas where reduced longitudinal separation standards were being applied.	Review the standard	ICAO HQ-ANB/ATM	Appropriate provisions ICAO Issue Form transmitted to HQ by Regional Office in early 2008	June 2008	SASP addressing the issue

TBD = To be determined

Concl/ Dec No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date	Status
C 18/11 **D**	**Endorsement of the Use of ICARD System**	That, so as to facilitate and enhance the management of the five-letter name-codes in the Asia and Pacific Region: a) States endorse the use of the ICAO Five-Letter Name Codes and Route Designators (ICARD) database, initially developed by the EUR/NAT Office and Euro control; and b) the Regional Office provide all necessary guidelines to facilitate the regional implementation of ICARD.	Endorse the use of the ICARD Provide guidelines	ICAO APAC Office/ States ICAO APAC Office	State letter Prepare Guidelines	May2008 May2008	**COMPLETED** **COMPLETED**
C 18/12 **D**	**Assistance to States to improve AIS capability**	That, in follow up to the comprehensive survey on AIS conducted in the Asia/Pacific Region in 2006/2007, ICAO undertake a special implementation project during the second half of 2008 for a workshop/seminar to be held on AIS automation	Establish SIP Conduct SIP	ICAO HQ Regional Office assisted by States	SIP approval SIP completed	2009. .	**COMPLETED** Council has approved -a Seminar, to be scheduled for late 2008 **ON GOING** Scheduled in Feb 2009 in Tokyo Japan

TBD = To be determined

Concl/ Dec No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date	Status
C 18/13 **D**	**Amendment to Chapter 3 of *Guidance Manual for Aeronautical Information Services (AIS) in the Asia/Pacific Region***	That, the amended Chapter 3 (OPADD) of the *Guidance Manual for Aeronautical Information Services (AIS) in the Asia/Pacific Region* as shown in **Appendix J** to the APANPIRG/18 Report on Agenda Item 3.2 be adopted and circulated as regional guidance material.	Circulate amended Chapter 3 to the States	ICAO APAC Office	State Letter	Dec2008	**COMPLETED** State Letter AP127/07 (ATM) of 20 November 2007 and on website
C 18/14 **D**	**Review of the NOTAM format**	That, in light of various terminologies in common use for NOTAM, such as date-time of filing, date-time of origination, effective, applicable, period of validity, comes into force and the need for NOTAMC and NOTAMR to be explicit and unambiguous, ICAO be invited: a) to review and revise Annex 15 – *Aeronautical Information Services*, Appendix 6 - NOTAM Format, Instructions for the Completion of the NOTAM Format, Section 5 – Item B to provide that NOTAMC and NOTAMR shall have immediate effect and prohibit a NOTAMC and a NOTAMR with a future date-time coming into force; and b) to define the terminologies used for NOTAM in the Instructions for Completion.	Review the NOTAM format	ICAO HQ	Appropriate provision ICAO Issue Form transmitted to HQ by Regional Office in early 2008	2010	**CLOSED** Work will be progressed by ICAO HQ. ANC has supported and requested the secretariat to process the issue form as a priority.

TBD = To be determined

Concl/ Dec No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date	Status
C 18/15	**Strategies to implement eTOD**	That, in light of the experiences encountered by States attempting to implement Annex 15 provisions on eTOD, ICAO be invited to:					
D		a) hold an eTOD Workshop in the Asia and Pacific Region during 2008;	conduct workshop	ICAO APAC Office	SIP Approval Workshop	Feb 2009	**COMPLETED** **ON GOING** Scheduled in Feb 09 in Tokyo Japan
		b) make available the *Guidelines for Electronic Terrain, Obstacle and Aerodrome Mapping Information* (Doc 9881), as soon as possible; and	circulate guidelines to states	ICAO APAC Office	State letter	2010	**CLOSED**
		c) provide specific guidance on cost recovery and property rights of eTOD material	establish and provide guidelines	ICAO HQ	Specific guidelines		**CLOSED**- WW symposium conducted in June 08 addressed this issue.

TBD = To be determined

Concl/ Dec No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date	Status
C 18/16 **D**	**State Non-Compliance with AIRAC notification periods**	That, in light of the longstanding concerns of APANPIRG in respect to the importance of regular and ongoing compliance by AIS service providers with Annex 15 – *Aeronautical Information Services* provisions on AIRAC notification periods, and in order to make stakeholders aware of the AIRAC system, the Regional Office urge States to: a) implement robust measures as soon as practicable to promulgate relevant information to aviation administrations, airport authorities, project managers, airspace planners, construction companies, etc, and b) specifically include this item in their safety oversight programmes.	Urge States to comply with Annex 15	ICAO APAC Office	State letter	Dec2007	**COMPLETED** State Letter AP103/07 (ATM) dated 10 October 2007
C 18/17 **D**	**JWG Review of Regional SAR Capability Matrix**	That, the Regional Office seeks the assistance of the United States in coordinating a review of the format of the Asia/Pacific SAR Capability Matrix by the ICAO-IMO Joint Working Group on SAR, with particular guidance sought in relation to COSPAS SARSAT capabilities including Local User Terminal and SAR Point of Contact	Liaise with USA	ICAO APAC Office ICAO APAC office/United States	E MAIL to USA Revised format of the SAR Capability Matrix	Dec2007. July 2008	**COMPLETED** **COMPLETED**

TBD = To be determined

Concl/ Dec No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date	Status
C 18/18 **A D**	**Promulgate Recommendations of the ICAO February 2007 SAR Workshop**	That, the recommendations made by the ICAO SAR Workshop held at Bangkok, Thailand on 26 February - 2 March 2007, as shown in **Appendix M** to the APANPIRG/18 Report on Agenda Item 3.2, be promulgated regionally by the ICAO Asia/Pacific Regional Office and be taken into account by States and the Regional Office in considering their future SAR activities.	Promulgate the recommendations	ICAO APAC Office/ States	State letter	Nov2007	**COMPLETED** State Letter AP104/07 (ATM) dated 10 October 2007
C 18/19 **D**	**Registration of ELT Beacons**	That, States be requested to designate by March 2008 a registering agency for registering ELT Beacons, coded with the country code of the State and unique code of that beacon in a database as specified in paragraph 5.3.2.2 of Annex 10, Volume III and the guidance provided in Appendix I to Chapter 5 'Emergency Locator Transmitter Coding' of the Annex.	Urge States to comply with Annex 10	ICAO APAC Office States	State Letter	Dec 2007	**COMPLETED** State Letter AP102/07 (ATM) dated 10 October 2007

TBD = To be determined

Concl/ Dec No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date	Status
C 18/20 **D**	**Promote Relationships between APANPIRG, APMHSA and the ICAO-IMO Joint Working Group**	That, recognizing that APANPIRG, the Asia-Pacific Heads of Maritime Safety Agencies (APHMSA) and the ICAO-IMO Joint Working Group on SAR discuss common SAR matters of relevance to the Asia/Pacific Region, the Regional Office seek the assistance of the United States in coordinating the SAR reporting activities of APANPIRG with the other two groups on a reciprocal basis.	Liaise with the United States	ICAO APAC Office	Letter to USA	**Target date <u>is July</u> 2008**.	**CLOSED** The United States are members of APANPIRG, APMHSA and the ICAO-IMO Joint Working Group and indicated that they will provide a coordinating role for SAR activities between each group on an ongoing basis
D 18/21 **D**	**ATM/AIS/SAR Subject/Task List**	That, the ATM/AIS/SAR Subject/Task Lists as contained in **Appendices N and O** to the APANPIRG/18 Report on Agenda Item 3.2 be adopted as the current work programme for the ATM/AIS/SAR Sub-Group.	Notify sub group	ICAO APAC Office	Notification by letter to the sub group members	June 2008	**COMPLETED**
C 18/22 **D**	**Foundation Training and Training for Implementation Planners**	That, States be encouraged to undertake Foundation Training and Training for Implementation Planners in the areas recommended in the Global Air Navigation Plan	Urge States to arrange Training as recommended in the Global Air Navigation Plan	ICAO APAC Office	State Letter	November 2007	**CLOSED**. State Letter AP0119/07 (CNS) issued on 2 Nov.07. GM provided to States.

TBD = To be determined

Concl/ Dec No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date	Status
C 18/23 **D**	**Discontinuation of Asia/Pacific Regional Plan for New CNS/ATM Systems**	That a) in order to harmonize planning process with the Global Air Navigation Plan, Regional Plan for New CNS/ATM Systems be discontinued; and b) ICAO be invited to develop detailed proposals for incorporating the useful information contained in the Regional Plan for the CNS/ATM Systems into the Asia Pacific Regional Air Navigation Plan (Doc 9763) and completed by 2009.	Notify states Establish proposals	ICAO APAC Office ICAO APAC Office	State letter Proposal for the consideration at APANPIRG 20 in September 2009	Oct 2007 2009	**COMPLETED**. State Letter AP0112/07 (CNS) issued on 16 Oct. 07 **ON GOING** Task in b) to be undertaken in coordination with HQ
D 18/24 **D**	**Revision to the Terms of Reference and the Subject/Tasks List of ATNICG**	That, the Revised Subject/Tasks List of the ATNICG provided in **Appendix A** to the Report on Agenda Item 3.3 be adopted.	Notify the revised TOR and Task List	ICAO APAC Office/ATNICG	Revised TORs/Tasks List	May 2008	**COMPLETED**. ATNICG/3 was notified the Subject/Tasks List
C 18/25 **D**	**Guidance Document for AMHS Conformance Testing**	That, the Guidance Document for AMHS Conformance Testing as provided in **Appendix B** to the Report on Agenda Item 3.3 be adopted and published as First Edition for use in the Asia and Pacific Region	Publish First Edition of the Guidance Document for AMHS	ICAO APAC Office	Guidance Document for AMHS in ICAO APAC Website	December 2007	**COMPLETED**. Posted on APAC web site and States were informed on 18 Dec. 07

TBD = To be determined

Concl/ Dec No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date	Status
C 18/26 **D**	**Amendment to FASID Table CNS-1E**	That, FASID Table CNS-1E, ATS Inter-Facility Data Communication (AIDC) Implementation Plan , be replaced with the updated Table in accordance with the established procedure.	Process amendment proposal	ICAO APAC Office	Amendment proposal	March 2008	**COMPLETED**. Amended FASID CNS Table 1E circulated to States through letter dated 19 March, 2008. Approved on 23 May 08.
C 18/27 **D**	**ATN/AMHS Implementation Seminar/Workshop**	That, ICAO be invited to coordinate with the State concerned to conduct an ATN/AMHS Seminar/Workshop to address implementation issues in early 2008	Coordinate with Thailand for conducting Workshop	ICAO APAC Office	Workshop	January 2008	**COMPLETED**. The workshop was conducted from 21 to 23 January, 2008 in Chiang Mai
C 18/28 **D**	**Amendment to AMHS ICD**	That, the revised AMHS ICD provided in the **Appendix C** to the Report on Agenda Item 3.3 be adopted as the Second Edition of ASIA/PAC AMHS ICD	Publish AMHS ICD	ICAO APAC Office	Web document	December 2007	**COMPLETED**. Posted and States were informed on 18 Dec.07
C 18/29 **D**	**Aeronautical Mobile (R) Service Strategy**	That, the Strategy for Aeronautical Mobile (R) Service in the Asia/Pacific Region shown in **Appendix D** to the Report on Agenda Item 3.3 be adopted and published.	Publish Aeronautical Mobile (R) Service Strategy	ICAO APAC Office	State Letter	September 2007	**COMPLETED**. State Letter AP0132/07 (CNS) issued on 14 Dec.07

TBD = To be determined

Concl/ Dec No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date	Status
C 18/30 **D**	**Strategies for the Provision of Navigation Services and GNSS Navigation Capability in the Asia/Pacific Region**	That, the Strategies for the provision of navigation services and GNSS Navigation Capability provided in **Appendix E** and **Appendix F** to the Report on Agenda Item 3.3 be adopted and published.	Publish the revised strategies on the ICAO APAC Website	ICAO APAC Office	Revised Strategies published in APAC Region Website	December 2007	**COMPLETED**. State Letter dated 14 December 2007 issued and posted on APAC web site.
D 18/31 **D**	**Revision of the TOR and Subject/Tasks List of ADS-B Study and Implementation Task Force**	That, the revised Terms of Reference (TOR) and Subject/Tasks List of ADS-B Study and Implementation Task Force provided in **Appendix G** to the Report on Agenda Item 3.3 be adopted.	Notify the ADS-B SITF revised Terms of Reference and Tasks list	ICAO APAC Office/ADS-B SITF	Revised TOR and Subject/Tasks list of ADS-B Study and Implementation Task Force	April 2008	**COMPLETED**. TOR and Subject/Tasks List reviewed by ADS-B SITF/7 held from 7 to 11 April, 2008 and posted on web site.
C 18/32 **D**	**The guidance material on comparison of various surveillance technologies**	That, the guidance material on comparison of various surveillance technologies (GMST) provided in the **Appendix H** to the Report on Agenda Item 3.3 be adopted.	Publish the Guidance Material on Comparison of Various Surveillance Technologies.	ICAO APAC Office	Publish Guidance Material on Comparison of Various Surveillance Technologies on ICAO APAC Website	January 2008	**COMPLETED**. State Letter dated 14 December 2007 issued and posted on APAC web site.

TBD = To be determined

Concl/ Dec No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date	Status
C 18/33 **D**	**The Second Amendment to the AIGD**	That, the ADS-B Implementation and Operational Guidance Document (AIGD) be amended as shown in the **Appendix I** to the Report on Agenda Item 3.3.	Publish the amended AIGD.	ICAO APAC Office	Amended AIGD be available in ICAO APAC Website	January 2008	**COMPLETED**. State Letter dated 14 December 2007 issued and posted on APAC web site.
C 18/34 **D**	**Guidelines on performance parameters for using ADS-B managed service**	That, States consider the performance parameters contained in **Appendix J** to the Report on Agenda Item 3.3 as service performance guidelines while finalizing acquisition of an ADS-B managed service agreement with a service provider.	a) Publish the guidelines; and b) urge the States to use these guidelines on performance parameters for using ADS-B managed service.	ICAO APAC Office	Publication of Guidelines on ICAO APAC Website State Letter	December 2007	**COMPLETED**. State Letter dated 14 December 2007 issued and the guidelines posted on the APAC web site.

TBD = To be determined

Concl/ Dec No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date	Status
C 18/35 **D**	**Mandate Regional ADS-B Out Implementation**	That, States planning to deliver ADS-B based ATS services, implement requirements for ADS-B Out avionics equipage for aircraft operating in their airspace with a target date of 2010 *Note: The implementation would require aircraft equipped with avionics compliant with either* *a) Version 0ES as specified in Annex 10, Volume IV, Chapter 3, Paragraph 3.1.2.8.6 (up to and including Amendment 82 to Annex 10) and Chapter 2 of draft* Technical Provisions for Mode S Services and Extended Squitter *(ICAO Doc 9871) to be used till at least 2020. or* *b) Version 1ES as specified in Chapter 3 of draft* Technical Provision for Mode S Services and Extended Squitter *(ICAO Doc 9871) (Equivalent to DO260A)*	Urge the States to implement requirements for ADS-B Out avionics with target date of 2010	ICAO APAC Office	State Letter	December 2007 **Target date revised to April 2008**	**CLOSED.** State letter issued on 16 April 08
C 18/36 **D**	**Concept of Use for Multilateration**	That, the Concept of Use of Multilateration provided in **Appendix K** to the Report on Agenda Item 3.3 be adopted as Version 1 for use as regional guidance material.	Advise the States on the availability of Guidance Material	ICAO APAC Office	Publish the Guidelines on ICAO APAC Region Website	January 2008	**COMPLETED**. Posted on APAC web site and States were informed on 14 Dec. 07

TBD = To be determined

Concl/ Dec No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date	Status
C 18/37 **D**	**Surveillance Strategy for Asia/Pacific Region**	That, the Surveillance Strategy for Asia/Pacific Region provided in **Appendix L** to the Report on Agenda Item 3.3 be adopted and published.	Publish the guidance material. Advise the States on availability of the Strategy	ICAO APAC Office	Surveillance Strategy in ICAO APAC Website	September 2007	**COMPLETED**. Surveillance Strategy for Asia/Pacific Region posted on ICAO APAC website
C 18/38 **D**	**Establishment of ADS-B Working Group-SEA**	That, a South-East Asia Sub-regional ADS-B Implementation Working Group be established by end 2007 to develop the terms of cooperation and an implementation plan for near-term ADS-B applications in the sub-region.	ADS-B SEA Working Group to be established	States concerned	Group established and first meeting conducted	December 2007	**COMPLETED**. ADS-B SEA Working Group established. First meeting of the Group held in Nov. 07. Conducted 2nd meeting on 2 & 3 July 08 in KL, Malaysia.
C 18/39 **D**	**Update of ISCS Operational Focal Points**	That, a) ICAO Regional Office request ASIA/PAC ISCS user States to update the list of ISCS operational focal points shown in **Appendix M** to the Report on Agenda Item 3.3; and b) the ISCS provider State maintains the list of ISCS operational focal points on the ISCS website.	a) Urge States to update their nomination for the focal points b) Urge provider State to maintain the updated list	ICAO APAC Office	Updated List of Focal Points of Contact	April 2008	a) **COMPLETED** State letter was Issued. Replies are being received and updating of the list in Progress. b) Provider States urged to maintain the updated list

TBD = To be determined

Concl/ Dec No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date	Status
C 18/40 **D**	**Co-ordination between WAFCs and TCACs**	That, the WAFSOPSG be invited to consider including a provision in Annex 3 requiring the WAFCs to establish and maintain contact with the TCACs in order to harmonize the information on tropical cyclones in the WAFS SIGWX forecast and the TCAC advisories.	Invite WAFSOPSG to consider inclusion in Annex 3 the requirement of contact information	ICAO HQ	Appropriate provisions in Annex 3.	2013	**CLOSED.** Coordination with WAFSOPSG has been completed through its Secretary. ANC supported the request
C 18/41 **A D**	**Improvements of WAFS temperature forecasts near the tropopause over the polar regions**	That, the WAFSOPSG be invited to consider ways to improve the provision of WAFS temperature forecasts near the tropopause over the polar regions.	Invite WAFSOPSG to consider the ways to improve temperature forecast	ICAO APAC Office	Improvement in the Temperature Forecast	2008	**CLOSED** Coordination with WAFSOPSG completed to consider the ways to improve temperature forecast
C 18/42 **A D**	**MET Deficiencies Related to OPMET Data Shortfalls**	Recognizing the importance of regular provision of OPMET data for the safety and efficiency of the air transport operations, systematic data shortfalls identified by the OPMET Management Task Force through its monitoring procedures be considered as deficiencies and added to the APANPIRG list of deficiencies in accordance with the established procedures	Carry out co-ordination with the States concerned to validate the identified deficiencies.	ICAO APAC Office/States concerned	State Letter	2008	**COMPLETED** States concerned were urged to take urgent action to validate and correct deficiency with U priority.

TBD = To be determined

Concl/ Dec No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date	Status
C 18/43 **D**	**Harmonization of the content and format of Asia/Pacific OPMET data on the ISCS broadcast.**	That, the ISCS Provider State, in coordination with RODB Tokyo and RODB Singapore, be invited to consider harmonizing the bulletin format and the content of the OPMET information on the ISCS broadcast in order to ensure that all ASIA/PAC OPMET data relayed to Washington Data Bank is disseminated by the ISCS broadcast.	Urge ISCS Provider State to consider the harmonization of bulletin format and content of OPMET Information	ICAO APAC Office	Harmonized format and contents of OPMET data	December 2007	**COMPLETED** ISCS Provider State and RODB Singapore and Japan harmonized bulletin format and content of OPMET Information as of 29 August 2008 at 0000UTC
C 18/44 **D**	**Implementation of Changes to TAF Provisions in Amendment 74 to Annex 3**	Recognizing that changes to the provisions for TAF in Amendment 74 to Annex 3, which will become applicable on 5 November 2008, will require significant changes to the States' national practices and to the ROBEX TAF exchange: a) the OPMET Management Task Force should conduct a regional study to identify the States' plans for implementation in order to ensure timely update of the related ROBEX TAF procedures:	Conduct a Study to identify the States' plans for implementation of Amendment 74 to Annex 3 and	OPMET Management Task Force	Study Results	2008	**COMPLETED** OPMETMTF/6 adopted a decision to conduct a survey on the use of TAF information in VOLMET by airlines. Survey conducted
		b) IATA be requested to provide the new users' requirements for the TAF period of validity for all aerodromes in FASID Table MET 1A as soon as possible but not later than end of December 2007	Request IATA to provide new user requirements	ICAO APAC Office	Identification of user requirements	December 2007	**COMPLETED**

TBD = To be determined

Concl/ Dec No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date	Status
C 18/45 **A D**	**Enhancing Quality Control on OPMET information by States.**	That, States be urged to undertake systematic monitoring and quality control of the OPMET information promulgated for international exchange in accordance with Annex 3, 2.2.4 and 2.2.5 to ensure full compliance with specified formats and contents of the messages, as well as, with the prescribed filing and transmission schedules.	Urge States to take up monitoring and quality control of OPMET information in accordance with Annex 3, 2.2.4 and 2.2.5	ICAO APAC Office	State Letter	December 2007	**CLOSED** State letter issued urging States to take up monitoring and quality control of OPMET information in accordance with Annex 3, 2.2.4 and 2.2.5
C 18/46 **D**	**Issues related to Implementation Improvement of the SIGMET Provisions**	That, the implementation issues identified by the ASIA/PAC SIGMET seminar, listed in **Appendix N** to the Report on Agenda Item 3.3, be brought to the attention of the Meteorology Warnings Study Group (METWSG) for further study and development of additional guidance to improve the implementation.	Inform METWSG about the issues identified for further study	ICAO HQ	Amendment to Doc 8896 Annex 3 provisions	2008 2010	**CLOSED** METWSG has been informed about the issues identified for further study

TBD = To be determined

Concl/ Dec No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date	Status
C 18/47 **D**	**New edition of the ASIA/PAC SIGMET Guide**	That, the Fourth edition of the ASIA/PAC SIGMET Guide, as shown in **Appendix O** to the Report on Agenda Item 3.3, be published on the ICAO APAC website according to established procedures and the Regional Office urges States to implement the amended SIGMET provisions in time for the applicability date of Amendment 74 to Annex 3 (7 November 2007).	a) Publish ASIA/PAC SIGMET Guide b) Urge States to implement SIGMET provisions in time as stipulated in Amendment 74 to Annex 3	ICAO APAC Office	SIMET Guide on web site State Letter	2008 2008	**a) COMPLETED-** New Edition of ASIA/PAC SIGMET Guide is published in the web site and States have been advised accordingly. **b) COMPLETED** States were urged to implement SIGMET provisions in time as stipulated in Amendment 74 to Annex 3
C 18/48 **D**	**Amendment to the MET part of the ASIA/PAC Basic ANP and FASID (Doc 9673)**	That, the amendment proposal to Part VI, Meteorology (MET) of the ASIA/PAC Basic ANP and FASID shown in **Appendix P** to the Report on Agenda Item 3.3, be processed in accordance with the established procedure.	Process amendment for Part VI (MET) of the ASIA/PAC Basic ANP and FASID	ICAO APAC Office	Amendment Proposal	2008	**COMPLETED** Processed amendments to Part VI (MET) of the ASIA/PAC Basic ANP and FASID in accordance with the established procedure.

TBD = To be determined

Concl/ Dec No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date	Status
C 18/49 **D**	**Developing guidance on the ATM requirements for MET services and facilities**	That, ICAO be invited to extend the guidance material in Doc 9377, *Manual on Coordination between Air Traffic Services, Aeronautical Information Services and Aeronautical Meteorological Services*, to cover new requirements for MET services and facilities emerging from the Global ATM Operational Concept, Doc 9854 and the Global Air Navigation Plan, Doc 9750.	Co-ordinate with ICAO HQ for the amendments of Doc 9377 to include new requirements for MET services and facilities	ICAO HQ	Amendment of Doc 9377 ICAO Issue Form transmitted to HQ by Regional Office in early 2008	2008	**CLOSED** Survey was conducted and the result is being consolidated for submission to ICAO HQ for the appropriate action.
C 18/50 **D**	**Replacing "km/h" with "m/s" as the SI unit of measurement of wind speed in ICAO Annexes**	That, ICAO, in consultation with users, be invited to consider replacing "km/h" with "m/s" as the SI unit of measurement of wind speed in ICAO Annexes.	Co-ordinate with ICAO HQ for amendment proposals in consultation with the users	ICAO HQ	Amendment proposal ICAO Issue Form transmitted to HQ by Regional Office in early 2008	2010	**CLOSED** ANC approved amendment proposal to Annex 3.
D 18/51 **D**	**Updated Terms of Reference and Subject/Tasks List of the CNS/MET Sub-group**	That, the Terms of Reference and the Subject/Tasks List of the CNS/MET Sub-group presented in **Appendix S** and **Appendix T** to the Report on Agenda Item 3.3 respectively, be adopted.	Notify CNS/MET SG of the updated Terms of Reference and Subject/Tasks List	ICAO APAC Office	Updated TOR and subject /Tasks List	2008	**COMPLETED** CNS/MET SG meeting in July 2008 notified of the updated Terms of Reference and Subject/Tasks List

TBD = To be determined

Concl/ Dec No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date	Status
C 18/52 **D**	**Establishment of a regional Performance Based Navigation Task Force (PBN/TF)**	That, an Asia/Pacific PBN Task Force, with terms of reference as outlined in **Appendix A** to the APANPIRG/18 Report on Agenda Item 3.5, be established to develop a PBN implementation plan for the Asia/Pacific Region and address related regional PBN implementation issues.	Establish the PBN Task Force	ICAO APAC Office	PBN Task Force	Jan/2008	**COMPLETED** First Meeting of PBN Task Force held from 9-11 January 2008. Second meeting held from 1-3 April 08. Third meeting held from 16-18 July 08.
C 18/53 **D**	**Development of State PBN Implementation Plans**	That, the Regional Office encourage States to begin development of their State PBN implementation plans in harmony with the development of the Asia/Pacific Regional PBN implementation plan being coordinated by the Asia/Pacific PBN Task Force for submission to APANPIRG/19 (2008).	Encourage States to develop State PBN implementation plan by 2009	ICAO APAC Office	State Letter based on regional PBN implementation plan to be developed by PBN task force	2009	**ONGOING**. PBN/TF is developing models for such plans.
C 18/54 **D**	**Globally harmonized SARPS and guidance material for PBN**	That, ICAO be invited to continue to ensure development and maintenance of globally harmonized PBN SARPs and guidance materials to keep pace with operational PBN implementation demands, including development of model documentation suitable for adaptation by State regulatory authorities in implementing State aircrew and airframe approval processes for PBN.	Develop globally harmonized PBN SARPs and guidance material.	ICAO HQ	Appropriate provisions and guidance material ICAO Issue Form transmitted to HQ by Regional Office in early 2008	July 2009	**CLOSED** ANC supported and requested the secretariat to process the issue form as a priority

TBD = To be determined

Concl/ Dec No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date	Status
C 18/55 **D**	**Designation of contact person for PBN implementation**	That, by 31 December 2007, States designate a focal contact person responsible for performance based navigation implementation and provide details of the contact person to ICAO Asia/Pacific Regional Office accordingly.	Designate contact person for PBN implementation	States	List of contact persons	Dec2007	**CLOSED** State letter circulated on 3 October 2007.
D 18/56 **D**	**Revised Terms of Reference for RASMAG**	That, the revised Term of Reference for the Regional Airspace Safety Monitoring Advisory Group (RASMAG) provided in **Appendix B** of the APANPIRG/18 Report on Agenda Item 3.5 be adopted.	Advise RASMAG of amended TOR	ICAO APAC Office	Revised TOR for RASMAG	Dec2007	**COMPLETED**, reviewed by RASMAG/8 December 2007
D 18/57 **D**	**Dissolution of RASMC/TF**	That, there being no need for further activity for the foreseeable future on mechanisms for regional funding arrangements for Asia/Pacific airspace safety monitoring, the RASMC/TF be dissolved.	Notify members	ICAO APAC Office	Notification to member States	Oct 2007	**COMPLETED** State Letter AP109/07 (ATM) dated 16 October 2007
C 18/58 **D**	**Adoption of APANPIRG On-line Deficiency Data Base (follow-up of APANPIRG 17/53, ALLPIRG 5/14**	That, a) the APANPIRG Deficiency Data Base be adopted and linked to the ICAO APAC web site; and b) the Regional Office provide secured access to the on-line Deficiency Data Base to all CAAs and other authorities concerned within the ASIA/PAC States.	Establish on line database on APAC website	ICAO APAC Office	User name and pass word provided to States and other authorities concerned	December 2007	**COMPLETED** State letter circulated on 10 Oct 07

TBD = To be determined

Concl/ Dec No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date	Status
C 18/59 **D**	**Resolution of ATM and OPS Deficiencies in the South West Pacific Small Island Developing States (SIDS)**	That, in recognizing the safety implications of the long-standing ATM and OPS deficiencies in the South-West Pacific SIDS included in the APANPIRG Deficiency Data Base, ICAO, in coordination with the international organizations and regional bodies concerned, considers providing urgent assistance to these States in order to build their capacity to provide the required services in a sustainable and cost-efficient manner	Assist in establishment of TC project	ICAO HQ	TC Project	2008	**ON GOING** State letter to SIDS circulated on 22 January 08 to update the status of deficiencies identified. Additional follow up by Regional Office and through PASO. Response still awaited from States.

TBD = To be determined

Concl/ Dec No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date	Status
C 18/60	**Implementation aspects of the Regional Supplement to the Uniform Methodology for resolution of deficiencies.**	That, the Regional Office promulgates the amended Supplement to the Uniform Methodology as shown in the attachment and draws attention to the need to comply with the Supplement, in particular, with the following key implementation requirements: • Designation of a contact officer by all States to coordinate with the Regional Office matters related to deficiencies ; • Timely provision of corrective action plans by the States for all identified deficiencies • User organizations obligation to provide periodically information on identified or resolved deficiencies.	Notification to States	ICAO APAC Office	State letter and web site publication	Nov 2007	**COMPLETED**. State letter issued on 1 October 2007. 10 States (China, HK, Fiji, Japan, Malaysia, Maldives, NZ, Singapore, and Thailand & ROK) have designated their contact person.
D 18/61 **D**	**Dissolution of DRTF**	That, the DRTF, having completed its task of developing procedures and guidelines in the management of air navigation deficiencies, according to its Terms of Reference, be dissolved	Notify member states	ICAO APAC Office	Notification to Member states	October 2007	**COMPLETED**. State letter issued on 24 Sept 07.

TBD = To be determined

Concl/ Dec No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date	Status
C 18/62 **A D**	**Resolution of air navigation deficiencies**	That, a) States establish action plans with fixed target dates for resolution of safety related deficiencies and inform ICAO Regional Office b) States to consider utilizing the services of the ICAO Technical Cooperation Bureau for rectification of the deficiencies identified and c) States, financial institutions, industry and other partners be requested to provide funding support or kind to technical cooperation projects developed to rectify deficiencies identified.	Urge States to prepare action plan and consider utilizing the services of Technical Cooperation Bureau for the resolution of deficiencies.	ICAO APAC Office, States	State letter State's Action Plan to resolve deficiencies.	Jan 2008	**COMPLETED**. State letter issued on 10 October 07.

*** Note:** ICAO has established the following Strategic Objectives for the period 2005-2010:
A: Safety - *Enhance global civil aviation safety*; **B: Security** - *Enhance global civil aviation security*; **C: Environmental Protection** - *Minimize the adverse effect of global civil aviation on the environment*; **D: Efficiency** - *Enhance the efficiency of aviation operations*; **E: Continuity** - *Maintain the continuity of aviation operations;* **F: Rule of Law** - *Strengthen law governing international civil aviation.*

TBD = To be determined

Follow up action by ICAO on other items

Strategic Objective	APANPIRG/18 report ref page	Text of item	Follow up action	To be initiated by	Deliverable	Target date	status
	3.2.126	Common ICD for global implementation of AIDC		ICAO APAC office	ICAO to advice on suitable automated method of transferring planned and/or current aircraft data from one ANSP to another		**CLOSED** ICAO HQ was informed and requested to include in the work programme.
	3.2.144	Communications performance associated with the provision of regional data link services	Further guidance on suitable mechanism that enforce adequate end to end system performance of satellite communications systems to meet current and future data link operational demands.	ICAO APAC office	Further guidance by ICAO		**CLOSED** HQ was informed and provided WP/21to APANPIRG/19

TBD = To be determined

Strategic Objective	APANPIRG/18 report ref page	Text of item	Follow up action	To be initiated by	Deliverable	Target date	Status
	3.1.1	Amendment proposal to Basic ANP and FASID-AOP	Notify member states	ICAO APAC	State letter	30 Sept 07	**COMPLETED** State letter issued on 26 Sept 07.

TBD = To be determined

STATUS OF OUTSTANDING CONCLUSIONS/DECISIONS OF APANPIRG IN ATM/AIS/SAR FIELDS

Report Reference ----------- Conc/Dec No	Action by ANC/ Council	Decision/Conclusion Title/ ANC/Council Action, if any	Action by States/ICAO	Status
C16/19		**Study of States' preparedness to implement safety management systems** That, a study of States' preparedness to implement ICAO safety management systems in accordance with Annex 11 be undertaken by the Asia/Pacific Regional Office in conjunction with the ATS coordination groups and RASMAG by the first quarter of 2006, and a plan of action developed to be reported to APANPIRG/17 in September 2006.	A SIP proposal for additional ATS SMS training via field visits was developed by Regional Office and approved by ICAO Council, for implementation in last quarter 2006. SIP workshop was conducted from 25-29 September 2006.	**CLOSED** RASMAG/9 (May 08) considered that this Conclusion had been overtaken by events and made recommendation to APANPIRG/19 that it be 'Closed'.

STATUS OF OUTSTANDING CONCLUSIONS/DECISIONS OF APANPIRG IN THE CNS/MET FIELDS

Report Reference ----------- Conc/Dec No.	Noted by ANC/ Council	Decision/Conclusion ANC/Council Action, if any	Action by States/ICAO	Status
C 15/15		**Conclusion 15/15 – Asia/Pacific Regional ATN Implementation System Management Operational Procedures** That, the Asia/Pacific regional ATN Implementation System Management Operational Procedures be published to assist States in implementation of the ATN ground infrastructure in the Asia/Pacific region.	Considered premature due to lack of experience in operational aspect to develop a manual procedure. This task can be addressed only after gaining sufficient operational experience of AMHS. Asia/Pacific Regional ATN Implementation System Management Operational Procedures containing initial direction and guidance was published in August 2004.	**ON GOING** The basic guidance material on procedures was developed in 2004. Further updates are expected by ATNICG based on sufficient experience gained in 2009.
Conclusions/Decisions of APANPIRG/16				
C 16/47		**Conclusion 16/47 – Production of SIGMET posters** That, in order to enhance the availability and quality of the SIGMET information, Australia and Hong Kong China be invited to produce in 2006, in coordination with the VA/TC Implementation TF, and in consultation with ICAO, WMO and the TCAC and VAAC Provider States in Asia/Pacific Region, SIGMET posters describing the SIGMET procedures for volcanic ash clouds, tropical cyclones and other hazardous meteorological phenomena, to be used as training material and quick reference tools by the MWOs.	The posters for WS and tropical cyclone SIGMET have been prepared by Hong Kong, China; the poster for volcanic ash SIGMET has been prepared by Australia and New Zealand in coordination with the ICAO, WMO and Japan. The posters dissemination to States is being processed.	**COMPLETED** . Design of VA, TC and WS SIGMET poster has been completed and distribution of the three posters is being processed.

Status of Outstanding Conclusions/Decisions of APANPIRG/17

Concl/Dec No. --- Strategic Objective *	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Status
C 17/2 A , D	**Implementation of ALLPIRG/5 conclusions by States**	That States of the Asia/Pacific Region take action to implement the following conclusions of ALLPIRG/5: Conclusions 5/1, 5/4, 5/5, 5/7, 5/8,5/9, 5/11, 5/13 and 5/16	Implement conclusions	ASIA/PAC States	ICAO State letter Ref: AN 3/8:AP0106/06 dated 9 Nov 06	**CLOSED** sufficient time has passed since ALLPIRG/5 allowing the work associated with these items to be incorporated in States normal work
C 17/3 A , D	**Implementation of ALLPIRG/5 conclusions by international organizations**	That international organizations take action to implement the following conclusions of ALLPIRG/5: Conclusions 5/2, 5/4, 5/5, 5/7, 5/13 and 5/16	Implement conclusions	Intl organizations	ICAO State letter Ref: AN 3/8:AP-MET 0109/06 dated 9 Nov 06	**CLOSED** sufficient time has passed since ALLPIRG/5 allowing the work associated with these items to be incorporated in International organisations normal work

TBD = To be determined

Concl/Dec No. --- Strategic Objective *	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Status
D 17/10 **D**	**Establish APANPIRG Regional Performance Framework Task Force**	That, recognizing the new regional planning methodologies precipitated by the second amendment to the Global Air Navigation Plan and the new ICAO business planning requirements, a Task Force be established to develop a proposal/framework for consideration by APANPIRG/18 for incorporating the performance based approach into the work programme of APANPIRG and its contributory bodies. The Terms of Reference of the Task Force are provided in **Appendix B** to the Report on Agenda Item 2.1.	Creation of TF Teleconference Follow work programme established with TORs. First meeting of RPF/TF held 2 September 2007. Further action deferred until guidance in Manual on Global Performance of the Air Navigation System (Doc 9883) is available, expected late 2008. Further actions to be deferred until the outcome of two activities being taken by ICAO HQ are known. 1. The ANC review PIRG' activities, particularly with respect to Business Plan implementation activities, which may result in changes to the mandate, activities and terms of reference of the PIRGs. 2. Development by ICAO HQ of an Air Navigation integrated air navigation work Programme to include appropriate regional office activities.	APANPIRG TF TF	TOR TF Report Regional performance framework Report to − ATM/AIS/ SAR/17 − CNS/MET/11 − APANPIRG/18	**CLOSED** Overtaken by events at HQ and no specific action by the Task Force is identified – APANPIRG/19 WP/6 refers. Decision 19/4 refers.

TBD = To be determined

Concl/Dec No. --- Strategic Objective *	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Status
C 17/14 **D**	**Improvement of aeronautical information exchange and management**	That, in order to increase the reliability and integrity of the aeronautical information in support of navigation functions, ICAO be invited to establish, as a matter of urgency, a standard model for the electronic exchange of aeronautical information.	Establish a standard model for the electronic exchange of aeronautical information. During March 2008, the Air Navigation Commission agreed that: a) a new study group, to be known as the Aeronautical Information Services-Aeronautical Information Management Study Group (AIS-AIMSG), be established to assist the Secretariat with the development of: 1) a global strategy/roadmap for the transition from AIS to AIM to be delivered in draft by December 2008; 2) SARPs and guidance material, expected by 2010, related to the provision of a standard aeronautical information conceptual model and standard aeronautical information exchange model to enable the global exchange of data in digital format;	ICAO HQ	Appropriate provisions	**CLOSED** actions being managed by ICAO HQ

TBD = To be determined

Concl/Dec No. --- Strategic Objective *	**Title of Conclusion/ Decision**	**Text of Conclusion/Decision**	**Follow-up Action**	**To be initiated by**	**Deliverable**	**Status**
			3) other SARPs, guidance and training material necessary to support AIM implementation; and b) the AISMAPSG and the ADMSG be disbanded.			
C 17/38 **A , D**	**Amendment to ASIA/PAC FASID Table MET 1A, Meteorological services required at aerodromes**	That, the ASIA/PAC FASID Table MET 1A be amended as shown in **Appendix I** to the Report on Agenda Item 2.2.	Process amendment proposal for FASID Table MET 1A	Regional Office	Amendment proposal	**COMPLETED** The amendment proposal has been processed in accordance with established procedures.

TBD = To be determined

Concl/Dec No. --- Strategic Objective *	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Status
C 17/43 **D**	**Development of provisions on MET/ATM coordination**	That, in recognizing the importance of the meteorological support for the air traffic management, a) ICAO Regional Office conduct a survey of the evolving requirements for meteorological information and services in support of air traffic management; and b) the results of the survey above, be referred to the appropriate ICAO body in view of potential extension of the existing provisions on the meteorological services for ATS, to cover the other ATM fields.	Conduct survey Develop SARPs	MET/ATM TF, Regional Office ICAO HQ	Questionnaire for the survey Survey Report to be presented to − ATM/AIS/ SAR/17 − CNS/MET/11 Appropriate provisions	**COMPLETED** Survey has been completed. Result of the survey provided to HQ. Survey Report presented to − ATM/AIS/ SAR/17 − CNS/MET/11 and Results of survey presented to -CNS/MET/ SG/12.
C 17/44 **A , D**	**Development of new windshear posters**	That, ICAO be invited to consider updating the windshear posters for training and educational purposes, based on the posters being developed by Hong Kong, China in collaboration with WMO and IFALPA.	Develop wind shear posters	Hong Kong, China, ICAO HQ, WMO, IFALPA	Posters	**COMPLETED**

TBD = To be determined

Concl/Dec No. --- Strategic Objective *	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Status
D 17/47 **A**	**Task Force to establish Regional Airspace Safety Monitoring Committees**	That a Task Force be established to develop and distribute to States by 30 June 2007 implementation proposals for the establishment of Regional Airspace Safety Monitoring Committees (RASMC). The Task Force would work in accordance with the terms of reference in **Appendix A** to the Report on Agenda Item 2.4 and use, *inter alia*, recent ICAO guidance materials in relation to the global approach for the funding of airspace safety monitoring.	Establish TF Develop proposal for RASMB First meeting of RASMC/TF held on 15 Feb 07. APANPIRG/18 considered outcomes and disbanded RASMC/TF	APANPIRG TF	TOR Report to RASMAG	**CLOSED** Decision 18/57 refers
C 17/53 **A**	**A regional on-line database of air navigation deficiencies in ASIA/PAC Region**	That, in order to ensure transparency and facilitate resolution of deficiencies, ICAO Regional Office be invited to establish a regional on-line database of air navigation deficiencies and provide secure access to States' Administrations and other users concerned.	Establish on-line database.	Regional Office, DRTF, ICAO HQ	On-line database	**COMPLETED** Online database of air navigation deficiencies has been created.

TBD = To be determined

Concl/Dec No. --- Strategic Objective *	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Status
C 17/54 **A**	**Deficiency resolution objective for ASIA/PAC States**	That, a) all ASIA/PAC States listed in the APANPIRG List of deficiencies be urged to establish action plans with fixed target dates for resolution of all safety related deficiencies and inform ICAO Regional Office by mid 2007 of their plans; and b) the need for urgent action in resolving safety related deficiencies be brought to the attention of DGCA/43 conference in December 2006.	Establish action plans Report to DGCA.	States Regional Office	Action plan DP for DGCA	**CLOSED** States urged to submit action plans Reported to DGCA/43. 43rd DGCA Conference addressed this issue in action item 43/1- Resolution of Deficiencies

*** Note:** ICAO has established the following Strategic Objectives for the period 2005-2010:

A: Safety - *Enhance global civil aviation safety*; **B: Security** - *Enhance global civil aviation security*; **C: Environmental Protection** - *Minimize the adverse effect of global civil aviation on the environment*; **D: Efficiency** - *Enhance the efficiency of aviation operations*; **E: Continuity** - *Maintain the continuity of aviation operations;* **F: Rule of Law** - *Strengthen law governing international civil aviation.*

TBD = To be determined

AGENDA ITEM 2: GLOBAL AND INTER REGIONAL ACTIVITIES

Agenda Item 2.1: Global Air Navigation Plan – CNS/ATM coordination & activities

Agenda Item 2.2: Global Aviation Safety Plan

Agenda Item 2: Global and Inter Regional Activities

2.1 Overview of Global Air Navigation Plan (GANP) and Global Aviation Safety Plan (GASP)

2.1.1 The meeting received an overview of GANP and GASP developed by ICAO. The meeting noted that subsequent to the work done by ICAO to harmonise safety and efficiency planning on a global basis, the 36th Session of ICAO Assembly resolved (A 36-7: ICAO Global Planning for safety and efficiency refers) that these global plans shall provide the framework in which regional, sub regional, and national implementation plans will be developed and implemented thus ensuring harmonisation and coordination of efforts aimed at improving international civil aviation safety and efficiency. The meeting agreed to use GASP and GANP as the basis for its efficiency and safety regional work programme.

2.2 Transition to Aeronautical Information Management

2.2.1 The meeting noted that to satisfy new requirements arising from the ATM operational concept, AIS must transition to a broader concept of aeronautical information management (AIM), with a different method of information provision and management given its data centric nature as opposed to the product centric nature of AIS.

2.2.2 To support this transition from AIS to AIM, the meeting noted that ICAO has put in place a work programme **(Appendix A** to the Report on Agenda Item 2.0**)** which includes development of a global strategy/road map; appropriate provisions in Annex 4 and Annex 15 and associated guidance material for standard aeronautical information conceptual and exchange models to enable the global exchange of data in digital, open-architecture formats; and establishment of new digital requirements with an appropriate presentation of aeronautical information to the end user such as eAIP, electronic charts and the use of Geographic Information System (GIS). Furthermore, it will be necessary to define the human resource activities to realize the future AIM. This will involve identification of the basic future personnel skills required, mechanisms for validating competency, and the development of supporting guidance and training material. Also, a work plan will be developed to consider the resolution of any legal and institutional issues.

2.2.3 In view of the complexity of the issues involved in the transition from AIS to AIM, ICAO has established a new ANC study group named the Aeronautical Information Services-Aeronautical Information Management Study Group (AIS-AIMSG) to assist the ICAO Secretariat with the development of a global strategy/road map for the transition from AIS to AIM and to prepare new AIM SARPs and guidance material. Consequently, the existing Aeronautical Information and Charts Study Group (AISMAPSG) and the Aeronautical Data Modelling Study Group (ADMSG) of ICAO have been disbanded. On-going activities at the regional level will be integrated with that of the study group to ensure harmonization at the global level. The meeting suggested that MET issues, including the review of existing provisions in Annex 3 — *Meteorological Service for International Air Navigation*, and a review of Doc 7192 be included in the work of the study group as the transition from AIS to AIM develops.

2.2.4 Noting the information on transition to AIM, the meeting recognized the need for States to establish a work programme once ICAO completes the development of the global strategy/road map for transition from AIS to AIM in 2009.

2.3 Asia and South Pacific Initiative to Reduce Emissions (ASPIRE)

2.3.1 The meeting noted that Australia, New Zealand, and the United States of America have launched a multi-lateral ASPIRE partnership, placing renewed emphasis on developing air traffic service improvements designed to increase efficiency and reduce greenhouse gas emissions through operational initiatives in the Asia and South Pacific Region.

2.4 Vision of the Next Generation Air Transportation System

2.4.1 USA provided an update on the Next Generation Air Transport System (NextGen) vision for 2025. The NextGen enables safe, efficient and reliable movement of large numbers of people and goods throughout the air transportation system. The system is founded upon a set of principles and is enabled by a series of key capabilities including Network-Enabled Information Access; Performance Based Services; Layered, Adaptive Security; Weather Assimilated into Decision-Making; Broad-Area Precision Navigation; Aircraft Trajectory-Based Operations; Equivalent Visual Operations; and Super-Density Operations. The real-time information access will provide users with all required information for the decision making. NextGen will use four dimensional trajectories as the basis for planning and executing system operations. The Concept of Operations (ConOps) Version 2.0, which provides a basic operational description how the NextGen will function, was released on 13 June 2007. The NextGen Enterprise Architecture (EA) Version 2.0, a tool for reengineering business practices and the underlying technology, was published on 22 June 2007. The NextGen Integrated Work Plan (IWP) Version 0.2 was published on 15 February 2008. The NextGen will deliver an overall system capacity up to three times greater than that of current operating levels. The detailed information regarding NextGen including ConOps and EA is provided at http://www.jpdo.gov.

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**EXPECTED OUTPUTS OF ICAO WORK PROGRAMME
FOR TRANSITION FROM AIS TO AIM**

D2-INF-AIM ─ Aeronautical Information Management

ID	*Expected output*	*Source*	*Final results*	*Completed*
1.	Global strategy/roadmap for the transition from AIS to AIM.	A36–WP/321	State letter/Guidance material	2008 (Draft)
2.	SARPs and guidance material related to the provision of a standard aeronautical information conceptual model and standard aeronautical information exchange model to enable the global exchange of data in digital format. Definition of a means to allow the further evolution of these models in a managed and supportable manner.	A36–WP/321	Amendments 36/37 to Annex 15 Amendments 56/57 to Annex 4 New manual and amendment Defined means to allow the further evolution of the models	2010/13 2010/13 2010/13 2010
3.	SARPs and guidance material related to an appropriate presentation of digital aeronautical information to the end user, including eAIP, electronic charts and use of GIS within the context of AIM.	A36–WP/321	Amendments 36/37 to Annex 15 Amendments 56/57 to Annex 4 Amendments to Doc 8126 Amendments to Doc 8697	2010/13 2010/13 2010/13 2010/13
4.	Guidance material and further development of SARPs related to the quality system to support AIM.	A36–WP/321	New AIM quality system manual Amendment 36 to Annex 15	2010 2010
5.	Review of SARPs and guidance material related to electronic terrain and obstacle data to determine if refinement of SARPs or additional guidance material is necessary.	EANPG Conc. 49/39	Amendment 36 to Annex 15 Amendment to Doc 9881	2010 2010
6.	Guidance and training material related to staffing and training for the transition from AIS to AIM.	A36–WP/321	New AIM training manual Amendment to Doc 8697	2010 2010
7.	Development of a proposed work plan to consider key legal and institutional issues raised during the Worldwide Symposium on Enabling the Net-Centric Information Environment (Montreal, 2 to 4 June 2008)	A36–WP/321	AN-WP	2009

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AGENDA ITEM 3: REGIONAL AIR NAVIGATION PLANNING AND IMPLEMENTATION ISSUES

Agenda Item 3: Regional Air Navigation Planning and Implementation Issues

3. Regional and National Performance Framework

3.1 The meeting noted that the ICAO planning objective is to achieve a performance based global air traffic management (ATM) system through the implementation of air navigation systems and procedures in a progressive, cost-effective and cooperative manner.

3.2 The notion of a performance based air navigation system emanated from good industry practices that have emerged over many years. As the aviation industry has evolved into a less regulated and more corporatized environment with greater accountabilities, the benefits of transitioning from systems based to performance-based planning are apparent. The performance-based approach adheres to the following principles: strong focus on results through adoption of performance objectives and targets; collaborative decision making driven by the results; and reliance on facts and data for decision making. Assessment of achievements is periodically checked through a performance review, which in turn requires adequate performance measurement and data collection capabilities. The advantages of a performance-based approach includes: Result oriented, transparent and promotes accountability; shift from prescribing solutions to specifying desired performance; employs quantitative and qualitative methods; avoids a technology driven approach; helps decision makers to set priorities; makes the most appropriate trade-offs; and allows optimum resource allocation.

3.3 To facilitate the realization of a performance based Global ATM system, the meeting was informed that ICAO has made significant progress in the development of relevant guidance material. The documents includes: a) *Global Air Traffic Management Operational Concept (Doc 9854)*; b) *The Air Traffic Management System Requirements (Doc 9882); the Manual on Global Performance of the Air Navigation System (Doc 9883);* and d) The *Global Air Navigation Plan* (*Doc 9750)*. All these documents are made available on ICAO-NET.

3.4 In term of regional performance planning, the work will be based on Global Air Navigation Plan in conjunction with Global Performance Manual. The outcome of this process would result in an output and management form that has been designated as "Performance Framework Form (PFF)". This PFF has been standardized and a sample is shown in **Appendix A** to the Report on Agenda Item 3. The PFF is applicable to both regional and national planning framework and thus ensures easy understanding and harmonization. The explanatory notes provided in **Appendix B** to the Report on Agenda Item 3 serve as guide for completing the PFF. The meeting agreed that APANPIRG, on the basis of PFF, will identify the individual parties responsible for achieving the regional performance objectives and establish a monitoring mechanism. Regional plans will include information on progress achieved and provide periodic reports to ICAO Headquarters.

3.5 In terms of national performance planning, the States in cooperation with the ATM community, evolve or develop national plans aligned with the regionally agreed performance objectives through the use of common PFF template described in **Appendix A** to the Report on Agenda Item 3. The meeting agreed that States, on the basis of PFF, should identify the individual parties responsible for achieving the national performance objectives as well as a means for monitoring the progress. National plans should include information on progress achieved and provide periodic reports to APANPIRG.

3.6 The meeting acknowledged that the global ATM system will emerge through the implementation of many initiatives by States over several years on an evolutionary basis. The set of global planning initiatives(GPIs) contained in the Global Plan are meant to facilitate and harmonize the work already underway within the regions and States so as to bring needed benefits to aircraft operators over the near and medium terms. ICAO will continue to develop newer initiatives on the basis of the operational concept and subsequently these will be placed in the Global Plan.

3.7 Considering the need to have a clearly defined strategy to implement ATM systems as well as to align work programmes of the States, regions and ICAO Headquarters, the meeting adopted the following Conclusions:

Conclusion 19 /1 — Regional performance framework

That, a regional performance framework be adopted on the basis of ICAO guidance material and aligned with the Global Air Navigation Plan and the Global ATM Operational Concept. The performance framework should include identification of regional performance objectives taking into consideration user expectations (to be mapped against current work) and completion of regional performance framework forms based on the sample shown in Appendix A to the report on Agenda Item 3.

Conclusion 19 /2 — National performance framework

That, States be invited to adopt a national performance framework on the basis of ICAO guidance material and aligned with the regional performance objectives, the regional air navigation plan and the Global ATM Operational Concept. The performance framework should include identification of national performance objectives taking into consideration user expectations (to be mapped against current work) and completion of national performance framework forms based on the sample shown in Appendix A to the report on Agenda Item 3.

3.8 In developing the regional and national performance framework and associated PFFs, the meeting agreed to take into account the IATA ATM user expectations for 2008-15. The meeting noted that the IATA ATM user expectations for operational improvements in the Asia Pacific region are in accordance with the requirements of ICAO Doc 9854, and aligned with the ICAO Global Plan Initiatives as well as the Performance Based Navigation Manual (Doc 9613). IATA informed the meeting that under the leadership of ICAO, substantial work is already underway within the Asia Pacific region in many areas. The IATA ATM user expectations statement is designed to complement and support the on going work of ICAO and the States within the Asia Pacific region and beyond. IATA indicated that the current focus of the aviation industry regarding environmental issues and the increased operating costs associated with fuel requires a review of work programs against user expectations.

Implementation of Global ATM system: TC Projects

3.9 The meeting recognized that the Technical Cooperation (TC) projects serve as an important mechanism for the States and PIRGs to support the implementation of air navigation systems in order to achieve a seamless Global ATM system. Also, TC projects allow for active and timely participation of specialists from different areas of States/international organizations that would ensure an orderly implementation of the infrastructure.

3. 10 In this respect, the meeting noted that a TC project RLA/06/901 is currently in progress in South American Region covering eight States at a total cost of USD 1,250,000 for the period 2007 to 2011. The meeting recognized that the goals of the TC project are aligned with performance objectives of the region and States and thus facilitate achieving a Global ATM system.

3.11 Using a similar approach, the meeting was informed that a project “Cooperative Air Navigation Services Development Programme for Asia and Pacific Regions(CANSP –AP)”, that includes addressing the air navigation deficiencies, training on performance framework, planning and implementation of quality assurance systems, establishment of State Safety programme (SSP) supported by SMS implementation by the industry, is being developed by ICAO on the principles of the on-going COSCAPs in the Region. The meeting agreed that States should consider a TC mechanism as appropriate in establishing a performance framework for the implementation of a Global ATM system.

APPENDIX A

PERFORMANCE FRAMEWORK FORM
(a sample)

<table>
<tr><th colspan="5">REGIONAL PERFORMANCE OBJECTIVES /NATIONAL PERFORMANCE OBJECTIVES —
OPTIMIZE THE ATS ROUTE
STRUCTURE IN EN-ROUTE AIRSPACE</th></tr>
<tr><th colspan="5">Benefits</th></tr>
<tr><td>Environment
Efficiency</td><td colspan="4">• reductions in fuel consumption;
• ability of aircraft to conduct flight more closely to preferred trajectories;
• increase in airspace capacity;
• facilitate utilization of advanced technologies (e.g., FMS based arrivals) and ATC decision support tools (e.g., metering and sequencing), thereby increasing efficiency.</td></tr>
<tr><td colspan="5">Strategy
Short term (2010)
Medium term (2011 - 20015)</td></tr>
<tr><th>ATM OC COMPONENTS</th><th>TASKS</th><th>TIMEFRAME START-END</th><th>RESPONSIBILITY</th><th>STATUS</th></tr>
<tr><td>AOM</td><td>En-route airspace
• analyze the en-route ATS route structure and implement all identifiable improvements;
• implement all remaining regional requirements (e.g. RNP 10 routes); and
• finalize implementation of WGS-84
• monitor implementation progress
• develop a strategy and work programme to design and implement a trunk route network, connecting major city pairs in the upper airspace and for transit to/from aerodromes, on the basis of PBN and, in particular, RNAV/5, taking into account interregional harmonization;
• monitor implementation progress</td><td>2005-2008</td><td></td><td></td></tr>
<tr><td>linkage to GPIs</td><td colspan="4">GPI/5: performance-based navigation, GPI/7: dynamic and flexible ATS route management, GPI/8: collaborative airspace design and management, GPI/11: RNP and RNAV SIDs and STARs and GPI/12: FMS-based arrival procedures.</td></tr>
</table>

APPENDIX B

PERFORMANCE FRAMEWORK FORM - EXPLANATORY NOTES

1. **Performance framework form:** This form is an output and management form which is applicable to both regional and national planning and includes references to the Global Plan. Other formats may be appropriate but should contain as a minimum the elements described below

2. **Performance objective:** Regional /national performance objectives should be developed using a performance based approach that best reflects the necessary activities needed to support regional/national ATM systems. During their life cycle, performance objectives may change depending on the ATM system's evolution; therefore, throughout the implementation process, these should be coordinated with and be available to all interested parties within the ATM Community. The establishment of collaborative decision making processes ensures that all stakeholders are involved in and concur with the requirements, tasks and timelines.

3. **Regional performance objective:** Regional performance objectives are the improvements required to the air navigation system in support of the global performance objectives, and are related to the operating environments and priorities applicable at the regional level.

4. **National performance objective:** National performance objectives are the improvements required to the air navigation system in support of the regional performance objectives, and are related to the operating environments and priorities applicable at the State level.

5. **Benefits:** The regional/national performance objectives should meet the expectations of the ATM community as described in the operational concept and should lead to benefits for stakeholders and be achieved through operational and technical activities aligned with each performance objective.

6. **Strategy:** ATM evolution requires a clearly defined progressive strategy including tasks and activities which best represent the national and regional planning processes in accordance with the global planning framework. The goal is to achieve a harmonized implementation process evolving toward a seamless global ATM system. For this reason, it is necessary to develop short (1 to 5 years) and medium term (6 to 10 years) work programmes, focusing on improvements to the system indicating a clear work commitment for the parties involved.

7. **ATM operational concept components;** Each strategy or set of tasks should be linked with associated components of the ATM operational concept. The designators for ATM components are as follows:

- AOM – Airspace organization and management
- DCB – Demand and capacity management
- AO – Aerodrome operations
- TS – Traffic synchronization
- CM – Conflict management
- AUO – Airspace user operations
- ATM SDM – ATM service delivery management

8 **Tasks:** The regional/ national work programmes, using this PFF template, should define tasks in order to achieve the said performance objective and at the same time maintain a direct relation with ATM system components. The following principles should be considered when developing work programme:

- The work should be organized using project management techniques and performance-based objectives in alignment with the strategic objectives of ICAO.

- All tasks involved in meeting the performance objectives should be developed using strategies, concepts, action plans and roadmaps which can be shared among parties with the fundamental objective of achieving seamlessness through interoperability and harmonization.

- The planning of tasks should include optimizing human resources as well as encouraging dynamic use of electronic communication between parties such as the Internet, videoconferences, teleconferences, e-mail, telephone and facsimile. Additionally, resources should be efficiently used, avoiding any duplication or unnecessary work.

- The work process and methods should ensure that performance objectives can be measured against timelines and the national and regional progress achieved can be easily reported to PIRGs and ICAO Headquarters respectively.

9. **Timeframe:** Indicates start and end time period of that particular task(s).

10. Responsibility: Indicates the organization/entity/person accountable for the execution or management of the related tasks.

11**.** **Status:** The status is mainly focused on monitoring the progress of the implementation of that task(s) as it progresses toward the completion date.

12**.** **Linkage to global plan initiatives (GPIs)*:*** The 23 GPIs, as described in the Global Plan, provide a global strategic framework for planning for air navigation systems and are designed to contribute to achieving the regional/national performance objectives. Each performance objective should be mapped to the corresponding GPIs. The goal is to ensure that the evolutionary work process at the State and regional levels will be integrated into the global planning framework.

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AGENDA ITEM 3: REGIONAL AIR NAVIGATION PLANNING AND IMPLEMENTATION ISSUES –

Agenda Item 3.1: AOP

Agenda Item 3: Regional Air Navigation Planning and Implementation Issues

3.1 Aerodrome Operations and Planning (AOP)

3.1.1 Report on the implementation of Aerodrome certification requirements

3.1.2 The meeting recognized the importance of aerodrome certification and took note of the observation made by the 36th Session of the Assembly on the relatively low level of implementation of aerodrome certification including SMS.

3.1.3 The meeting noted from the ICAO survey on the level of implementation of both aerodrome certification and Safety Management System in the Asia Pacific Region that:

i) 23 States including one territory and two Administrations participated in the survey

ii) 22 States have confirmed the existence of a basic aviation law that provides for the establishment of the Civil Aviation Authority, a key requirement for undertaking the process of aerodrome certification.

iii) 19 states have promulgated aerodrome certification regulations.

iv) 78 international airports out of the 193 listed in ANP have been certified

v) 12 states have promulgated regulation on SMS

vi) 59 international airports out of 193 listed in ANP have an SMS in place at the certified aerodrome.

vii) South West Pacific Small Islands States and Myanmar, Mongolia, and Timor-Leste need assistance to implement the Annex 14, Volume I requirements on aerodrome certification and SMS implementation. In light of this, the meeting adopted the following Conclusion:

Conclusion 19/3 – Assistance in South West Pacific Small Island States and Mongolia, Myanmar and Timor Leste in implementing the requirements of aerodrome certification and SMS

That, in recognizing the importance on the implementation of Annex 14, Volume I provisions related to aerodrome certification and SMS in the South West Pacific Small Island States and developing States (Mongolia, Myanmar and Timor Leste), ICAO considers providing assistance to these States in order to build their capacity to provide the required services in a sustainable and cost efficient manner.

[*Note: An appropriate form of providing assistance could include establishment of an ICAO technical cooperation project with funding sought from donor agencies.]*

3.1.4 The meeting urged States who have not implemented the requirements of aerodrome certification and Safety Management System in certified aerodromes to allocate a high priority and adequate resources to achieving implementation. New Zealand informed the meeting of their willingness to assist States. Indonesia informed the meeting that 57 of their airports have been certified.

<u>Bird Hazard Control and Monitoring</u>

3.1.5 The meeting recalled that in light of bird strikes to aircraft being a serious safety issue APANPIRG/18 urged States to establish a National Bird Control Committee and report to ICAO Regional office by 31 July 2008. The meeting noted from the feedback that 10 States and one Administration have confirmed that a National Bird control committee has been established. 3 States are in the process of establishing Committees.

3.1.6 The meeting urged States who have not done so, to establish a National Bird Control committee and inform ICAO Regional Office. The ICAO Secretariat will follow up with a State letter by 31 October 2008.

<u>Aerodrome Emergency Planning Overview</u>

3.1.7 The meeting noted from the survey carried out by the ICAO Regional Office in April 2008 that:

- 22 States have established aerodrome emergency plans at international airports under their administration.
- 21 States have tested the AEP by conducting full scale exercises and that full scale exercises are held once in two years.
- 16 States have included emergencies in difficult environment and tested their AEP for this event.
- 11 States have asked for assistance by way of seminars/workshops.

3.1.8 The meeting noted that the result of the survey is very encouraging and urged States who have not responded to complete the survey questionnaire and submit to ICAO Regional Office. The ICAO Secretariat will follow up with a State letter by 31 October 2008.

3.1.9 The meeting expressed appreciation for the Civil Aviation Authority Singapore's gesture to organize a three day seminar from 20 to 22 October 2008 in conjunction with a full scale off shore aerodrome emergency exercise at Changi Airport and urged States to participate.

<u>Flexible Pavement Design</u>

3.1.10 The meeting noted the information provided by the Secretariat on revised alpha factor (pavement thickness reduction factor) values for the computation of Aircraft Classification Number (ACN).

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Agenda Item 3.2: ATM/AIS/SAR

Agenda Item 3: Regional Air Navigation Planning and Implementation Issues

3.2 ATM/AIS/SAR

3.2.1 The meeting reviewed the outcomes of the eighteenth meeting of the APANPIRG Air Traffic Management/Aeronautical Information Services/Search and Rescue Sub-Group (ATM/AIS/SAR/SG/18, June 2008) held at the ICAO Regional Office in Bangkok, Thailand. A copy of the full report of the meeting is available on the website of ICAO Asia/Pacific Office.

ATM/AIS/SAR Related Activities of the Regional Office

3.2.2 Information was tabled on the ATM/AIS/SAR related activities of the Regional Office summarizing the many ATM, AIS and SAR related working groups in the Asia/Pacific Regions, with which ICAO Asia/Pacific Office has an involvement. The meeting recognised the importance of the coherent development of work programmes under the APANPIRG umbrella, as the regional planning and implementation body, and the need for all related groups to avoid duplications of effort by ensuring the close coordination of their respective activities.

Review of Outstanding Conclusions and Decisions of APANPIRG

3.2.3 ATM/AIS/SAR/SG/18 reviewed and updated the list of Outstanding Conclusions and Decisions of APANPIRG meetings prior to and including APANPIRG/18 (September 2007, Bangkok), making updates to the many ATM/AIS/SAR related issues as recorded in the Report on Agenda Items 1.2 and 1.3.

3.2.4 In relation to Decision 17/10, ATM/AIS/SAR/SG/18 recommended that due to actions being taken at the ICAO headquarters (paragraphs 3.1 to 3.7 of this report refer) to address the performance based planning matters originally intended to be managed by the Regional Performance Framework Task Force (RPF/TF) and the consequent lack of a specific work task for the RPF/TF, the Task Force be dissolved. The meeting supported this recommendation, and adopted the following Decision:

Decision 19/4 – Dissolution of the Regional Performance Framework Task Force

That, recognising the performance based planning process utilising "Performance Framework Forms (PFF)" promulgated by ICAO during 2008 had overtaken the Terms of Reference of the Regional Performance Framework Task Force (RPF/TF), the RPF/TF be dissolved.

RVSM Implementation in China

3.2.5 The meeting was informed that the RVSM Implementation Task Force (RVSM/TF) had met three times (July/August 2007, September 2007 and April 2008) since APANPIRG/18 with the primary objective of implementing RVSM throughout the airspaces of China. The meeting noted the activities of the RVSM/TF in this regard and that a metric system had been retained in China for the RVSM operations. Following extensive preparations and with assistance from the RVSM/TF, China implemented RVSM in the Beijing, Guangzhou, Kunming, Lanzhou, Shanghai, Shenyang, Urumqi and Wuhan flight information regions (FIRs) and Sector 01 (airspace over the Hainan Island) of the Sanya FIR at 1600 UTC on 21 November 2007, as scheduled.

3.2.6 The meeting congratulated China for their concerted efforts and application in achieving RVSM implementation successfully over a very compressed timeframe and the continued safe operations that had been achieved since then, including during the heavily trafficked period of the Beijing Olympic Games. Japan highlighted the many benefits that they had experienced from RVSM implementation and expected that these benefits would also be experienced in China. Japan also expressed appreciation for the hard work and remarkable achievements of the RVSM/TF, the notable cooperation among States and international organizations, and, in particular, the leadership of the ICAO Regional Office.

Review of RVSM Implementation

3.2.7 The meeting recalled that the formation of the RVSM/TF arose as a result of Decision 9/4 adopted by APANPIRG/9 (August 1998, Bangkok) which, in addressing an output of the Third Asia/Pacific Regional Air Navigation Meeting (RAN/3, April-May 1993), called for the establishment of the ICAO RVSM Implementation Task Force to progress RVSM implementation in the Pacific and assist work which had already commenced under the auspices of a combined Informal South Pacific ATS Coordination Group (ISPACG) and Informal Pacific ATC Coordinating Group (IPACG) work effort. Conclusion 9/3, adopted at the same time, required actions to establish an RVSM implementation schedule for the Asia Region, in addition to the RVSM programme for the Pacific Region. The updated RVSM implementation status is attached as **Appendix A** to the Report on Agenda Item 3.2. The meeting recognized that with the implementation of RVSM in China, RVSM had now been very widely implemented throughout the Regions except for the Pyongyang and the Ulaanbaatar FIRs.

3.2.8 Some 10 years later, as virtually all airspaces of the Regions had now implemented RVSM and that the work of the RVSM/TF was very close to completion, the meeting considered that the RVSM/TF could be dissolved. The dissolution would take effect after the one year review meeting of China RVSM implementation which was scheduled in December 2008, and any residual matters would be allocated to the respective ATS Coordination Groups or the ATM/AIS/SAR Sub-Group for action. Accordingly, the meeting formulated the following Decision:

Decision 19/5 – Dissolution of the RVSM/TF

That, following the widespread and safe implementation of RVSM throughout the Asia/Pacific Regions over a 10 year period, the Asia/Pacific RVSM Implementation Task Force (RVSM/TF) be dissolved, with effect from the close of the RVSM/TF/34 meeting (one year review of China RVSM) in late 2008, and any residual work items be allocated to the ATM/AIS/SAR Sub-Group.

Note: *In dissolving the RVSM/TF, APANPIRG places on the record its highest commendation and appreciation to all parties associated with the RVSM/TF for the continuous implementation of RVSM and the very positive and quantifiable beneficial effects on safety, efficiency and the environment that have resulted directly from the work of the RVSM/TF.*

Implementation of RVSM in AFI Region

3.2.9 The meeting was informed of the outcomes of the fifteenth meeting of the AFI RVSM/RNAV/RNP Task Force (July 2008, Nairobi). A “Go” decision was taken for the implementation of RVSM in African (AFI) Region including the Indian Ocean area on AIRAC 25 September 2008. Accordingly, affected States including Australia, India and the Maldives were urged to continue coordination with neighbouring AFI States to revise ATS operational Letters of

Agreement (LOAs) and to arrange the coordinated cancellation of aeronautical information relating to existing flight level transition areas, etc.

Amendments to ICAO Flight Plan

3.2.10 The meeting noted that on 28 May 2008, amendment No. 1 to the Fifteenth Edition of the *Procedures for Air Navigation Services — Air Traffic Management* (PANS-ATM, Doc 4444) was approved, calling for substantial changes to ICAO flight plan to take effect from 15 November 2012. The interim edition of the amendment is available as an attachment to the electronic version of State letter AN 13/2.1-08/50 on the ICAO-NET (www.icao.int/icaonet).

3.2.11 The new ICAO model flight plan form and related provisions are necessary to allow ATM systems to make optimum use of advanced aircraft capabilities as well as to meet the evolving requirements of automated ATM systems. The new flight plan addresses air navigation functionalities and technologies such as RVSM, PBN, RCP, ADS-B and GNSS, while maintaining a high degree of commonality with the existing flight plan format. It should be noted that the amendment to the flight plan is an interim step towards a completely revamped system of interaction between aircraft and the ATM system, wherein the aircraft will be an integral part of the ATM system as envisaged in the Global ATM Operational Concept.

3.2.12 During the discussions on this topic, the meeting raised the concern that States could begin to implement the new FPL format as early as 2009. Implementation of FPLs in a non-integrated fashion could result in Flight Plans being rejected or processed improperly by States that have not yet transitioned. The changes will have widespread implications on automated systems, including ATM systems and airspace user systems.

3.2.13 In view of the many implications affecting a wide range of automated flight plan processing systems and the associated operating practices, the transitioning process needs to be carefully planned taking into account compatibility with existing systems, human factors, training, cost and transition aspects. Any incompatibility in the processing capability in a few States could have significant impact on operations in other states of the region. This has the potential to create a significant and global degradation of ATM services.

3.2.14 The meeting was of the view that that a full and comprehensive assessment of the implications of the transition to the new FPL for ANSPs and airspace users is absolutely necessary. In this regard, the meeting considered that ICAO global leadership is critical in addressing the issues to ensure a smooth transition.

3.2.15 In order to assist States for an orderly transition from the current flight plan to the new one, a basic checklist, using the performance framework form (PFF) has been developed by ICAO HQ and is available in **Appendix B** to the Report on Agenda Item 3.2. Additional guidance on transition to the new flight plan is being developed by ICAO HQ and is scheduled to be made available to States by February 2009.

3.2.16 The meeting agreed that there would be many actions necessary to ensure a streamlined regional implementation, including the development of a regional transition strategy and procedures for its implementation. In order to ensure that the matter would be appropriately addressed on a regional basis, the meeting agreed to the following Decision establishing a Task Force and drafted preliminary Terms of Reference accordingly.

Decision 19/6 – Establishment of an ICAO Flight Plan & ATS Message Implementation Task Force

That, an Asia/Pacific ICAO Flight Plan & ATS Message Implementation Task Force (FPL&AM/TF), with terms of reference as outlined in **Appendix C** to the APANPIRG/19 Report on Agenda Item 3.2, be established to develop a regional transition strategy and procedures to ensure the streamlined implementation of the amended ICAO flight planning and associated ATS Message provisions.

Asia/Pacific ATS Route Catalogue

3.2.17 APANPIRG/16 (August 2005, Bangkok) adopted the *Asia/Pacific ATS Route Catalogue* as a regional planning tool under the terms of Decision 16/9. Version 5 is now available from the ICAO Asia/Pacific website (http://www.bangkok.icao.int/) under the menu "APAC eDocuments". On-going updates have been undertaken by the Regional Office based on the information made available by States and airspace users.

3.2.18 The Catalogue is an informal document that consolidates material from the Basic Air Navigation Plan (BANP, Doc 9673) and related documents to serve as an aid to States and users for route planning purposes. The Catalogue does not replace the BANP or provide material to be used in an operational context. It is primarily a one stop information document, showing which routes are contained in the BANP, the status of implementation and amendment of routes, and future route requirements of States and users. As such, the meeting confirmed that the Catalogue does not affect the status of ATS routes in the BANP, and unless the amendment to the BANP is duly processed, removing the deficient status of an ATS route is not justified simply by inclusion of the route in Chapters 2 or 3 of the Catalogue.

Activation of UL333 and Removal of Restrictions on B466 in Afghanistan

3.2.19 Pakistan informed the meeting that arising from the work of the ATFM Task Force (ATFM/TF) of the Bay of Bengal ATS Coordination Group (BBACG), an extension to ATS route UL333 across the southern Kabul FIR from SERKA (on the Karachi/Kabul FIR boundary) to SOKAM (on the Kabul/Tehran FIR boundary) had been implemented with effect from 28 August 2008. Simultaneously, restrictions on usage of B466 in Kabul FIR had been lifted on the basis that Pakistan would ensure that westbound flights on the intersecting G792 would not conflict with B466 traffic at PAROD in Kabul FIR. (**Appendix D** to the Report on Agenda Item 3.2 refers).

3.2.20 Afghanistan and Pakistan had taken a number of measures to ensure their ability to support the extra route capacity available in Kabul FIR, including the following main activities:

a) Issuance of AIP Supplement 01/08 by Ministry of Transport and Civil Aviation Afghanistan for extension of UL333 in the Kabul FIR.

b) Removal of time restriction on the availability of ATS route B466 SERKA-PAROD segment by Afghanistan.

c) Delegation of responsibility for provision of ATS on a route segment G792 (AMBER-ASLUM) falling within the Lahore FIR to Karachi area control centre (ACC) by Pakistan.

d) Signing of LOAs between Afghanistan and Pakistan in accordance with new airspace management.

e) Revision of LOA within Pakistan between Karachi and Lahore ACCs.

f) Issuance of NOTAM by States for inclusion of waypoint SERKA in ATFM Procedures (Pakistan NOTAM A0641/08)

3.2.21 This change in route structure undertaken on initiative of ATFM/TF would not only benefit the airline operators in planning their aircraft operation from South Asia to Europe and beyond for their long haul flights during ATFM hours of operation but it would also facilitate operations from Europe to South East Asia on H24 basis by providing an alternate routing through the Kabul FIR.

Bangkok ATFMU – BOBCAT Update

3.2.22 Thailand provided updates on the implementation of ATFM in the Bay of Bengal and South Asia for aircraft transiting the Kabul FIR during the night time peak traffic period (2000-2359 UTC) since ATFM/TF/12 (July 2008). The BOBCAT system was configured to provide spacing for waypoints SERKA and PAROD on AIRAC 28 August 2008, taking advantage of activation of ATS routes B466 and UL333. The meeting was advised that the BOBCAT system transitioned smoothly into Version 1.03 and also took into account the ATS route enhancements to UL333 and B466 described above.

Japan – Ocean ATM Enhancements and Environmental Benefits

3.2.23 Japan informed the meeting that 50NM longitudinal separation based on ADS/CPDLC became applicable within the whole oceanic airspace of the Fukuoka FIR in April 2007, and subsequently in March 2008 this application of 50NM longitudinal separation was expanded to the Hawaii-Japan tracks on a trial basis. Civil Aviation Bureau Japan (JCAB) and the United States Federal Aviation Administration (FAA) agreed to further expand this trial application to the remainder of the Pacific Organized Track System (PACOTS) between the Fukuoka and the Oakland FIRs, including a trial of the User Preferred Routes (UPR) between Hawaii and Japan in June 2008.

3.2.24 In preparation for the next stage (RNP 4-based separation), JCAB conducted a pre-implement safety assessment for ADS 30 NM longitudinal separation which concluded that, even though the PANS-ATM provisions indicate that the maximum interval of ADS periodic reports for RNP 4 is 14 minutes, a reporting interval of 10 minutes was necessary because of the heavy traffic density on the North Pacific (NOPAC) routes. ATM/AIS/SAR/SG/18 recorded concern about the network load of the satellite data link system because of this comparatively higher rate of periodic reports.

3.2.25 Japan informed the meeting that they commenced the trial application of 30NM longitudinal separation minimum in the oceanic airspace of the Fukuoka FIR on 28 August 2008. This minimum is applied only between aircraft with RNP 4 approval. Between an RNP 4 approved aircraft and an RNP 4 non-approved aircraft, and between RNP 4 non-approved aircraft, 50 NM or 10 minutes with the Mach number technique (MNT) or 15 minutes longitudinal separation shall be applied.

3.2.26 The meeting noted that this separation reduction would provide aircraft with more opportunity to fly at or closer to an optimum altitude than before as well as increase airspace capacity and ATC flexibility. JCAB conducted a study of environmental benefits of the RNP 4-based separation reduction, and the study indicated significant improvement as below:

- Estimated annual fuel saving will be approximately 24,800,000 pounds (14,000,000 litres); and
- Estimated annual reduction of CO_2 emissions will be about 34,400,000 kg.

***Note**: The JCAB study includes savings to be achieved by flights entirely from departure to destination, not just the flight segments within the Fukuoka FIR, and was based on:*

a) actual data of flights conducted in August 2007;

b) assumption that all aircraft were B747-400 with RNP 4 approval; and

c) results of simulations conducted to compare operations using 50NM separation with those using 30 NM separation.

3.2.27 The meeting was informed that JCAB had been working collaboratively with the FAA through the IPACG, and had successfully reduced separations in the Pacific airspace as follows:

- In April 1998, lateral separation was reduced to 50 NM from 100NM, between RNP 10 aircraft;
- In April 2005, longitudinal separation was reduced to 50NM from 15 minutes time-based separation, using ADS/CPDLC; and
- In August 2008, longitudinal separation was reduced to 30 NM from 50NM, between RNP4 aircraft, using ADS/CPDLC.

3.2.28 The meeting noted that JCAB planned to develop tracks where 30NM lateral separation will be applied, taking into account the preparedness of operators and the growth of the number of RNP 4 approved aircraft Noting that the meeting had adopted an interim regional PBN implementation plan which set the target for RNP 4 implementation in oceanic airspace as short term (2008-2012), Japan urged operators to equip their aircraft with RNP 4 avionics and obtain approval from the States of Registry/Operators as early as possible. In this context the meeting noted that suitable ground equipment to support RNP 4 operations was already being used by both Japan and the United States for Pacific operations, so aircraft equipping with RNP 4 avionics would gain immediate benefits. Accordingly, the meeting formulated the following conclusion:

Conclusion 19/7 – RNP 4 capability for operators

That, recognizing the significant benefits expected from the implementation of 30 NM longitudinal separation based on RNP 4, operators of Pacific fleets be urged to equip with RNP 4 avionics for oceanic airspace operations and obtain approval from the States of Registry/Operators as early as possible, but no later than 2012.

Japan – USA User Preferred Routes (UPR)

3.2.29 The meeting noted that Japan and the United States began the trial operation of UPR between Hawaii and Japan on 11 August 2008. JCAB and the FAA had put the Pacific Organised Track System (PACOTS) into use between Hawaii and Japan for many years. Although PACOTS proved effective and efficient for oceanic operations in comparison with fixed routes, some limitations have been also recognized in relation to the timeliness and accuracy of weather information, the differences between the forecast and the actual situation at the time of flight, and the variations of aircraft types and configurations.

3.2.30 The UPR is designed by individual operators to suit their operational requirements based on their own weather forecast, fleet configurations, departure time, etc. This UPR trial operation will allow operators to choose their best track, and assess effectiveness of the UPR and differences between flexible tracks established by Japan and the USA. It was noted that an airline operating between Hawaii and Japan had collected data since 11 August to evaluate the impact of UPRs, showing quantifiable environmental benefits. The meeting was informed that their comparison indicated extremely positive results when choosing UPRs, and more comprehensive evaluation would be presented to the next meeting of the IPACG.

ATS Route Modification Proposal by Mongolia

3.2.31 Mongolia informed the meeting that the volume of international flights crossing the Mongolian airspace was increasing noticeably every year. In view of this, Mongolia foresaw needs to improve and develop the existing route network at the upper airspace of Mongolia. In connection with the opening of a new entry/exit point named GINOM at the border between Mongolia and Russia from 25 September 2008, the Civil Aviation Authority of Mongolia was planning to make modifications to the following ATS routes:

a) The route DARNO-A575-MU-B208-NIXAL will be changed to B208 (DARNO-B208-NIXAL)
(Figure 1 of **Appendix E** to the Report of Agenda Item 3.2 refers.)

b) The name of ATS route GINOM-A308-HATGA-A200-BULAG-A575-INTIK will be changed to A575 (GINOM-A575-INTIK)
(Figure 2 of **Appendix F** to the Report of Agenda Item 3.2 refers.)

3.2.32 The meeting invited Mongolia to further coordinate with the Regional Office before the implementation of these changes, which should undergo the normal process of an amendment to the BANP.

United States - Oakland Air Route Traffic Control Centre (ARTCC) Air Traffic Service (ATS) Route Realignment Update

3.2.33 ATM/AIS/SAR/SG/18 noted that in support of ICAO's efforts to reduce operator costs and ecological impacts due to aircraft engine emissions, the FAA continued to undertake efforts to identify areas where airspace efficiency can be improved. Accordingly, Oakland ARTCC had evaluated its current ATS route structure and determined that efficiencies could be gained by realigning the airways. A number of ATS route improvements were identified for action during 2007/2008. The meeting noted the FAA activities to enhance efficiency and improve the effectiveness of the current airspace/route structures. These efficiency measures include UPR, Dynamic Airborne Reroutes, a flexible route system, and tailored arrivals.

Runway Safety Seminar/Workshop

3.2.34 Japan informed the meeting that they presented a summary of preventive measures against runway incursions adopted by Japan to ATM/AIS/SAR/SG/18. JCAB prioritised runway safety and continued its efforts through the "Runway Incursion Prevention Countermeasures Implementation Team", which was established in April 2008 and includes participation of aircraft operators. This Team has identified the following subjects as major critical areas for examination:

a) Preventive actions against communication errors between ATC and pilots;
b) Development of visual aids to ATC and pilots; and
c) Mechanism to foster safety initiatives.

3.2.35 Japan highlighted that runway incursions were not necessarily unique to Japan and might occur in other States, and that there were some commonalities in root causes of runway incursions, such as human factors involving ATC and pilots.

3.2.36 ATM/AIS/SAR/SG/18 had been advised that Asia/Pacific COSCAPs were liaising with the FAA for support to conduct a runway safety seminar in the Region. The United States had confirmed their support for such a seminar via letter to the Regional Office. Hong Kong China and Japan also indicated that they expected to be in a position to support a runway safety seminar/workshop during 2009. The event will be open to all States regionally and the meeting adopted the following Conclusion:

Conclusion 19/8 – Conduct Regional Runway Safety seminar/Workshop

That, noting the critical nature and persistent occurrence of runway incursions, the ICAO Asia/Pacific Regional Office, with assistance from States experienced in runway safety management and in conjunction with the COSCAPS of South Asia, South East Asia and North Asia, conduct a 3-day runway safety seminar/workshop during 2009.

Fuel Savings through Lifting of Speed Restrictions for SIDs

3.2.37 IATA had provided information to ATM/AIS/SAR/SG/18 detailing the significant costs incurred by the widespread application of 250 knots below 10 000 ft. They requested that those airports in the Asia/Pacific Region which impose the speed restrictions on the SIDs systematically review these procedures and examine if such restrictions are still needed. IATA would assist by asking member airlines to fly the departures in a simulator to validate the results.

3.2.38 The meeting noted that in Appendix 4 to Annex 11 – *Air Traffic Services,* speed limitations of 250 kts below 10 000 ft AMSL were required for airspace classes B to G where ATC services for separation are not provided to VFR. In addition, the meeting noted advice that speed restrictions were imposed in standard instrument departure (SID) design for obstacle clearance requirements, and were used to regulate air traffic in terminal areas with different aircraft types and also where the same aircraft type fly at different speeds. Lifting speed restrictions in the latter case may necessitate an increase in the departure interval to ensure that minimum separation is maintained. The meeting agreed that States be encouraged to review SIDs on a case-by-case basis with a view to lifting speed restrictions where appropriate and in accordance with the aforementioned relevant design and airspace management requirements.

Reconvening of the OPLINK Panel

3.2.39 The meeting was informed that the joint EUR/NAT Data Link Steering Group (DLSG), which operates under the auspices of the EUR/NAT Office of ICAO, was tasked with addressing divergence in the data link implementations occurring in the European and North Atlantic regions. The DLSG had reached a number of conclusions that have a bearing on all ICAO Regions. It was therefore considered necessary to bring these matters to the attention of the ANC where global harmonization of present data link procedures and interoperability of the data link services of the future would be addressed.

3.2.40 The Operational Data Link Panel (OPLINKP) had been dissolved during 2005. More recently, arising in part from the work of the DLSG, the Secretariat was of the view that an ICAO Panel would be necessary to act as a focal point for the consolidation and development of ATM data link operational requirements globally. Provisions for projects such as NextGen and SESAR are currently being developed outside of ICAO. It is imperative that ICAO is well positioned to support the development of applications that have global implications towards the future support of ATM.

3.2.41 Accordingly, the ICAO OPLINK Panel has been reconvened and will develop and present a suitable work programme to the ANC during November 2008 for approval.

Ad Hoc Working Group on Global Operational Data Link Document

3.2.42 The meeting welcomed the initiatives taken so far by both the Asia/Pacific and the North Atlantic Regions, in coordination with the ICAO Regional Offices in Bangkok, Paris and ICAO HQ in Montreal, to work towards a single, globally applicable procedures document for FANS data link operations – the Global Operational Data Link Document (GOLD). The meeting supported the work of the Ad-Hoc GOLD Working Group and adopted the following Conclusion:

Conclusion 19/9 – Support for Ad-Hoc GOLD Working Group

That, recognizing the many benefits to be gained from the global application of harmonized FANS data link operational procedures, APANPIRG supports the work being undertaken under the auspices of the Ad-Hoc GOLD Working Group to produce a FANS Global Operational Data Link document (GOLD) and invites the Asia/Pacific Regional Office to act as the regional focal point for the Ad-Hoc GOLD Working Group.

Data Link Harmonisation

3.2.43 The meeting reviewed the outcomes of the second meeting of the Trans-Regional Airspace and Supporting ATM Systems Steering Group (TRASAS/2, March 2008), as recorded in the Report of Agenda Item 3.5. Additionally, TRASAS/2 had noted the progress on Data Link Harmonization activities in the European and North Atlantic Regions, and invited APANPIRG/19 to consider a draft Conclusion as follows:

Draft Conclusion TRASAS/2 - 1 – Data Link Harmonization Strategy

That the APANPIRG be invited to consider amending the Strategy for Implementation of the Air-Ground Data Link in the Asia/Pacific Region to include the Data Link Harmonization Strategy endorsed by EANPG and NATSPG.

3.2.44 However, in light of subsequent developments advised to ATM/AIS/SAR/SG/18, the meeting considered that it was premature to endorse the draft Conclusion above but agreed that APANPIRG promulgate clear ‘in-principle’ support for global data link harmonization in terms of the following text:

That, noting the developmental work being coordinated by the ICAO Secretariat in terms of a global harmonization strategy for ADS-C and CPDLC data link operations, APANPIRG fully supports the principle of global converge of data link evolutions to properly support seamless ATS provision across global FIR boundaries. In this context, APANPIRG gives in-principle support to the draft Data Link Harmonization Strategy shown at ***Appendix G*** *to the APANPIRG/19 Report on Agenda Item 3.2, recognizing that amendment to the draft strategy is likely under the guidance of the OPLINK Panel.*

Draft ATFM Communication Manual for the Asia/Pacific Region

3.2.45 JCAB and the FAA had presented to APANPIRG/18 a copy of the *Interim Guideline for Air Traffic Flow Management (ATFM) Communication* that was in current usage between the two States, with a recommendation to consider accepting this guideline as the basis for ATFM communication throughout the Asia and Pacific Regions. APANPIRG/18 supported this initiative, and encouraged Japan and the United States to continue this work and present the documentation to ATM/AIS/SAR/SG/18 in accordance with the established procedure of APANPIRG.

3.2.46 The most recent draft of the now renamed *ATFM Communication Manual for the Asia Pacific Region* is provided at **Appendix H** to the Report on Agenda Item 3.2. ATM/AIS/SAR/SG/18 reviewed the draft ATFM Communication Manual and encouraged States to provide comments to the Regional Office by the end of August 2008. This would enable additional development of the draft document in time for further examination during the ATFM Seminar/Workshop to be held 7-9 October 2008. The meeting noted that the draft would also be forwarded to the ICAO headquarters for review and consideration in their ATFM phraseology development activities.

ATFM Seminar/Workshop

3.2.47 The meeting was informed that the Regional Office had scheduled a three day Regional ATFM Seminar/Workshop in coordination with Japan from 7 – 9 October 2008 in Fukuoka, to address APANPIRG Conclusion 18/7. A copy of the tentative programme for the event has been included as **Appendix I** to the Report on Agenda Item 3.2. Existing ATFM issues and capabilities in the Asia and Pacific Regions would be established by the sharing of current traffic management experiences, issues and lessons learnt by regional providers. The Workshop component would be tasked with identifying and recommending appropriate regional objectives, for example:

a) Development of a high level ATFM Concept of Operations for the Region,
b) Enhancement of the ATFM Communications Manual,
c) Develop mechanisms for data gathering, collation and sharing, and
d) Review activities of the Bay of Bengal ATFM Task Force.

Proposal for the Establishment of the ATFM Task Force in North Asia

3.2.48 The Republic of Korea proposed the establishment of the ATFM/TF for North Asia to deal with the increases of air traffic in this area. The meeting was informed that the total traffic volume and the number of over-flights within the Incheon FIR between December 2007 and May 2008 (six months) were 233,256 flights and 19,647 flights, respectively. These figures show 7 % and 16 % increase of traffic volume, respectively, comparing with the same period from the previous year. The figures are well above the IATA's forecasts in spite of the rapid increase of crude oil prices.

3.2.49 To improve the efficiency of current ATFM procedures and strengthen cooperation among States in North Asia, the Republic of Korea considered the establishment of ATFM/TF under the auspices of the ATM/AIS/SAR/SG was necessary. The improvement of ATFM in North Asia should be in a phased manner as described in **Appendix J** to the Report of Agenda Item 3.2, which is the proposed TOR of the ATFM/TF by the Republic of Korea.

3.2.50 The meeting recognised that improvements would be beneficial in this airspace but considered that the establishment of a North Asia ATFM/TF would seem premature. The meeting encouraged Republic of Korea to take advantage of the normal ICAO processes and present the proposal to the ATM/AIS/SAR/SG/19 during June 2009 in the usual way. Republic of Korea was invited to attend the ATFM Seminar/Workshop in October and continue discussion on the subject during this event.

India – CNS/ATM Update

3.2.51 India informed the meeting that they had recorded, in the recent past, a phenomenal rate of traffic growth [2005-06 (16.8%), 2006-07 (28.3%), 2007-08 (27.2% up to August 2008)], which was unprecedented. India was taking the following measures to ease the traffic congestion and ensure smooth handling of air traffic:

a) new Integrated ATS Automation System for Chennai and Kolkata ACCs;

b) ASMGCS under implementation at Bangalore, Hyderabad and Mumbai;

c) cross runways operations at Chennai and parallel runway operations at Kolkata;

d) all control towers equipped with controller work station as available at ACCs and all flight data exchange shall be automatic with least need for manual inputs;

e) implementation of RNAV/RNP procedures for remaining airports; and

f) additional radars being planned to cover the entire continent airspace and integrate them to provide seamless radar cover.

3.2.52 To ensure efficient communication, India informed the meeting that they were implementing the following arrangements:

a) 12 additional locations for Remote Controlled Air Ground - VHF (VHF–RCAG);

b) Dedicated Satellite Communication Network (DSCN) based on VSAT;

c) Aeronautical Message Handling System (AMHS) at Mumbai;

d) new voice communication switches and digital voice tape recorders;

e) additional 14 state-of-the-art data link capable D-ATIS equipments;

f) all domestic AFTN X.25 circuits having been replaced with TCP/IP protocols; and

g) duplication of NOTAM database over WAN implemented at 10 major airports.

3.2.53 The navigational infrastructure is also being augmented at various airports in India, in accordance with the details below:

a) New DVOR/DME have been implemented at nine locations;

b) Additional 12 units of ILS (with DME) have been implemented;

c) Extensive use of RNAV/RNP procedures;

d) ‘GAGAN’ (GPS Aided GEO Augmented Navigation) is under implementation; and

e) Ground Based Augmentation System (GBAS) under implementation.

3.2.54 Some additional radar surveillance facilities are also being implemented in India.

Indonesia - ADS/CPDLC Trial in the Ujung Pandang FIR

3.2.55 The meeting considered information from Indonesia which described how Indonesia had installed ADS/CPDLC in Ujung Pandang ACC to overcome limited capability in radar surveillance and VHF-voice direct controller-pilot communications (DCPC) in eastern areas of Indonesia, and to harmonize ATS for the international flight operations between the Brisbane and the Ujung Pandang FIRs. Indonesia informed the meeting that the trial operations of ADS/CPDLC in the Ujung Pandang FIR would be effected from 3 July – 3 October 2008 particularly for the ATS routes A461, B462, B472, B473, B583, B584 and R340/R590. The meeting noted that international flights involved in the trial and operating on these routes would use CPDLC for main communication and VHF voice communication for back up. Data link non-capable flights would be managed in the same way as they were today but operators were encouraged to make maximum use of data link to enable full operational testing of the ground systems.

3.2.56 Experience from the trial so far indicated that of the approximately 70 international flights operating on affected routes each day, about 50 per day were logging on to Ujung Pandang ACC. Investigations were continuing to identify why the remaining traffic was not yet logging on. The data link activity would be supported through the expanded scope of the FANS Implementation Team, Bay of Bengal (FIT-BOB) mechanism, as agreed during previous FIT-BOB meetings, and problem reports should be submitted to the BOB-CRA (Boeing) in accordance with the provisions of the *FANS Operations Manual*.

Coordination of ATS Contingency Plans

3.2.57 The meeting recalled that in previous years, APANPIRG had recognized that many States in Asia/Pacific Region still had not developed contingency measures for application in the event of disruptions to ATS and associated services in accordance with Annex 11 standard and recommended practices (SARPs). In light of the longstanding difficulties, APANPIRG/16 August 2005 called for a SIP to be conducted in conjunction with the Regional Office to develop a suitable contingency plan model. Indonesia was selected to receive the SIP, which concentrated on addressing the provisions of Attachment D in Annex 11, primarily in the context of operations in international airspace. The SIP also addressed the relevant APANPIRG Conclusions, particularly in respect of continuity of operations following acts of terrorism, industrial action, natural disaster and presence of volcanic ash.

3.2.58 Subsequently, under the terms of Conclusions 17/11, APANPIRG called for the ATM Contingency Plans for Jakarta and Ujung Pandang FIRs to be adopted as a model for Asia/Pacific States in the preparation of national ATM contingency plans.

3.2.59 Singapore highlighted to the meeting that coordination of contingency plans necessarily involved a consultative process between adjacent FIR authorities. Logistically, this could require a large number of bi-lateral or tri-lateral meetings between affected States and this process would need to be completed many times over across the region during the next few years in order to ensure widespread completion of contingency plans. Singapore considered that it would be more efficient if either, contingency plan meetings involving many States were held under the ICAO umbrella, or full advantage was taken of ICAO periodic ATS Coordination meetings to hold side meetings amongst the many States normally represented to progress contingency plan preparations.

3.2.60 The Secretariat informed the meeting that APANPIRG/16 (2005) had raised the following Decision:

Decision 16/14 – Contingency Plans on ATS Coordination Group Agendas

That, the development of State Contingency Plans be included as an item on the agenda of State ATS coordination meetings.

3.2.61 This action had been carried out by the Secretariat and the ICAO South East Asia ATS Coordination Group (SEACG) and the ICAO Bay of Bengal ATS Coordination Group (BBACG) agendas had been updated in this regard. Additionally, the Secretariat had invited the informal ATS coordination groups in the Pacific to also follow this Decision. The Secretariat would invite the recently constituted informal Arabian Sea/Indian Ocean ATS Coordination Group (ASIOACG) to include this matter as a standing agenda item. In addition to the SEACG and BBACG meetings, the Secretariat would facilitate side meetings during any of the other ICAO ATM related meetings to enable States to engage in coordination activities to finalize ATS contingency plans with their neighbour States.

Viet Nam – Update on ATM activities

3.2.62 Viet Nam updated the meeting in relation to the main ATM activities conducted during 2007-08. The meeting was informed that the Civil Aviation Administration of Viet Nam (CAAV) provided ATS and other ANS for more than 100 airlines operating within the Ha Noi and the Ho Chi Minh FIRs, at four international airports and more than 16 domestic airports. The current average traffic volume is about 890 flights per day and, in the recent period, the traffic volume has been increasing considerably.

3.2.63 The main activities in ATM were:

a) Establishment of ATS route R471 serving traffic between Ha Noi and Kunming on 10 April 2008;

b) Participating in AFTM operations for the westbound traffic overflying the Kabul FIR;

c) RVSM - Implementation of the single RVSM FLOS within the Ha Noi FIR on 22 November 2007; implementation of the new RVSM flight level arrangements for the Western Pacific/South China Sea area within the Ho Chi Minh FIR effective from 3 July 2008;

d) Following successful completion of ADS/CPDLC operation trial, regular data link operations within the Ho Chi Minh FIR implemented from 10 April 2008; and

e) Implementation of RNAV10 (RNP 10) 50NM longitudinal & 50NM lateral reduced separation operations on RNAV routes L642 and M771 in the Ho Chi Minh FIR effective from 3 July 2008; Implementation of 40 NM radar spacing along ATS routes A202 and R474.

3.2.64 Viet Nam expected continued coordination for adjustment of ATS domestic routes; establishment of new ATS routes with shorter distances serving traffic between Ha Noi – Siem Riep, Ho Chi Minh/Phuket/ Kuala Lumpur and Hong Kong/beyond respectively. Viet Nam would continue work in relation to ATS airspace classification, reducing radar spacing on ATS route A1, setting up new DVOR flight operation procedures, revision of ATC LOAs and SAR agreements, developing ATS contingency plan, implementing AIDC between Ho Chi Minh ACC and Sanya ACC, Singapore ACC. Vietnam would also be participating in ADS-B study and implementation activities, PBN activities, preparation for on-board carriage of ELT 406 MHz, SADIS 2G and AWOS stations, adoption of new TAF Code and other activities.

AIS Matters

3.2.65 The meeting recalled that APANPIRG/14 (August 2003, Bangkok) expressed that AIS was an essential service that had safety implications and was crucial to the provision of air traffic services. Accordingly, under Decision 14/8, APANPIRG reactivated the regional AIS Implementation Task Force (AITF). The third meeting of the AITF (AITF/3, June 2008) was held back-to back with the Global AIM Congress in Singapore.

Review of AITF Terms of Reference (TOR)

3.2.66 AITF/3 was of view that the TOR and the name of the Task Force should be changed to reflect the transition from AIS to AIM. ATM/AIS/SAR/18 agreed that the TOR be amended and the name of the Task Force be changed to the AIS-AIM Implementation Task Force (AAITF).

Review of Air Navigation Deficiencies in the AIS Field and Proposed Action Plan

Preliminary Examination of Actions

3.2.67 The meeting was informed that Australia reported to AITF/3 on an examination of deficiencies in Asia/Pacific Regions which related to AIS matters. Australia provided a summary of identified deficiencies and research based on a survey that had been conducted by the Regional Office and presented to AITF/2 (February 2007, Bangkok). Australia proposed some actions (and "tools" in the form of draft letters) that might assist States in eliminating the identified deficiencies. It was noted that the area of highest concern was that some States had insufficient resources to fully meet the ICAO requirements, and as a consequence have a number of deficiencies that are enduring.

3.2.68 AITF/3 agreed that the draft letters would be useful tools and might be useful in attracting remedial actions to improve the AIS outcomes in their States. Particularly, a consistent theme throughout the meeting days was the continued poor adherence to AIRAC notification provisions.

3.2.69 AITF/3 was also presented with information on the electronic Terrain and Obstacle Databases (eTOD) and industry developments. The Task Force was made aware of ICAO Special Implementation Project (SIP) funding for special eTOD workshop.

Review of Euro OPADD (Operating Procedures for AIS Dynamic Data) Edition 2.1

3.2.70 The meeting recalled that APANPIRG had adopted the OPADD as guidance material for the Asia/Pacific Regions, continuing the practice of harmonizing operating procedures in the Regions with those of the European States and fostering global harmonisation. Subsequently, Edition 2.1 of the Euro OPADD had become available.

3.2.71 AITF/3 reviewed the recent amendment (Edition 2.1) to the Eurocontrol Operating Procedures for AIS Dynamic Data (OPADD) and recommended that Edition 2.1 be adopted. In considering this matter, the recognized that Euro OPADD Edition 2.0 had been previously been adopted as regional guidance material under the terms of APANPIRG Conclusion 18/13 and that the Edition 2.1 was an updating amendment to the Edition 2.0. ATM/AIS/SAR/SG/18 agreed with the AITF/3 recommendation and requested that the Secretariat take action to update Chapter 3 of the *Guidance Manual for Aeronautical Information Services (AIS) in the Asia/Pacific Region* with Edition 2.1. of the OPADD.

ICAO Special Implementation Project

3.2.72 The meeting was informed that SIPs were established under a special budget of the ICAO Assembly and were designed to assist States in overcoming problems of implementation, which may have significant adverse effects on the safety, regularity, or efficiency of international civil aviation. Arising from proposals prepared by the Regional Office, the AIS Seminar/Workshop SIP has been approved by ICAO Council. The purpose of the SIP is to conduct a combined workshop/seminar for States in the Asia/Pacific Region to address issues related to AIS automation and electronic terrain and obstacle data (eTOD) implementation. Planning has commenced for the SIP and the AITF considered that combined workshop/seminar could be held in conjunction with the AITF/4 meeting during February 2009 in Tokyo, Japan, with assistance from the JCAB and Eurocontrol.

Future date-time in NOTAMC and NOTAMR

3.2.73 ATM/AIS/SAR/SG/18 noted that the Air Navigation Commission (ANC) supported the proposal in APANPIRG Conclusion 18/14 that the use of future effective date-time in NOTAMC and NOTAMR be reviewed to determine appropriate provisions for Annex 15 – *Aeronautical Information Services* and that the ANC had requested the Secretariat to process the issue as a priority with target date of 2010. However, as the relevant Annex 15 amendment enabling use of future date-time became effective from November 2007, the AITF and ATM/AIS/SAR/SG/18 noted concerns from States as to what actions should be taken in the intervening period 2007 to 2010, specifically whether or not the future date-time should be used for NOTAMC and NOTAMR.

3.2.74 In this context, the Secretariat informed the meeting that the *Aeronautical Information Services Manual* (Doc 8126), at Chapter 6, Appendix A, Instructions for the Completion of the NOTAM Format, Section 5. Item B), provides that:

> *For date-time group use a ten-figure group, giving year, month, day, hours and minutes in UTC. This entry is the date-time at which the NOTAMN comes into force. In the case of NOTAMR and NOTAMC, the date-time group is the actual date and time of the NOTAM origination.*

3.2.75 Similarly, the Asia/Pacific Operating Procedures for AIS Dynamic Data (OPADD), which were adopted by APANPIRG/18 as a regional guidance material (Conclusion 18/13), provide that, *"for NOTAMR and NOTAMC, the Item B) time shall correspond to the actual date/time of creation of that NOTAMR or NOTAMC"*, and *"no future coming into force is permitted"* (paragraph 2.10.1.1 of OPADD refers).

3.2.76 Recognising that the intention of the AIS Manual is to assist States in the uniform application of the Standards and Recommended Practices (SARPs) contained in Annex 15, and that the OPADD is an approved regional guidance material, the meeting adopted the following Conclusion:

Conclusion 19/10 – Future Date-time for NOTAMC and NOTAMR

Recognizing that the concerns raised in APANPIRG Conclusion 18/14 relating to use of future date-time in NOTAMC and NOTAMR have been included in the Air Navigation Commission work programme for formal resolution by 2010, States be encouraged to use relevant guidance material in the Aeronautical Information Services Manual (Doc 8126) and the Asia/Pacific Operating Procedures for AIS Dynamic Data (OPADD) in the application of Annex 15 SARPs.

Republic of Korea – AIS Quality System ISO Certification

3.2.77 Republic of Korea informed the meeting that the Civil Aviation Safety Authority (CASA), which is the responsible body for the provision of Aeronautical Information Services and Aeronautical Charts Services within the Incheon FIR, had implemented an AIS Quality Management System (QMS) during 2007 to meet Annex 15 provisions. An outline of the process adopted by CASA is described below.

3.2.78 One of the consulting companies in the Republic of Korea was selected to support the QMS implementation and ISO 9001:2000 Certification process. In cooperation with the consultants, CASA reviewed the organizational structure of AIS and all the documents and procedures related to the provision of AIS. In addition, CASA trained AIS managers and officers on the QMS under the auspices of the consultant company.

3.2.79 After the thorough review of current AIS documents and procedures, CASA developed a QMS Manual for Aeronautical Information as a foundation document, containing the quality policy and objectives, authorities and responsibilities, resources, monitoring and evaluation, internal regulations and procedures. Each element of QMS Manual meets the requirements of the ISO 9001:2000 Quality Management Standards.

3.2.80 As a final phase of the certification process, CASA selected an ISO 9001:2000 certification company to conduct a review of all relevant documents, AIS and aeronautical charts offices under CASA. After a thorough evaluation process, the company concluded that CASA met the requirements of ISO 9001:2000 in the fields of Integrated Aeronautical Information Package (AIP, AIC, NOTAM, PIB) and aeronautical chart, and issued the ISO 9001:2000 Certification in December 2007.

India – Status of AIS/AIM Automation

3.2.81 India informed the meeting that they introduced automation in AIS in 2000 at all international NOTAM offices, where manual handling of NOTAM etc have been replaced with computer-based systems to facilitate airlines obtaining real time Pre-flight Information Bulletins (PIB) through Automated Self-Briefing Systems (ASBS). This initiative was expanded to include MET products along with PIBs which are made available to the airline community at their premises through Remote Briefing Terminals (RBTs). Such RBTs also have value added features for the airlines to obtain clearance information as well as to originate delay and cancellation information of their flight via AFTN.

3.2.82 Presently, these services are also made available at about 10 major domestic aerodromes by replicating the NOTAM databases from International NOTAM offices in India. In order to bring in further automation in AIS in India where manual means are still utilized in AIS functions other than cartography, an *“Integrated AIS/AIM Automation System”* is being implemented to ensure efficiencies and quality checks on the production processes of the AIP products from the design to publication stages.

3.2.83 Automation will be achieved at the primary AIS Unit in New Delhi by establishing a database information management system based on the AICM/AIXM concepts for managing the aeronautical data for AIP output including its amendments/supplements and maps/charts. In accordance with the Global AIM concept, the automation system will also integrate and harmonize all the current workflow functions involved in the design and publication processes at the AIS unit. System design, planning & qualitative requirements have been established and the procurement process has commenced. The new system is expected to be operational by the end December 2008.

Update on the Development of the ICAO EUR/NAT Regional Database for the Five-Letter Name-codes Allocations

3.2.84 The meeting was provided with an update on the ICAO EUR/NAT Regional Database (ICARD) for five-letter name-codes and route designators. APANPIRG/18 had recognized the considerable benefits of using the ICARD system and, under Conclusion 18/11, endorsed the regional use of ICARD.

3.2.85 The initial trial phase of implementation of ICARD for Asia/Pacific has been successfully completed. Accordingly, all States of the Region are now invited by the Regional Office to register in the ICARD system and to start using it. States should contact the Regional Office, who will provide guidance and assistance in this respect.

Search and Rescue (SAR) Matters

Review of Format of SAR Capability Matrix

3.2.86 In considering the follow up work arising from Conclusion 18/17, the meeting accepted the recommendation made by the ICAO/IMO Joint Working Group on SAR that the last column of the State SAR Capability Matrix be renamed to “COSPAS-SARSAT Distress Alerts”. In thanking the Joint Working Group and the United States for coordinating and arranging this positive outcome, the meeting amended the Matrix format accordingly and agreed to the following Conclusion:

Conclusion 19/11 – Update SAR Matrix including guidance material

That the updated format for the SAR Capability Matrix Table and explanatory text shown in **Appendix K** to the APANPIRG/19 Report on Agenda Item 3.2 be adopted and the explanatory text be included as a perpetual attachment to the SAR Capability Matrix, to serve as guidance to States when filling in the Matrix.

SAR Capability Matrix and List of SAR Agreements

3.2.87 The meeting reviewed and updated the SAR Capability Matrix Table (using the new format – see Appendix K above) and list of SAR Agreements as presented in **Appendix L** to the Report on Agenda Item 3.2, noting that ATM/AIS/SAR/SG/18 had adopted a date order sorting for the SAR agreements for ease of reference. The Secretariat thanked States for the input received since ATM/AIS/SAR/SG/18 and would ensure that these updates were entered into the tables.

ICAO SAR Seminar in Conjunction with Hong Kong China SAREX – October 2008

3.2.88 The meeting was informed that planning was taking place for an ICAO SAR seminar to be held in conjunction with the Hong Kong China International SAREX in October 2008. It is anticipated that the Seminar will be held over a day and a half, commencing from Tuesday, 28 October, and lead directly into the Hong Kong International SAREX 2008 commencing on the afternoon of Wednesday, 29 October and concluding late on Thursday, 30 October 2008.

Viet Nam – Revision of SAR LOAs

3.2.89 Viet Nam emphasized that the SAR activities required a mutual assistance between the neighbouring States in order to facilitate the search for aircraft in distress and rescue of survivors in the most expeditious and effective manner. Recognizing the importance of ensuring mutual assistance in SAR service provision, the Civil Aviation Authority of Viet Nam (CAAV) has been actively coordinating with other Civil Aviation Administrations in developing and signing the Letters of Agreement (LOAs) for provision of assistance in SAR activities. These LOAs, including the SAR coordination procedures and mission control arrangements, are based on the SARPs of Annex 12.

3.2.90 CAAV has signed bilateral LOAs for the provision of assistance in aviation SAR services with:

- Civil Aviation Authority Singapore in 1996;
- Air Transportation Office of the Philippines in 1996;
- Department of Civil Aviation Lao People's Democratic Republic in 1998; and
- State Secretariat of Civil Aviation Kingdom of Cambodia in 1999.

3.2.91 A number of details in these LOAs such as the names of responsible agencies, relevant postal, fax, telephone addresses etc have changed over time. In some instances, areas of responsibility for SAR provision and/or Search and Rescue Region (SRR) have been re-aligned for the South China Sea area. Updates are also necessary to the coordination arrangements and applicable procedures.

3.2.92 In order to improve effective SAR coordination between the States, Viet Nam proposed that:

a) The parties to existing SAR LOAs would consider working with Viet Nam to revise the SAR LOAs as soon as possible; and

b) Other parties neighbouring Viet Nam would consider working with Viet Nam to developing and signing new SAR LOAs.

3.2.93 The meeting supported these initiatives from Viet Nam and requested that affected States commence coordination with CAAV to achieve these outcomes.

Data Link Implementation in the Manila FIR

3.2.94 The Philippines updated the meeting in respect to their CNS/ATM Implementation Programme, as detailed in Report of Agenda Item 3.6. The meeting noted that the project included provision for ADS-C and CPDLC but that commissioning of this equipment was not scheduled until late 2012, some 4 years hence. Also, any slippage in the delivery timeline of the Philippines project would further delay the availability of data link services in the Manila FIR.

3.2.95 The meeting recognised that the Manila FIR is the last integral part for seamless data link operations in the entire South China Sea area, including a large component of the high capacity parallel route structure between South East Asia and Japan/North America. Japan highlighted that datalink operations in Manila FIR will improve surveillance and communication capability in South China Sea, allowing an immediate increase in airspace capacity by the adoption of reduced horizontal separations similar to those introduced on L642 and M771 in July 2008.

3.2.96 In respect to the L642 and M771 50/50NM implementations, Japan worked collaboratively with Singapore and Vietnam in the datalink implementation from its planning stage, and has been providing CRA services for FIT-SEA group in performance analysis and problem resolution. Japan will continue such commitments as much as possible to this area and is greatly anticipating an early operation of data link in Manila FIR.

3.2.97 The meeting recognised that reduced separations as a result of seamless datalink operations between adjacent airspaces are becoming more and more important in the situation of increasing fuel prices and environmental pressures. The meeting urged the Philippines to consider appropriate steps for ADS/CPDLC data link services to be provided in the Manila FIR as soon as possible and developed the following Conclusion**:**

Conclusion 19/12 – Accelerated Data Link Implementation in the Manila Flight Information Region (FIR)

That, to enable the early realization of the full benefit of data link operation and the implementation of reduced lateral and longitudinal separations throughout the South China Sea airspace, the Philippines be invited to expedite implementation of ADS-C and CPDLC data link services in the Manila FIR.

ATM/AIS/SAR Task List

3.2.98 The meeting recalled that a new format Task List for the Sub Group was rejected by ATM/AIS/SAR/SG/17 as the new format was too cluttered and too high level, resembling a Key Priorities list rather than a working list intended to effectively support the implementation work programme of the Sub-Group. Consequently, the Secretariat had prepared a 'rewritten' task list for consideration by the Sub-Group which was accepted by ATM/AIS/SAR/SG/18. In accordance with a decision of ATM/AIS/SAR/SG/17, the relevant Conclusions and Recommendations from ALLPIRG/5 and the 11th Air Navigation Conference are now included as attachments to the ATM/AIS/SAR/SG Task List for ease of reference.

3.2.99 The meeting adopted the following Decision in this regard:

Decision 19/13 – ATM/AIS/SAR Task List

That, the ATM/AIS/SAR Sub-Group Task List and attachments contained in Appendix A to the ATM/AIS/SAR/SG/18 Report on Agenda Item 9 be adopted as the current work programme for the ATM/AIS/SAR Sub-Group of APANPIRG.

Commitments to the Work of ICAO by Japan

3.2.100 Japan informed the meeting that they, as a member of APANPIRG over the years and the member of ICAO Council as well, provided extensive supports to the work of ICAO regionally and globally. Some of examples of JCAB's commitment to the ICAO programmes are summarized below:

Establishment of JCAB Regional Monitoring Agency (RMA)

3.2.101 APANPIRG/18 formulated Conclusion 18/6 – Establishment of Japan RMA. Subsequently, the 8th meeting of RASMAG (RASMAG/8, December 2007) conducted a technical review of Japan's submission and noted the comprehensiveness of the documentation prepared by Japan. RASMAG/8 endorsed Conclusion 18/6 and offered full congratulations to JCAB RMA for achieving APANPIRG RMA status. Japan has been continuing to work with RASMAG and other RMAs in undertaking regional safety monitoring activities to ensure the continued safe operation of reduced separation applications in the Asia/Pacific region.

3.2.102 In addition, Japan has obtained budget approval and commenced the technical specification design process and site surveys to commission ground-based Height Monitoring Unit (HMU) facilities. The plan is to eventually commission three HMU facilities in Japan, with a target date for commissioning of the first HMU in 2011, with the other two HMUs following in 2012 and 2013 respectively.

3.2.103 Since Japan is located at the west end of the Pacific and its strategic location connects Northeast Asia and the Pacific, the availability of HMU facilities in Japan is expected to enhance monitoring of aircraft height-keeping capability as well as data collection and analysis capability in Asia, thus contributing to safety improvement.

Hosting ICAO Meetings/Seminars

3.2.104 Japan wished to invite as many international events as possible to Japan as part of their commitment to promoting safety and efficiency of civil aviation. Their programmes in 2008 and 2009 include the following events:

- the 7th meeting of FIT-SEA (FIT-SEA/7) in Fukuoka in January 2008;
- ATFM Seminar/Workshop in Fukuoka in October 2008;
- AIS Automation and Electronic Terrain Data Seminar in Tokyo in February 2009;
- PBN Seminar in Kansai in March 2009; and
- the 46th Conference of APAC Director Generals of Civil Aviation (DGCA/46) (date and venue to be determined)

3.2.105 In addition, Japan has been the Co-Chair of GNSS Implementation Team of the Asia and Pacific Economic Cooperation (APEC) for more than four years, and is leading the promotion of region-wide use of GNSS technologies and application in all transport modes, including aviation.

RVSM IMPLEMENTATION STATUS IN THE ASIA/PACIFIC REGION

(Last updated 5 September 2008)

FIRs	RVSM Implementation Date	Comments
Anchorage Arctic	24 Feb 2000	Implemented
Anchorage Continental	24 Feb 2000	Implemented
Anchorage Oceanic	24 Feb 2000	Implemented
Auckland Oceanic	24 Feb 2000	Implemented
Bali	31 Oct 2002	Implemented
Bangkok	21 Feb 2002	Implemented on specific routes on 21 Feb 2002. Whole FIR on 27 Nov 2003.
Beijing	21 Nov 2007	Implemented
Brisbane	24 Feb 2000	Implemented in the Oceanic East of Australia on 24 Feb 2000 - Remainder of FIR on 1 Nov 2001.
Calcutta	27 Nov 2003	Implemented
Chennai	27 Nov 2003	Implemented
Colombo	27 Nov 2003	Implemented
Delhi	27 Nov 2003	Implemented
Dhaka	27 Nov 2003	Implemented
Guangzhou	21 Nov 2007	Implemented
Fukuoka	24 Feb 2000	Implemented over the Pacific Oceanic on 24 Feb 2000. Remainder on 29 September 2005.
Hanoi	31 Oct 2002	Implemented
Ho Chi Minh	21 Feb 2002	Implemented
Hong Kong	31 Oct 2002	Implemented
Honiara	24 Feb 2000	Implemented
Incheon	29 Sep 2005	Implemented
Jakarta	31 Oct 2002	Implemented
Karachi	27 Nov 2003	Implemented
Kathmandu	27 Nov 2003	Implemented
Kota Kinabalu	21 Feb 2002	Implemented
Kuala Lumpur	21 Feb 2002	Implemented in the eastern part on 21 Feb 2002. Western part on 27 November 2003.

FIRs	RVSM Implementation Date	Comments
Kunming	21 Nov 2007	Implemented
Lahore	27 Nov 2003	Implemented
Lanzhou	21 Nov 2007	Implemented
Male	27 Nov 2003	Implemented
Manila	21 Feb 2002	Implemented
Melbourne	1 Nov 2001	Implemented
Mumbai	27 Nov 2003	Implemented
Nadi	24 Feb 2000	Implemented
Nauru	24 Feb 2000	Implemented
New Zealand (Domestic)	13 July 2000	Implemented
Oakland Oceanic	24 Feb 2000	Implemented
Phnom Penh	21 Feb 2002	Implemented
Port Moresby	13 Apr 2000	Implemented
Pyongyang		
Sanya	31 Oct 2002	Implemented on N892 on 21 February 2002. Whole FIR on 21 Nov 2007.
Shanghai	21 Nov 2007	Implemented
Shenyang	21 Nov 2007	Implemented
Singapore	21 Feb 2002	Implemented
Tahiti	24 Feb 2000	Implemented
Taibei	21 Feb 2002	Implemented
Ujung Pandang	31 Oct 2002	Implemented
Ulaanbaatar		
Urumqi	21 Nov 2007	Implemented
Vientiane	31 Oct 2002	Implemented
Wuhan	21 Nov 2007	Implemented
Yangon	27 Nov 2003	Implemented

—END—

REGIONAL/NATIONAL PERFORMANCE OBJECTIVE — IMPLEMENTATION OF THE NEW ICAO FPL FORM	
Benefits	
Environment	• reductions in fuel consumption
Efficiency **Safety**	• ability of air navigation service providers t make maximum use of aircraft capabilities • ability of aircraft to conduct flights more closely to their preferred trajectories • facilitate utilization of advanced technologies thereby increasing efficiency • optimized demand and capacity balancing through the efficient exchange of information • enhance safety by use of modern capabilities onboard aircraft
Strategy **Short term (2010)** ***Medium term (2011 - 2015)***	

ATM OC COMPONENTS	TASKS	TIMEFRAME START-END	RESPONSIBILITY	STATUS
SDM	***En-route airspace***	2009-2012		
	• ensure that the automation and software requirements of local systems are fully adaptable to the changes envisaged in the new FPL form	2009		
	• ensure that issues related to the ability of FDPS's to pass information correctly and to correctly identify the order in which messages are received, to ensure that misinterpretation of data does not occur	2009-2012		
	• analyze each individual data item within the various fields of the new flight plan form, comparing the current values and the new values to verify any problems with regard to applicability of service provided by the facility itself or downstream units	2009		
	• ensure that there are no individual State peculiarities or deviations from the flight plan provisions	2009-2012		
	• ensure that the accepting ATS Reporting Office accepts and disseminates all aircraft capabilities and flight intent to all the downstream ACCs as prescribed by the PANS-ATM provisions	2012		

	• plan the transition arrangements to ensure that the changes from the current to the new ICAO FPL form occur in a timely and seamless manner and with no loss of service	2009-2012		
	• in order to reduce the change of double indications it is important that any State having published a specific requirement(s) which are now addressed by the amendment should withdraw those requirements in sufficient time to ensure that aircraft operators and flight plan service providers, after 15 November 2012, use only the new flight plan indications.	2009-2012		
	• establish a central depository in order to track the implementation status and inform the ICAO regional offices on an ongoing basis	2009		
linkage to GPIs	GPI/18 Aeronautical Information			

TERMS OF REFERENCE

Asia/Pacific ICAO Flight Plan & ATS Messages Implementation Task Force (FPL&AM/TF)

Terms of Reference

The terms of reference of the FPL&AM/TF are:

1) To conduct a comprehensive review of Amendment 1 to the Fifteenth Edition of the PANS ATM (Doc 4444, effective 15 November 2012) in order to identify, study and address implementation complexities arising from the adoption of amended PANS ATM Chapter 4, Chapter 11, Appendix 2 and Appendix 3 provisions relating to the ICAO Flight Plan and associated ATS Message formats; and

2) As a result of the review, and in accordance with relevant additional ICAO provisions, prepare and promulgate coordinated Asia/Pacific transition strategies and plans with associated timelines to enable the streamlined implementation of the amended Flight Plan and ATS Message provisions contained in Amendment 1 to the Fifteenth Edition of the PANS ATM.

In addressing these terms of reference, the Task Force should consider, *inter alia,* the following aspects:

1) Likelihood that such changes within local systems will differ between Regions and systems, therefore global transition is not feasible in view of the localized issues and APANPIRG is best placed to authorize regional transition plans;

2) Inter and intra regional issues;

3) Impact on inter-system co-ordination messaging (e.g. AIDC)
   - AIDC guidelines and other regional documents will need to be updated;

4) Contingency arrangements for States that cannot comply by the due date;
   - How to handle staged implementations by States and/or airspace users,
   - Expectations across ANSPs with different implementation dates, and
   - Systems that transition early will need to be capable of handling both new and current instruction sets.

5) Inter-system exchanges need to take account of differing automation capabilities in order to avoid excessive message rejection;

6) Establishment of an Information Management system to track implementation timelines for various States/systems;

7) Management of Repetitive Flight Plans;

8) Implications for presentation formats, including paper & electronic flight progress strips;

9) Impacts to users (flight planning systems etc); and

10) Appropriately timed withdrawal of existing State or Regional specific requirements to ensure consistency with new instruction set.

Membership

Proposed membership of the Task Force should include, but is not limited to, operational and systems engineering personnel from the following States:

> Australia, China, Hong Kong-China, India, Indonesia, Japan, Malaysia, New Zealand, Singapore, Thailand, United States, Viet Nam, IATA and IFALPA.

Industry participation, if required, is to be included under responsibility of State delegations or with approval from the ICAO Asia/Pacific Regional Office.

Reporting

Report progress to ATM/AIS/SAR/SG/19 and CNS/MET/SG/13 (June/July 2009), and APANPIRG/20 (September 2009).

ICAO Strategic Objectives and GPIs

Amendment 1 to the Fifteenth Edition of PANS-ATM promulgates updates to operational messages, including the ICAO Flight Plan message set, in order to provide, *inter alia*, increased detail and definition of aircraft equipage with the objective of better managing and enabling provision of the related ATS services.

The Task Force will prepare and maintain a performance framework form (PFF) to codify the implementation of the new ICAO Flight Plan format and associated ATS Messages as an Asia/Pacific regional performance objective. The work and outcomes from the Task Force are expected to support:

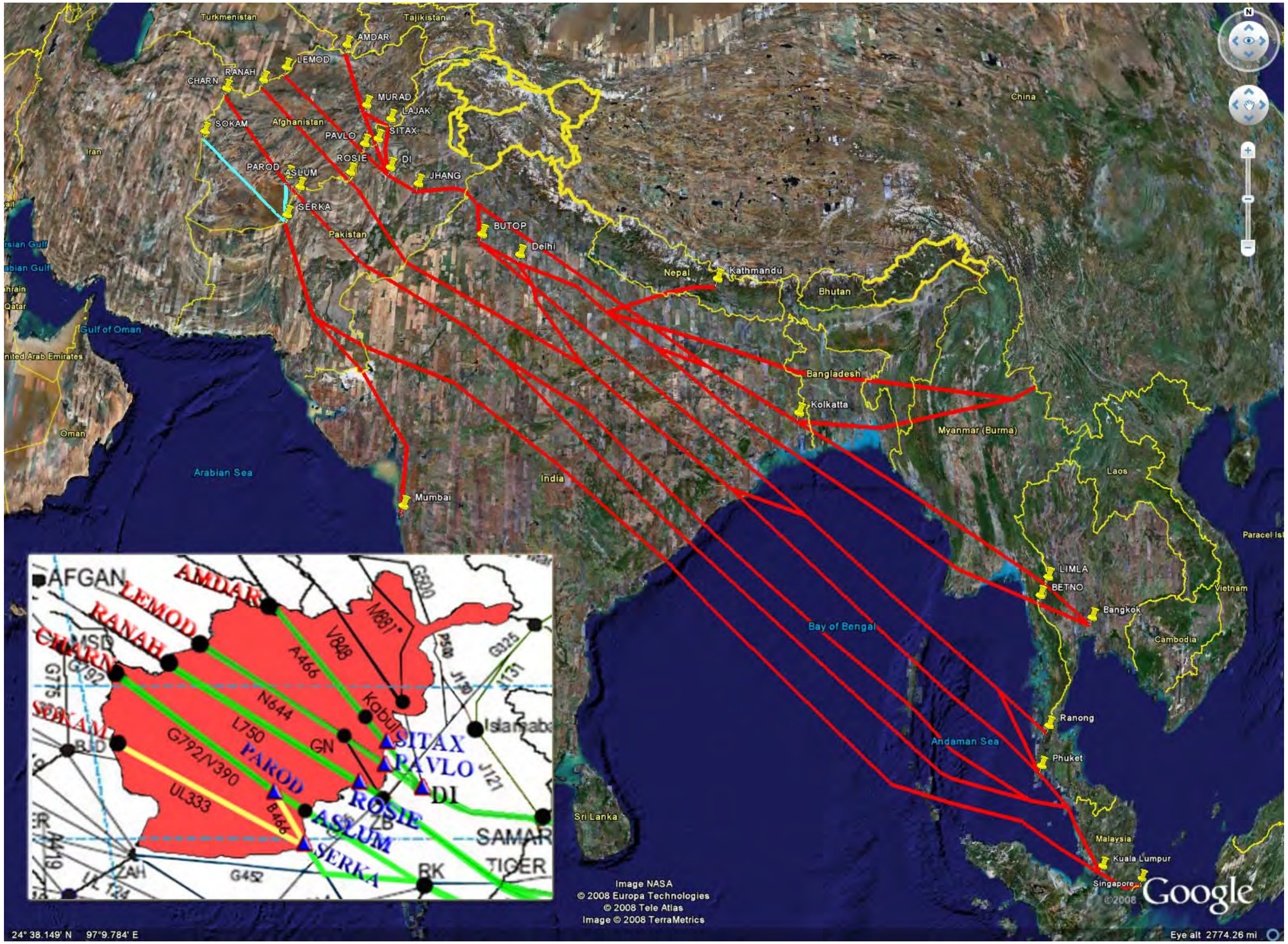
ICAO Strategic Objectives:

A: Safety – Enhance global civil aviation safety
D: Efficiency – Enhance the efficiency of aviation operations
E: Continuity – Maintain the continuity of aviation operations

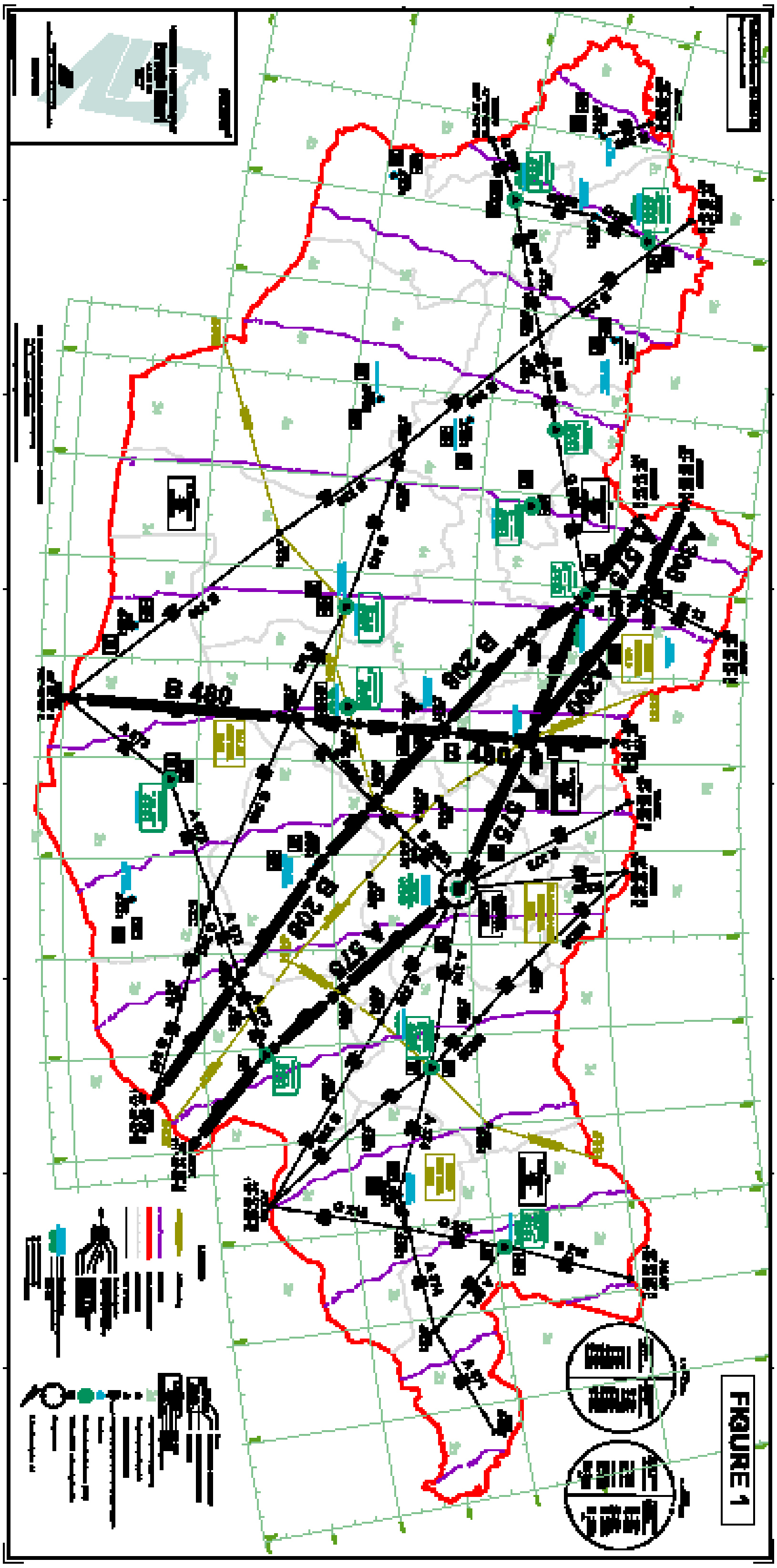
Global Plan Initiatives

GPI-5	*Performance based navigation*
GPI-9	*Situational awareness*
GPI-11	*RNP and RNAV Standard Instrument Departures (SIDs) and Standard Terminal Arrivals (STARs)*
GPI-17	*Implementation of data link applications*

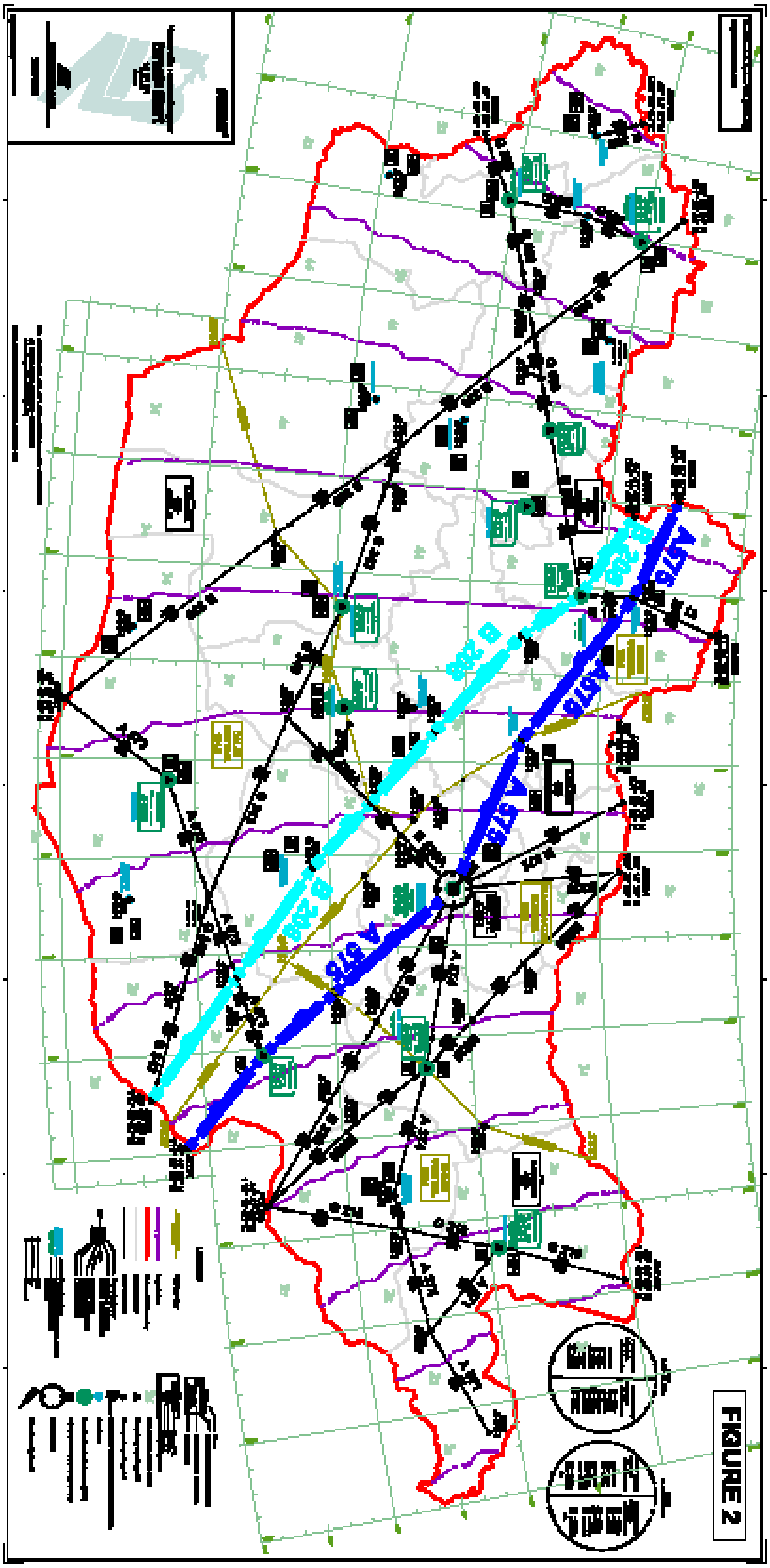
……………… end …………..



ATS Routes affected by ATFM procedures in the Bay of Bengal and South Asia for flights transiting the Kabul FIR, period 2000 – 2359 UTC daily.



EXISTING ATS ROUTES OF MONGOLIA



PROPOSAL VERSION OF ATS ROUTES

FINAL DRAFT

Data Link Harmonization Strategy — ADS-C and CPDLC

- Any additional aircraft implementation of automatic dependent surveillance — contract (ADS-C) should either;

  i) utilise without change the existing DO-258A/ED-100A[1] (FANS-1/A) ADS-C, or

  ii) move to the full implementation of the internationally agreed common technical definition that will be defined based on relevant provisions and guidance material (*Manual of Air Traffic Services Data Link Applications* (Doc 9694)) developed by ICAO and its technical bodies

  Partial or divergent aircraft data link evolutions should not be pursued, as they will continue to promote divergent paths to the detriment to the broader community. Interim steps or phases toward full implementation of the common technical definition in ground systems should only be pursued on a regional basis, after coordination between all States concerned.

- Any additional aircraft implementation of controller-pilot data link communications (CPDLC) should either;

  i) utilise without change the existing DO-258A/ED-100A (FANS-1/A) or DO-280B/ED-110B[2] (ATN) CPDLC for ACM/ACL/AMC[3] data link services, or

  ii) move to the full implementation of the internationally agreed common technical definition, based on *Procedures for Air Navigation Services — Air Traffic Management* (PANS-ATM, Doc 4444), and other operational material as appropriate

  Partial or divergent aircraft data link evolutions that result in excluding messages from aircraft systems should not be pursued, as they will continue to promote divergent paths to the detriment to the broader community. Interim steps or phases toward full implementation of the common technical definition in ground systems should only be pursued on a regional basis, after coordination between all States concerned.

- Harmonization of operational procedures for implementation of the above packages is considered essential. States, planning and implementation regional groups (PIRGs), ANS providers and other ATS coordinating groups should adopt common procedures to support seamless ATS provision across flight information region (FIR) boundaries, rather than each State or Region developing and promulgating unique procedures for common functions.

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[1] *RTCA/EUROCAE Interoperability Requirements for ATS Applications Using ARINC 622 Data Communications*
(FANS 1/A INTEROP Standard)
[2] *RTCA/EUROCAE Interoperability Requirements Standard For ATN Baseline 1 (ATN B1 INTEROP Standard)*
[3] *Air traffic control communications management/Air traffic control clearances and information/Air traffic control microphone check*

DRAFT

**Air Traffic Flow Management (ATFM) Communication Manual
for the Asia Pacific Region**

Version 1.0

May 2008

FOREWORD

Centralized air traffic flow management (ATFM) facilities are best able to communicate their national system's ability to accept traffic from adjacent international air traffic service (ATS) providers. As coordination and collaboration efforts intensify between the countries, common procedures and communication are essential. Once procedures are defined, a key element in removing language barriers is establishing common terms and phrases. Terminology and phraseology differences in ATFM could be a potential source of confusion during communications between international ATFM facilities.

Common terminology is an essential element in exchanging definitive, clear, and concise communication between international ATFM units. Likewise, the phraseology should follow a technical pattern for the exchange of standardized and harmonized messages. The terminology and phraseology presented are not intended to be a requirement for ATFM communications, but may be used as a guideline for the exchange of ATFM messages.

TABLE OF CONTENTS

1. General

1.1 The primary goal of these guidelines is to develop terminology and phraseology for the exchange of ATFM messages between units providing ATFM services. The terminology and phraseology contained herein are intended to both reflect the current use of plain language and provide a basis for standardization and harmonization.

1.2 Although there are various plain language words and phrases in use today by ATFM service providers, these words and phrases can be organized into a modular and structured method of delivery to ensure communication harmonization and reduce the incidence of misunderstanding between units providing ATFM service.

1.3 It is not the intent of these guidelines to provide detailed information on ATFM concepts, procedures, and initiatives; however, since not all readers may be familiar with ATFM terms used in the examples, a brief description of ATFM initiatives is provided at Appendix 1. The list is not all-inclusive and does not preclude the innovation and application of other procedures that will result in improved service.

1.4 These guidelines include the concept of modular and structured ATFM messages and define an ATFM message's components as who, what, where, when and why. These five components are described as follows:

a. Who: The ATFM service unit being contacted followed by the ATFM service unit that is initiating the contact.

b. What: The ATFM objective to be achieved.

c. Where: The location of the ATFM objective to be achieved.

d. When: The time and/or duration of the ATFM objective to be achieved.

e. Why: The reason for the ATFM objective.

1.5 There is no module regarding "how" the ATFM restrictions should be achieved by the counterpart ATFM service provider. It is the counterpart's responsibility how they fulfill the requested ATFM restrictions within their airspace. However, the center being asked for the ATFM restrictions may collaborate with the originating center on the type and method of ATFM measure application. Generally speaking, ATFM service providers resolve demand-capacity related constraints by initiating national ATFM initiatives first. Therefore, ATFM restrictions requested by an adjacent international ATFM facility should be considered highly necessary. Therefore, once information is exchanged regarding an ATFM restriction and the acceptance is expressed, it is considered MANDATORY. It should be noted that a critical situation could require acceptance of an ATFM restriction without allowing any options for the requested facility.

1.6 Below are the examples of possible ATFM messages:

- "FAA COMMAND CENTER, THIS IS FUKUOKA ATMC … REQUIRE 100 MILES IN TRAIL REGARDLESS OF FLIGHT LEVEL ON R220, R580 AND ALL PACOTS TRACKS FOR TRAFFIC LANDING NARITA ESTIMATING FIR BOUNDARY FROM 0100 UTC UNTIL 0500 UTC DUE TO SEVERE WEATHER".

- "FUKUOKA ATMC, THIS IS FAA COMMAND CENTER… CAPACITY RESTRICTION: LOS ANGELES HAS STARTED FLOW RESTRICTIONS FOR ALL AIRCRAFT LANDING LOS ANGELES DUE TO EARTHQUAKE. APPROACH HAS REQUESTED GROUND STOPS FOR ARRIVALS UNTIL FURTHER NOTICE".

2. ATFM Message Components

2.1 The use of a modular and structured ATFM message provides for consistent ATFM message design and delivery. Each of the ATFM message's five components can contain plain language elements that when combined provide a complete ATFM message. The harmonization achieved lies in the delivery of an ATFM message that has all of the required components in a structured format while making allowances for different plain language elements. This is of particular benefit for ATFM service providers that use different ATFM terminology or for non-native English speaking ATFM service providers.

2.2 As the modular and structured ATFM message may contain several different elements of plain language, this section will examine each of the five components and detail some of the possible plain language words and phrases that are in use today.

2.3 **WHO**: The **who** component identifies the ATFM service unit being contacted followed by the ATFM service unit that is initiating the contact. ATFM units will be addressed by name until ICAO Annex 10 is amended accordingly. Examples of the who component:

- "FUKUOKA ATMC, THIS IS FAA COMMAND CENTER…"
- "FAA COMMAND CENTER, THIS IS FUKUOKA ATMC…"

2.4 **WHAT**: The **what** component identifies the ATFM objective to be achieved. The **what** component may also be used to provide ATFM information. Objectives include but are not limited to:

a) REQUIRE (number) MILES (or MINUTES) IN TRAIL AT THE SAME FLIGHT LEVEL;
b) REQUEST (number) MILES (or MINUTES) IN TRAIL REGARDLESS OF FLIGHT LEVEL;
c) REQUEST A RATE OF (number) AIRCRAFT PER HOUR;
d) FLIGHT LEVELS (number) AND (number) NOT AVAILABLE;
e) ONLY FLIGHT LEVELS (number), (number) AND (number) ARE AVAILABLE;
f) (route/airport/airspace) NOT AVAILABLE DUE (reason) ALTERNATIVE[S] IS/ARE (routes/airports).

2.5 **WHERE**: The **where** component represents the location of the ATFM objective to be achieved. It is often preceded by a modifying clause, indicating what aircraft or traffic the restriction will apply to. The modifying clause and the location combination are used to construct there where component.

Examples of location:

- "…AT NIPPI…"
- "…ON A337…"
- "…WESTBOUND ON PACOTS TRACK CHARLIE…"
- "…INBOUND ON G344…"
- "…ON PACOTS TRACK 2 LANDING SAN FRANCISCO AIRPORT…"
- "…ABOVE FLIGHT LEVEL 300…"

Examples of what aircraft or traffic are included:

- "…FOR ALL AIRCRAFT…"
- "…FOR TRAFFIC FASTER THAN 300 KNOTS…"
- "…FOR HEAVY AIRCRAFT…"
- "…FOR TRAFFIC LANDING…"
- "…FOR AIRCRAFT DEPARTING…"
- "…FOR TRAFFIC OVERFLYING…"
- "…FOR AIRCRAFT PASSING…"

2.6 **WHEN**: The **when** component represents the time and/or duration of the ATFM objective to be achieved:

[FROM (time)] UNTIL (time).

Examples of time/duration:

- "…FROM 0300 UTC UNTIL 0600 UTC…"
- "…FROM NOW UNTIL 0600 UTC…"
- "…FROM 2300 UTC UNTIL FURTHER NOTICE…"
- "…UNTIL FURTHER NOTICE…"

2.7 **WHY**: The **why** component represents the reason for the ATFM objective:

a) DUE TO (reason);
b) FOR (reason).

Examples of reasons:

- "…DUE TO RUNWAY CLOSURE"
- "…FOR (SEVERE) WEATHER"
- "…DUE TO COMMUNICATION FAILURE"
- "…DUE TO (significant event/natural disturbance such as FIRE or VOLCANIC ASH)"
- "…FOR STATE AIRCRAFT ACTIVITY"
- "…DUE TO EQUIPMENT OUTAGE"
- "…FOR EMERGENCY"
- "…DUE TO ATFM INITIATIVES IN (location)"

3. ATFM Message Types

3.1 **Information to be shared prior to invoking the ATFM restrictions**: The information-sharing should be facilitated not only during the actual flow control but also (and more importantly) well prior to invoking the ATFM restrictions when the possibility of flow control arises. The following phrases will make clear the distinction between the ATFM messages and the information provided for situation awareness:

a) POSSIBLE TRAFFIC FLOW RESTRICTIONS;
b) CAPACITY RELATED INFORMATION.

Examples of messages sent prior to invoking ATFM restrictions follow:

- "FAA COMMAND CENTER, THIS IS FUKUOKA ATMC… **POSSIBLE TRAFFIC FLOW RESTRICTIONS**… NARITA AIRPORT HAS CLOSED ONE RUNWAY AND STARTED SNOW REMOVAL".
- "FAA COMMAND CENTER, THIS IS FUKUOKA ATMC… **CAPACITY RELATED INFORMATION**…NARITA AIRPORT HAS ENTERED THE STORM ZONE OF THE TYPHOON".

3.2 **ATFM Initiative Message**: ATFM initiatives communicate air traffic flow restrictions/objectives from one air traffic service provider to another. They follow the five component structure described earlier:

a. Who: The ATFM service unit being contacted followed by the ATFM service unit that is initiating the contact.

b. What: The ATFM objective to be achieved.

c. Where: The location of the ATFM objective to be achieved.

d. When: The time and/or duration of the ATFM objective to be achieved.

e. Why: The reason for the ATFM objective.

Examples of ATFM initiatives follow:

- "FUKUOKA ATMC, THIS IS FAA COMMAND CENTER … REQUIRE 30 MINUTES IN TRAIL AT THE SAME FLIGHT LEVEL FOR ALL AIRCRAFT LANDING CHICAGO FROM 0800 UTC UNTIL FURTHER NOTICE DUE TO STATE AIRCRAFT ACTIVITIES".
- "FAA COMMAND CENTER, THIS IS FUKUOKA ATMC… FL350 AND BELOW NOT AVAILABLE FOR AIRCRAFT OVERFLYING JAPANESE DOMESTIC AIRSPACE UNTIL 0900 UTC DUE TO EMERGENCY".

3.3 **Reply to ATFM Initiative Message**: The following phrases will be used for replying to ATFM initiative messages:

a) ACCEPT (initiative);
b) AGREED TO (initiative);
c) (initiative) IS ACCEPTABLE [DEPENDS ON THE DEMAND] (other pertinent information, if any);
d) UNABLE (initiative) [DUE (reason)] (alternative proposed).

Examples of replying to ATFM initiatives follow:

- "AGREED TO 30 MINUTES IN TRAIL AT THE SAME FLIGHT LEVEL ON PACOTS TRACKS 2 AND 3 FROM 1000 UTC UNTIL 1500 UTC".
- "UNABLE TO ACCEPT THE RESTRICTION FROM 1430 UTC DUE TO TRAFFIC VOLUME ON A590 UNTIL 1530 UTC".

3.4 **Coordination of aircraft exempted from ATFM initiatives**: The following phrases will be used for the coordination of aircraft which are exempt from ATFM restrictions:

a) REQUEST EXEMPTION FROM ATFM;
b) COORDINATION OF ATFM EXEMPTION.

3.5 The following types of aircraft may be exempted from ATFM restrictions:

- Aircraft in a state of emergency
- Aircraft engaged in search and rescue missions
- Aircraft operating for humanitarian reasons
- Aircraft carrying the head of State or distinguished visitors of State
- Aircraft carrying a patient who needs urgent medical treatment

Examples of messages requesting ATFM exemption follow:

- "FUKUOKA ATMC, THIS IS FAA COMMAND CENTER… **REQUEST EXEMPTION FROM ATFM**…UAL123 IS CARRYING A PATIENT WHO NEEDS URGENT MEDICAL TREATMENT".
  "UAL123…EXEMPTION APPROVED".
- "FAA COMMAND CENTER, THIS IS FUKUOKA ATMC… **COORDINATION OF ATFM EXEMPTION**… JA501A IS OPERATING SEARCH AND RESCUE MISSIONS".

3.6 **Information for the next coordination**: If it is possible and appropriate, the expected time of next coordination will be forwarded with the ATFM messages:

I WILL CALL YOU AT (time) FOR FURTHER COORDINATION.

An example of a message with information for the next coordination follows:

- "FUKUOKA ATMC, THIS IS FAA COMMAND CENTER… REQUIRE 30 MINUTES IN TRAIL REGARDLESS OF FLIGHT LEVEL FOR ALL AIRCRAFT ON PACOTS TRACK 8 FROM 1000 UTC UNTIL FURTHER NOTICE DUE TO MILITARY ACTIVITY. I WILL CALL YOU AGAIN AT 1100 UTC FOR FURTHER COORDINATION".

3.7 **Amendment:** The amendment of an ATFM message should be structured as the initial message and include similar elements but with additional modifiers. These modifiers may include:

a) CHANGE
b) AMEND
c) REDUCE
d) INCREASE
e) DECREASE

3.8 Amendment messages should also identify which message is being amended, as several restrictions could be in place at one time. Examples of ATFM amendment messages follow:

- "FAA COMMAND CENTER, THIS IS FUKUOKA ATMC… WE HAVE **CHANGED** THE RESTRICTION ON TRAFFIC FLYING PACOTS TRACKS CHARLIE, ECHO AND FOXTROT FOR NARITA AIRPORT. WE NOW NEED 20 MINUTES IN TRAIL AT THE SAME FLIGHT LEVEL ON PACOTS TRACKS CHARLIE, ECHO AND FOXTROT FOR TRAFFIC LANDING NARITA FROM NOW UNTIL 0900 UTC".
- "FUKUOKA ATMC, THIS IS FAA COMMAND CENTER…WE HAVE **INCREASED** THE INBOUND RATE FROM 5 AIRCRAFT PER HOUR TO 10 AIRCRAFT PER HOUR FOR TRAFFIC BEYOND OAKLAND FIR UNTIL FURTHER NOTICE".

3.9 **Cancellation**: The cancellation of an ATFM message should be structured the same as the initial message and include similar elements but also contain a canceling word or phrase. It is normally not necessary to state the reason for the cancellation. A canceling word or phrase may include:

a) CANCEL
b) RESUME
c) RESUME NORMAL
d) RELEASE

3.10 Cancellation messages should also identify which message is being cancelled, as several restrictions could be in place at one time. An example of an ATFM cancellation message follows:

- "FAA COMMAND CENTER, THIS IS FUKUOKA ATMC… **CANCEL** THE RESTRICTION ON TRAFFIC BEYOND THE FUKUOKA FIR AT THIS TIME. **RESUME NORMAL** TRAFFIC FLOW".

4. Active Listening

4.1 Because of the variety of ATFM information that may be exchanged, and the lack of a full set of standardized phraseology, **active listening** is encouraged. Active listening is a structured form of listening and responding that focuses the attention on the speaker. The listener must take care to attend to the speaker fully, and then repeats, in the listener's own words, what he or she thinks the speaker has said. The listener does not have to agree with the speaker; he or she must simply state what they think the speaker said. This enables the speaker to find out whether the listener really understood. If the listener did not, the speaker can explain further. Once the speaker and listener are clear as to the message, the listener should respond with agreement, acceptance or disagreement.

4.2 Active listening has several benefits. First, it forces people to listen attentively to others. Second, it avoids misunderstandings, as people have to confirm that they do really understand what another person has said.

5. Abbreviations

5.1 Appendix 2 provides a sample list of abbreviations used that are not defined in the ICAO Doc. 8400 (PANS-ABC). Neighboring ATFM facilities may wish to develop a similar list of abbreviations which are frequently used in ATFM communication, and include them in a letter of agreement. There is no requirement to develop such a list.

DESCRIPTION OF AIR TRAFFIC FLOW MANAGEMENT INITIATIVES

The following list contains the ATFM initiatives presently conducted by U.S. FAA. It is not all-inclusive and does not preclude the innovation and application of other procedures that will result in improved service.

Name	Description
Airborne holding	Planned holding of aircraft may be utilized. This is normally done when the operating environment supports holding and the weather conditions are expected to improve shortly; this ensures aircraft are available to fill the capacity at the airport.
Altitude	Utilized to segregate different flows of traffic, or to distribute the number of aircraft requesting access to a specified geographic region. **a. Capping**: Term to indicate aircraft will be cleared to an altitude lower than their requested altitude until they are clear of a particular airspace. Capping may apply to the initial segment of the flight or for the entire flight. **b. Tunneling**: Term to indicate traffic will be descended prior to the normal descent point at the arrival airport to remain clear of an airspace situation; e.g., holding.
Fix balancing	Assigning an aircraft a fix other than that in the filed flight plan in the arrival or departure phase of flight to equitably distribute demand.
Ground delay programs (GDP)	Aircraft are held on the ground in order prior to departure to manage capacity and demand at a specific location, by assigning arrival slots. The purpose of the program is to limit airborne holding.
Ground stops (GS)	GS is a process that requires aircraft that meet specific criteria to remain on the ground. Since this is one of the most restrictive methods of traffic management, alternative initiatives should be explored and implemented if appropriate. GSs should be used: **a.** In severely reduced capacity situations (below most user arrival minimums, airport/runway closed for snow removal, or aircraft accidents/incidents); **b**. To preclude extended periods of airborne holding; **c**. To preclude sector/center reaching near saturation levels or airport grid lock; **d**. In the event a facility is unable or partially unable to provide ATC services due to unforeseen circumstances; and **e**. When routings are unavailable due to severe weather or catastrophic events.
Miles-in-trail (MIT)	The number of miles required between aircraft that meet a specific criteria. The criteria may be separation, airport, fix, altitude, sector, or route specific. MIT are used to apportion traffic into manageable flows, as well as to provide space for additional traffic (merging or departing) to enter the flow of traffic.
Minutes-in-trail (MINIT)	The number of minutes required between successive aircraft. It is normally used in a non-radar environment, or when transitioning to a non-radar environment, or when additional spacing is required due to aircraft deviating around weather.
Reroutes	Reroutes are ATC routings other than the filed flight plan. They are issued to: **a.** Ensure aircraft operate with the “flow” of traffic. **b.** Remain clear of special use airspace. **c.** Avoid congested airspace. **d.** Avoid areas of known weather where aircraft are deviating or refusing to fly.

Name	Description
Sequencing programs	These programs are designed to achieve a specified interval between aircraft; they may be software generated or determined by ATFM personnel. Different types of programs accommodate different phases of flight. **1. Departure Sequencing Program (DSP) -** Assigns a departure time to achieve a constant flow of traffic over a common point. Normally, this involves departures from multiple airports. **2. En route Sequencing Program (ESP) -** Assigns a departure time that will facilitate integration in the en route stream. **3. Arrival Sequencing Program (ASP) -** Assigns fix crossing times to aircraft destined to the same airport.

Appendix 2

SAMPLE TABLE OF ABBREVIATIONS

The abbreviations listed here are those used by the ATCSCC and ATMC respectively that are not defined in the ICAO Doc. 8400 (PANS-ABC), and are provided only as an example. The shaded abbreviations are considered to be the common terms between the two centers. The asterisk shows verbatim difference in the original collocation but the abbreviation still indicates the common object. The non-common abbreviations are deemed inappropriate for the inter-facility ATFM communication between ATCSCC and ATMC.

	ATCSCC	ATMC
AAR	Airport Acceptance Rate	
ACID	Aircraft Identification	
ADL	Aggregate Demand List	
ADR	Airport Departure Rate	
ADZY	Advisory	
AIM	Aeronautical Information Manual	
ALTRV	Altitude Reservation	Altitude Reservation
ANP	Air Navigation Plan	
AOA	Office of the Administrator	
AOC	Airline Operations Center	
AP	Air Patrol	
APREQ	Approval Request	Approval Request
APVL	Approval	Approval
ARO	Airport Reservation Office	
ARTCC	Air Route Traffic Control Center	Air Route Traffic Control Center
ASM		Airspace Management
AT	Air Traffic	
ATCSCC	Air Traffic Control System Command Center	Air Traffic Control System Command Center
ATMC	Air Traffic Management Center	Air Traffic Management Center
ATMetC		Air Traffic Meteorological Center
ATO	Air Traffic Operations Program	
AUTODIN	Automatic Digital Network	
CARF	Central Altitude Reservation Function	
CCFP	Collaborative Convective Forecast Product	
CCWSU	Command Center Weather Service Unit	
CDM	Collaborative Decision Making	Collaborative Decision Making
CDR	Coded Departure Route(s)	Conditional Route
CDR	Continuous Data Recording	
CDT	Controlled Departure Time	
CFR	Code of Federal Regulations (formerly FAR)	
CIWS	Corridor Integrated Weather System	

	ATCSCC	ATMC
COMSEC	Communications Security System	
CR	Collaborative Routing	
CT	Select Flights Ground Delay Program	
CTA	Controlled Time of Arrival	
CTAS-TMA	Center TRACON Automation System Traffic Management Advisor	
CVRS	Computerized Voice Reservation System	
CWA	Central Weather Advisory	
CWSU	Center Weather Service Unit	
DARC	Direct Access Radar Channel	
DCCWU	ATCSCC Weather Unit	
DOTS	Dynamic Ocean Track System	Dynamic Ocean Track System
DP	Departure Procedure	
DSP	Departure Sequencing Program	
EDCT	Expected Departure Clearance Time	Expected Departure Clearance Time
EFAS	Enroute Flight Advisory Service	
EFTO	Encrypt For Transmission Only	
EOF	Emergency Operations Facility	
EOR	Emergency Operations Room	
EPS	Engineered Performance Standards	
ESCAT	Emergency Security Control of Air Traffic	
ETE	Estimated Time Enroute	Estimated Time Enroute
ETMS	Enhanced Traffic Management System	
EUCARF	European Central Altitude Reservation Facility	
FA	General Ground Delay Program	
FAA	Federal Aviation Administration	Federal Aviation Administration
FADT	Fuel Advisory Delay Time	
FCA	Flow Constrained Area	
FDMS		Flight Data Management System
FDPS		Flight Data Processing Section
FEA	Flow Evaluation Area	
FP	Flight Plan	
FPL	Full Performance Level	
GA	General Aviation	
GAAP	General Aviation Airport Program	
GDP	Ground Delay Program	
GS	Ground Stop	
HARS	High Altitude Route System	
HDTA	High Density Traffic Airport	

	ATCSCC	ATMC
IFCN	Interfacility Communication Network	
IFPFP	Individual Flight Plan From this Point	Individual Flight Plan From this Point
IFSS	International Flight Service Station	
INATS	Interruption of Air Traffic Service	
JCAB	Japan Civil Aviation Bureau	Japan Civil Aviation Bureau
LAA	Local Airport Advisory	
LADP	Local Airport Deicing Plan	
LOA	Letter of Agreement	Letter of Agreement
MAP	Monitor Alert Parameter	
MARSA	Military Assumes Responsibility for Separation of Aircraft	Military Assumes Responsibility for Separation of Aircraft
MEL	Minimum Equipment List	
MINIT	Minutes in Trail	
MIT	Miles in Trail	
MOS	Military Operations Specialist	
MTSAT	Multi-functional Transport Satellite	Multi-functional Transport Satellite
MVFR	Marginal Visual Flight Rules	
NADIN	National Airspace Data Interchange Network	
NAS	National Airspace System	
NAVAID*	Navigational Aid	Navigation Aid
NFDC	National Flight Data Center	
NMCC	National Maintenance Coordination Center	
NOAA	National Oceanic and Atmospheric Administration	
NOM	National Operations Manager	
NOPAC	North Pacific	North Pacific
NOS	National Oceanographic Service	
NRP	National Route Program	
NTMO	National Traffic Management Officer	
NWS	National Weather Service	
OAG	Official Airline Guide	
ODP		Oceanic Air Traffic Control Data Processing System
OPSNET	Operations Network	
OTG		Oceanic Track Generator
OTR		Oceanic Transition Route
PACMARF*	Pacific Military Altitude Reservation Facility	Pacific Military Altitude Reservation Function
PACOTS	Pacific Organized Track System	Pacific Organized Track System
PMTC	Pacific Missile Test Center	
PO	Plan of Operation	

	ATCSCC	ATMC
Pref Route	Preferential Route	
PT	Planning Team	
RA	Route Advisory	
RAA	Remote Airport Advisory	
ROT	Runway Occupancy Time	
SAA	Special Activity Airspace	
SOP	Standard Operating Procedure	
STMP	Special Traffic Management Program	
SUA	Special Use Airspace	
SVRW	Severe Weather	
SWAP	Severe Weather Avoidance Program	
TEC	Tower-Enroute Control	
TELCON	Telephone Conference	
TFM	Traffic Flow Management	
TIS	Traffic Information System	
TMC	Traffic Management Coordinator	Traffic Management Coordinator
TMCIC	Traffic Management Coordinator in Charge	
TMI	Traffic Management Initiative	
TMU	Traffic Management Unit	Traffic Management Unit
TSTM	Thunderstorm	
WSO	Weather Service Office	

.

Tentative Programme
ICAO Asia/Pacific ATFM Seminar/Workshop
Fukuoka, Japan, 7-9 October, 2008

TUESDAY, 7TH OCTOBER 2008		
TIME	**TITLE AND SUMMARY**	**SPEAKER & ORGANIZATION**
0930-1000	Registration of Delegates	
1000-1030	Opening of the Seminar/Workshop, Administration, Introduction of Delegates	Moderators: Mr. Andrew Tiede, Regional Officer ATM, ICAO Asia/Pacific Office Mr. XXXX, JCAB
1030-1100	**Coffee/Tea**	
1100-1130	ICAO ATFM Provisions & APANPIRG Key Priorities	Mr. Andrew Tiede - ICAO
ATFM in the Asia Pacific Region Today		
1130-1200	Air Traffic Management Centre Fukuoka	JCAB
1200-1230	(Title to be confirmed)	Mr. Piyawut (Toon) Tantimekabut, Senior Systems Engineer, Air Traffic Services Engineering Research & Development Department, AEROTHAI
1230-1330	**Lunch**	
1330-1400	Singapore Changi Strategic Flow Management – Lessons Learnt	Mr. Victor Tan, Deputy Chief, Singapore Air Traffic Control Centre, CAAS
1400-1410	Flow Management Programme for Traffic Transiting Hong Kong/Taipei/Naha FIRs	Mr. Raymond Li, Hong Kong CAD
1410-1430	Air Traffic Flow Management in China	(to be confirmed), Air Traffic Management Bureau of CAAC
1430-1500	Tactical Air Traffic Flow Management in Australia	Mr. Matthew Shepherd, ATM Optimisation Manager/National Operations Centre, Airservices Australia
1500-1530	**Coffee/Tea**	
1530-1630	Questions and Answers Panel session	All Speakers from the day

WEDNESDAY, 8TH OCTOBER 2008		
TIME	**TITLE AND SUMMARY**	**SPEAKER & ORGANIZATION**
0945-1000	Opening Remarks Day 2	Mr. Andrew Tiede - ICAO
1000-1030	Hurry Up and Wait – The IFATCA Perspective	Mr. John Wagstaff, Executive Vice President, Asia Pacific Region, IFATCA
1030-1100	**Coffee/Tea**	
1100-1120	User Needs in the Future	Mr. Bill Leber, Chief International Dispatcher/CDM, Northwest Airlines
1120-1140	Operators' Perspective on BOBCAT ATFM in the Bay of Bengal	Capt Aric Oh, Deputy Chief Pilot, Singapore Airlines
1140-1200	Users' Perspective	(to be confirmed), Japan Air Lines
ATFM in Other Regions		
1200-1230	Overview of Regional ATFM Initiatives in North America, Caribbean and South America[1]	Mr. Tim McHale, International Operations, FAA Air Traffic Control System Command Center Mr. Ricardo Torres, SENEAM
1230-1330	**Lunch**	
Workshop – Session 1 – Planning for ATFM		
1330-1400	The Bay of Bengal long range ATFM implementation – Lessons from the ATFM Task Force. A Regional Office perspective	Mr. Andrew Tiede - ICAO
1400-1430	ATFM Lessons Learned in NAM/CAR/SAM	Mr. Ricardo Torres, SENEAM
1430-1500	Pre-Tactical Experience with CTMS in Australia	Mr. Matthew Shepherd, Airservices Australia
1500-1530	**Coffee/Tea**	
1530-1600	ATFM Policy and Future Planning	JCAB
1600-1630	Planning for Near-Term Implementation of ATFM	Ms. Leslie McCormick, International Operations, FAA Air Traffic Control System Command Center
1630-1700	Questions and Answers Panel session	All Speakers from the day

[1] CONOPS, Ops Telcons, Data Exchange, ATFM TF, etc.

THURSDAY, 9TH OCTOBER 2008		
TIME	**TITLE AND SUMMARY**	**SPEAKER & ORGANIZATION**
0900-1000	*Travel to Fukuoka ATMC*	*Transport arrangements from Hotel to Fukuoka ATMC by JCAB*
Workshop – Session 2 - Where Do We Go From Here?		
1000-1030	Asia/Pacific ATFM Concept of Operations – Strategy and Recommendations	Moderators: Mr. Andrew Tiede – ICAO Mr. XXXX
1030-1100	Asia/Pacific ATFM Communications Manual – Strategy and Recommendations	Moderators: Mr. Andrew Tiede – ICAO Ms. Leslie McCormick - FAA
1100-1130	**Coffee/Tea**	
1130-1200	Regional Supplementary Procedures (Doc 7030) and Guidance Materials – Recommendation and Update	Moderators: Mr. Andrew Tiede – ICAO Ms. XXXX
1200-1230	Proposals for Consideration by APANPIRG	Moderators: Mr. Andrew Tiede – ICAO Ms. XXXX
1230-1300	Summary and Closing of ICAO Asia/Pacific ATFM Seminar/Workshop	Mr. Andrew Tiede – ICAO
1300-1400	**Lunch**	
1400-1630	Visit to ATMC and ATC facilities at the Fukuoka Air Traffic Management Center	Hosted by Fukuoka ATMC
1630 onwards	Return to Hotel	*Transport arrangements from Fukuoka ATMC to Hotel by JCAB*

Proposed Terms of Reference for the Air Traffic Flow Management Task Force for North Asia Region (ATFM/TF)

The Air Traffic Flow Management Task Force (ATFM/TF) will report to the ATM/AIS/SAR Sub Group of APANPIRG.

Objectives:

1. To enhance and facilitate the orderly and efficient flow of air traffic across the North Asia region;

2. To minimize ground and en-route delays;

3. To maximize capacity and optimize;

4. To plan for and manage future ATM workload in the light of the increased air traffic forecast within the area; and

5. To assess the economic and environmental impact of the implementation of the ATFM system.

Implementation Program

To meet these objectives the ATFM/TF shall adopt a phased implementation program as per the following:

Phase One: Assessment of the capacity of the current and planned ATM system using a recognized and common methodology to find out choke point of air traffic flow

Phase Two: Harmonization between ATFM services of adjacent States and development of common procedures and practices to be used among units

Phase Three: Intra-regional connection of existing ATFM systems to exchange flight information and to improve the operational efficiency.

— END —

Analysis of SAR Capability of ICAO States in the ASIA/PAC Region

	Training	Alerting	Legislative	SAR committee	Agreements	Relationships	Communications	Quality Control	Civil/Military	Resources	SAREX	Library	Computerisation	SAR programme	Supply dropping	Special equipment	SAR aircraft	Navigation	ELTs	**Cospas-Sarsat Distr**
Australia	E	E	E	E	E	C	E	E	E	E	E	E	E	E	E	E	E	E	C	E
Bangladesh	B	C	D	A	A	C	C	A	D	A	A	C	A	A	C	C	D	A	D	C
Bhutan																				
Brunei	E	E	E	E	E	E	E	E	E	E	E	E	E	E	D	D	E	E	E	A
Cambodia	B	B	B	B	B	B	C	A	B	B	A	C	A	A	A	A	B	A	A	A
China	E	E	E	E	E	E	D	D	E	D	D	C	B	A	E	E	E	E	E	A
Cook Islands	A	B	B	A	A	C	C	C	B	A	B	A	A	A	A	B	B	A	E	A
DPR Korea	B	D	B	D	A	B	D	D	D	C	B	A	A	A	B	A	C	C	A	A
Fiji	B	C	C	C	C	C	C	B	D	C	D	C	A	C	B	A	C	C	C	A
French Polynesia	C	D	D	D	C	D	E	A	E	C	C	B	A	A	E	D	E	E	E	A
Hong Kong, China	E	E	E	E	D	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
India	D	C	C	B	B	C	C	A	C	C	C	C	C	D	D	D	C	A	B	E
Indonesia	E	D	E	E	E	D	D	D	E	D	E	D	D	D	C	D	D	D	D	E
Japan	E	E	E	E	D	E	E	E	E	E	E	E	D	E	E	E	E	E	E	E
Kiribati																				
Lao PDR	B	A	B	B	B	A	B	A	B	B	A	C	A	A	A	A	A	A	A	A
Macau, China	E					E	E				E						E			
Malaysia	E	E	C	E	D	E	E	E	E	E	E	D	E	E	E	D	E	E	E	B
Maldives	B	A	A	A	A	A	A	A	D	A	C	A	A	A	A	A	A	A	A	A
Marshall Islands																				
Micronesia	C	B		A	A	B	C					A		B	B					
Mongolia	A	C	C	A	B	B	B	A	B	B	B	C	B	B	A	A	A	A	B	A
Myanmar	B	A	B	C	A	D	C	C	D	A	A	A	A	A	C	A	D	C	A	A
Nauru																				
Nepal	D	D	C	B	A	C	C	B	D	B	A	B	A	D	D	C	D	D	D	B
New Caledonia	C	D	D	D	C	D	E	A	E	C	C	B	A	A	E	D	E	E	E	E
New Zealand	E	E	E	E	A	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Pakistan	C	C	D	D	A	D	D	C	D	C	A	A	A	A	D	A	D	D	C	E
Palau																				
Papua New Guinea	D	E	D	C	D	D	C	C	D	C	C	D	C	C	C	A	A	A	E	A
Philippines	D	C	E	D	D	C	D	D	E	C	C	C	C	C	C	B	C	E	C	A
Rep. of Korea	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Samoa																				
Solomon Islands																				
Singapore	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Sri Lanka	D	A	C	D	B	C	C	D	E	D	B	C	A	A	D	D	C	A	C	A
Thailand	E	E	E	E	D	E	E	E	E	E	E	D	D	D	E	E	E	E	E	E
Timor Leste																				
Tonga	C	B	A	A	B	C	C	A	D	A	A	A	A	A	A	A	C	A	E	A
United States	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Vanuatu																				
Viet Nam	D	D	D	E	D	D	D	C	E	D	C	C	B	C	C	D	D	C	D	**D**

Last updated 5 September 2008

Categorisations:	
A = Not implemented	D = Meets Annex 12 requirements in most areas
B = Initial implementation	E = Fully meets Annex 12 requirements
C = Meets Annex 12 requirements in some areas	Blank = No response

APANPIRG State SAR Capability Matrix

Guidance to complete the Matrix

1. **Training**
   - The appropriate level and type of training for SAR coordinator, SAR mission coordinator, on-scene coordinator, and operational facilities. (IAMSAR Manual Vol. 1, Chapter 3)

2. **Alerting**
   - Fast and reliable means for the rescue coordination center to receive distress alerts. (IAMSAR Manual Vol. 1, Chapter 2)

3. **Legislative**
   - Statutes and related provisions that establish a legal foundation for establishing a SAR organization and its resources, policies, and procedures. (IAMSAR Manual Vol. I, Chapter 1)

4. **SAR committee**
   - Typically established under a national SAR plan, the SAR coordinating committee is comprised of SAR system stakeholders. (IAMSAR Manual Vol. 1, Chapter 6 and Appendix J)

5. **Agreements**
   - States should enter into agreements with neighboring States to strengthen SAR cooperation and coordination. (Chapter 3 – *Cooperation*, in both Annex 12 – Search and Rescue, and the International Convention on Maritime SAR)

6. **Relationships**
   - Close cooperation between services and organizations which may contribute to improving SAR service in areas such as operations, planning, training, exercises and research and development.

7. **Communications**
   - Communication capability for receipt of distress alerts and operational coordination among the SAR mission coordinator, the on-scene coordinator and SAR facilities. (IAMSAR Manual Vol. 1, Chapter 3)

8. **Quality Control**
   - Procedures to focus on improving the quality of SAR services so as to improve results and reduce costs. (IAMSAR Manual Vol. 1, Chapter 6)

9. **Civil/Military**
   - Close cooperation between the various civilian and military organizations.

10. **Resources**
    - The primary operational facilities made available to the national SAR system by various authorities and arrangements with others. (IAMSAR Manual Vol. 1, Chapter 5 and Appendix C)

11. SAR Exercise

- Exercise to test and improve operational plans, provide learning experience and improve liaison and coordination skills. (IAMSAR Manual Vol. 1, Chapter 3; Annex 12, and Annex 14 regarding Airport Emergency Plan)

12. Library

- Quick access to the applicable international, national, and agency SAR publications that provide standards, policy, procedures and guidance.

13. Computerization

- Use of or access to output of various computer resources including databases, computer aids for SAR system management, search planning software, etc. (IAMSAR Manual Vol. 1, Chapter 2)

14. SAR programme

- National structure to establish, manage and support the provision and coordination of SAR services. (IAMSAR Manual Vol. 1, Chapter 1)

15. Supply dropping

- Supplies and survival equipment carried by air and maritime SAR facilities to aid survivors and facilitate their rescue, as appropriate. (IAMSAR Manual Vol. 1, Chapter 2 and Appendix B)

16. Special equipment

- Equipment created for specific rescue scenarios (such as mountain or desert rescue) and equipment typically carried on designated SAR units to support coordination and locating functions as well as special supplies and survival equipment to aid survivors and facilitate their rescue. (IAMSAR Manual Vol. 1, Chapter 2 and 4)

17. SAR aircraft

- An aircraft provided with specialized equipment suitable for the efficient conduct of SAR missions (Annex 12, Chapter 2 - *Organization*)

18. Navigation

- Suitable means provided within the SAR region to determine position, and the responding SAR facilities have the appropriate equipment on board to determine their position in the SAR region they are likely to operate. (IAMSAR Manual Vol. 1, Chapter 2)

19. Emergency Locator Transmitter (ELT)

- National regulations for carriage of ELTs, and arrangements for registration of the 406 MHz beacon and rapid access to the beacon registration database. (Annex 6 – Operation of Aircraft and Annex 10 - Aeronautical Telecommunications; and IAMSAR Manual Vol. 1, Chapter 4)

20. Cospas-Sarsat Distress Alerts

- A SAR Point of Contact (SPOC) designated for receipt of Cospas-Sarsat distress data, and arrangements for efficient routing of the distress data to the appropriate SAR authority (the aeronautical emergency locator transmitter ELT), maritime emergency position-indicating beacon (EPIRB), and personal locator beacon (PLB)). (Annex 12, paragraph 3.2.5 and Section 2.4; and, IAMSAR Manual Vol. 1, Chapter 4)

STATE SAR AGREEMENTS

(last updated 5 September 2008)

ID NO.	DATE	STATES	REMARKS
1	14 April 1972	ASEAN States - Indonesia, Malaysia, Philippines, Singapore and Thailand	Multilateral agreement for the facilitation of search for aircraft in distress and rescue of survivors of aircraft accidents
2	March 1997	Viet Nam - ASEAN	Viet Nam signed instrument of accession to 1972 ASEAN Agreement (as above)
3	June 1982	Indonesia / Singapore	
4	11 August 1984	Malaysia / Singapore	
5	29 August 1985	Malaysia / Indonesia	
6	September 1985	Singapore / Thailand	Updated July 1996
7	9 September 1985	Malaysia / Thailand	
8	9 December 1985	Malaysia / Philippines	
9	August 1986	Indonesia / Philippines	
10	1986	United States / Japan	
11	1988	United States / Indonesia	
12	1990	Indonesia / Papua New Guinea	JBC MOU signed
13	November 1990	Australia / Indonesia	Updated 5 April 2004
14	July 1996	Philippines / Singapore	
15	July 1996	Viet Nam / Singapore	
16	September 1996	Viet Nam / Philippines	
17	16 December 1998	Malaysia / Brunei Darussalam	
18	1998	Lao PDR / Vietnam	LOA for provision of assistance
19	February 1999	Cambodia / Viet Nam	
20	February 2001	Australia / Papua New Guinea	
21	September 2002	New Caledonia / New Zealand	
22	November 2002	United States / Republic of Palau	

ID NO.	DATE	STATES	REMARKS
23	2003	United States / New Zealand	
24	notified 2003	United States / Marshall Islands	
25	notified 2003	United States / Micronesia	
26	notified 2003	United States / China	
27	June 2005	Tonga / New Zealand	
28	notified 2005	New Zealand / Australia	
29	notified 2005	New Zealand / Samoa	
30	April 2006	Australia / Maldives	Letter of Arrangement
31	notified July 2006	Indonesia / United States	Agreement on the Coordination of SAR Services
32	notified July 2007	New Zealand / Cook Islands,	
33	notified July 2007	New Zealand/Chile	Final draft agreement being considered by authorities in Chile
34	notified July 2007	New Zealand/Niue	No requirement for separate SAR agreement, covered under Government to Government aid agreement
35	notified July 2007	New Zealand/Tahiti French Polynesia	Final draft agreement being considered by authorities in Tahiti
36	notified July 2007	New Zealand/Tokelau	No requirement for separate SAR agreement, covered under Government to Government aid agreement
37	**16 May 2007**	**Republic of Korea/China**	
38	**30 April 2008**	**Republic of Korea/Japan**	

Note: ATM/AIS/SAR/SG/18 re-ordered the List by date, any additional updated entries by APANPIRG/19 in bold type.

Agenda Item 3.3: RASMAG

Agenda Item 3: Regional Air Navigation Planning and Implementation Issues

3.3 Regional Airspace Safety Monitoring Advisory Group (RASMAG)

3.3.1 The meeting reviewed a consolidated report of the Eighth and Ninth Meetings of the Regional Airspace Safety Monitoring Advisory Group of APANPIRG (RASMAG/8 and 9), held in December 2007 and May 2008, respectively. Full copies of the meeting reports are available on the web site of the ICAO Asia and Pacific Office at http://www.bangkok.icao.int/ under the 'Meetings' menu. The meeting expressed its appreciation for the many tasks that had been addressed by RASMAG since reporting to APANPIRG/18 last year.

RASMAG List of Competent Airspace Safety Monitoring Organizations

3.3.2 RASMAG is required by its terms of reference to recommend and facilitate the implementation of airspace safety monitoring and performance assessment services and to review and recommend on the competency and compatibility of monitoring organizations. Accordingly, RASMAG reviewed and made a number of updates to the "RASMAG List of Competent Airspace Safety Monitoring Organizations" (shown at **Appendix A** to the Report on Agenda Item 3.3) for use by States requiring airspace safety monitoring services.

Asia/Pacific RVSM Safety Assessments

3.3.3 There are five "APANPIRG Approved" RVSM Regional Monitoring Agencies (RMAs) currently providing services in the Asia/Pacific region, as follows, with the China RMA gaining APANPIRG RMA approval from the meeting in accordance with paragraphs 3.3.9 to 3.3.12 below:

- The Pacific Approvals Registry and Monitoring Organization (PARMO), operated by the United States FAA;
- The Monitoring Agency for the Asia Region (MAAR), operated by Aeronautical Radio of Thailand (AEROTHAI);
- The Australian Airspace Monitoring Agency (AAMA), operated by Airservices Australia;
- The JCAB RMA, operated by Japan Civil Aviation Bureau; and
- The China RMA, operated by the Air Traffic Management Bureau of the Civil Aviation Administration of China.

3.3.4 The meeting reviewed a summary of the most up to date safety assessments of RVSM operations in the widespread airspaces of the Asia/Pacific Region, as prepared by the Asia/Pacific RMAs under procedures and in formats established by RASMAG. Arising from the RMA reporting, the meeting noted the following points:

a) With the exception of the Pyongyang (DPRK) and Ulaanbataar (Mongolia) FIRs, RVSM has been implemented throughout the Asia/Pacific Region;

b) RVSM safety monitoring in Asia/Pacific is undertaken as a regional programme in accordance with Annex 11 requirements;

c) In general terms, the regional Target Level of Safety (TLS) for RVSM operations is widely satisfied across the Asia/Pacific Region;

d) The Western Pacific/South China Sea airspace now satisfies the TLS, this is due to the focused efforts of the WPAC/SCS RVSM Scrutiny Group (WPAC/SCS RSG) over the past 18 months;

e) However, the regional TLS is not being satisfied in Australian Domestic & Indian Ocean airspace and the Fukuoka FIR. The meeting noted that causes of some of the LHDs resulting from ATC Unit to ATC Unit transfers were due to circumstances occurring in neighbouring FIRs, while the LHDs were subsequently identified in the Australian and Japanese airspace. Active investigation and remediation by affected States is ongoing; and

f) RASMAG has concerns in relation to probable under reporting of Large Height Deviations in the Bay of Bengal airspace. The meeting reminded the States involved of the need to strengthen their incident reporting systems;

RVSM Non - Approved Operators Using RVSM Airspace

3.3.5 Persistent examples of a minority of RVSM non-approved flights ‘incorrectly’ filing flight plans showing RVSM approval have been identified through the work of the PARMO and AAMA. This meant that it was likely that in some circumstances the 1000 feet separation standard was being inadvertently applied by ATC when the 2000 feet separation standard was required – this was a breakdown of separation incident.

3.3.6 Questions were raised during RASMAG/9 about the legal responsibility of an air navigation service provider (ANSP) who knew, through the RMA work in this area for example, that some identified airframes were filing “W” (i.e. RVSM approved) when they were not authorized to do so but took no action to apply the greater vertical separation standard.

3.3.7 The meeting expressed serious concern in relation to flights that were apparently using RVSM airspace when they did not have the State approvals to do so. In agreeing that this issue ultimately required regulatory intervention, the meeting requested RASMAG to continue its investigations in this regard with the objective of providing a more comprehensive briefing to APANPIRG/20 (2009) in relation to this issue**.**

Review of China RVSM Implementation

3.3.8 Following implementation of RVSM in China on 21 November 2007, RVSM/TF/33 conducted the post implementation review during April 2008. In its review of the RVSM/TF/33 outcomes, RASMAG/9 noted the many actions taken by China to ensure a smooth implementation and that the post implementation safety assessment demonstrated that the regional TLS continued to be satisfied. Additional information in relation to the implementation of RVSM in China is included in Agenda Item 3.2.

China – Approved as APANPIRG RMA

3.3.9 Recognizing that it would be impractical for an RMA outside China to assume responsibility for such a large airspace as the sovereign Chinese RVSM airspace, as part of their programme to support implementation of RVSM during 2007 China had made significant steps towards establishing the China RMA to take on the long-term airspace monitoring and safety assessment responsibilities.

3.3.10 In conducting a review of the submission from the China RMA for APANPIRG accreditation, it was evident to RASMAG/9 that the performance of the China RMA was adequately demonstrated and documented against the provisions of Annex 11, the RVSM Manual and the draft RMA Manual.

3.3.11 China presented an update to the meeting detailing the additional progress that had been made by China since the RASMAG/9 review in May 2008. The meeting noted that, *inter alia*, China RMA had:

a) completed three formal risk assessments for Chinese sovereign airspace, including
   - the assessment for Shanghai FIR,
   - the preliminary assessment for the Chinese RVSM airspace to support 'GO' decision for China RVSM implementation, and
   - the post-implementation assessment for 90 day review of the RVSM implementation demonstrating that TLS continues to be satisfied.

b) continued close relationships with PARMO and MAAR over some years, completing training and a number of safety assessments with assistance from PARMO and MAAR;

c) attended the recent Global RMA meeting (Montreal, May 2008) to make all the necessary contacts and connection with the global RMA community;

d) established and maintained a database of aircraft RVSM approvals and shared this information with the global RMA community on a monthly basis;

e) established mechanisms for Traffic Sample Data (TSD) and Large Height Deviation (LHD) data collection and analysis;

f) arranged provision of training and equipment to provide aircraft height keeping performance monitoring service using EGMU (Enhanced GPS monitoring unit) equipment; and

g) established and maintained China RMA website at www.chinarma.cn which contains full details of the capabilities and functions of China RMA.

3.3.12 Accordingly, the meeting was pleased to support the recommendation from RASMAG that the China RMA be endorsed as an APANPIRG RMA, adopting the following Conclusion:

Conclusion 19/14 – Approval of China RMA as Asia Pacific RMA

That, having met all requirements established by the Regional Airspace Safety Monitoring Advisory Group (RASMAG), the China RMA be approved as an APANPIRG Asia/Pacific RVSM Regional Monitoring Agency with responsibility for all sovereign RVSM airspaces in China.

Review of WPAC/SCS RSG/4

3.3.13 The meeting commended the very positive outcomes from the work of the WPAC/SCS RSG. The adverse trend in the safety performance of the WPAC/SCS area had been reversed and the regional TLS was being reliably satisfied. Additional information in relation to the activities of the WPAC/SCS RSG is included in Agenda Item 3.5 of this report.

Australia - RMA services for Port Moresby, Honiara, Nauru, Jakarta and Ujung Pandang FIRs

3.3.14 Australia presented RASMAG with details of an Australian initiated programme aimed at fostering and promoting aviation safety and operational efficiency in the Indonesian and Papua New Guinea region, including Timor Leste. As a result of this cooperative programme, the AAMA identified an opportunity to directly assist Papua New Guinea to enhance its safety management system to, amongst other things, enable the responsible RMA to undertake the necessary RVSM safety assessment and monitoring. Accordingly, RASMAG endorsed a change that transferred RMA responsibility for Port Moresby FIR from the PARMO to AAMA.

3.3.15 Additionally, the transfer of RMA responsibility for the Nauru and Honiara FIR from PARMO to AAMA, and for the Jakarta and Ujung Pandang FIRs from MAAR to AAMA was endorsed by RASMAG.

Inverse correlation between ATC-to-ATC coordination errors and automated messaging

3.3.16 Previous meetings had continually noted that the category of LHD that contributes the most to operational risk was errors in transfer of control from one ATC unit to the adjacent ATC unit (Category E). Australia and the USA presented research that demonstrated that ATC coordination errors were much more prevalent along those FIR boundaries where automated messaging (e.g. AIDC) is not available. RASMAG considered that if AIDC capabilities were implemented between all FIRs in the Asia/Pacific Region, this would have an immediate positive benefit in terms of reduced ATC-to-ATC coordination errors and strongly encouraged States to consider accelerating AIDC implementation planning in order to achieve the direct safety benefits that would result. Additional information and action by APANPIRG is included in Agenda Item 3.4 of this report.

Global Long Term Height Monitoring

3.3.17 APANPIRG/18 had recognized that the 2010 implementation of Annex 6 global long term monitoring requirements for airframes used in RVSM operations would have significant impacts in the way regional monitoring was managed, including the need for widespread regional height monitoring infrastructure capability to be made available. Under the terms of Conclusion 18/4, APANPIRG had tasked Asia/Pacific RMAs in conjunction with RASMAG to prepare a regional impact statement summarizing the estimated consequences for the Region, including consideration of the numbers of airframes required to be monitored and ground infrastructure required.

3.3.18 RASMAG/8 had commenced work in this regard, identifying six Long Term Height Monitoring (LTHM) Actions (see **Appendix B** to the Report on Agenda Item 3.3) which had subsequently been circulated by ICAO State Letter (Ref: T3/10.1.17 – AP018/08 ATM) during January 2008.

3.3.19 Noting that the global monitoring provisions were in the form of an Annex 6 Standard, and therefore the responsibility of States rather than RMAs to implement, RASMAG recognised the excellent assistance that RMAs would be able to provide to the respective States associated with each RMA. However, a number of the LTHM Actions proposed by RASMAG had a common focus in attempting to strengthen the coordination relationships between the RMAs and their associated States. The need to include this type of initiative in the LTHM Actions arose out of the long experience by RMAs of the coordination difficulties with States. This was also evidenced by the continued problems with States not providing timely and accurate safety data for use by RMAs in regional safety assessments –as required by a number of related APANPIRG Conclusions.

3.3.20 The meeting agreed that effective coordination arrangements between States and RMAs was a critical first step and adopted the following Conclusion:

Conclusion 19/15 – Enhanced communications between States and RVSM RMAs

That, noting the Annex 6 provisions for the global long term monitoring of airframes used in RVSM operations and the critical role of Asia/Pacific RVSM Regional Monitoring Agencies (RMAs) in monitoring the safety of RVSM operations, the Regional Office draw the attention of States to the Long Term Height Monitoring Actions promulgated by RASMAG. In particular, States are encouraged to immediately strengthen relationships with their respective RMAs to ensure that information in relation to RVSM approval status is continuously available to RMAs.

<u>Use of ADS-B data for monitoring Altimetry System Error (ASE)</u>

3.3.21 In airspace where RVSM is applied, the importance of accurate aircraft height-keeping is magnified. ASE is not detectible in routine operations; specialized measurement equipment is necessary to independently measure the errors. The United States provided information to RASMAG in relation to the progress in attempts to use the aircraft geometric height data obtained from Automatic Dependent Surveillance – Broadcast (ADS-B) messages as one method of monitoring RVSM height keeping performance.

3.3.22 Following presentations from Australia and United States, RASMAG/9 identified some of the likely benefits for the region if ADS-B and/or Multi-lateration was an accepted method for height monitoring. The United States would be willing to assist directly with the analyses being undertaken by Australia. Recent trials completed in the United States during July/August 2008 had shown promising results and tests by the FAA Technical Centre would continue during 2008.

3.3.23 Recognizing the considerable infrastructure savings and operational efficiencies that would result if the use of ADS-B and/or Multi-lateration data provided viable data for RVSM height monitoring, the meeting strongly supported further research taking place and requested Asia/Pacific RMAs to cooperatively support this work.

<u>Consideration of 100 foot Operational Errors</u>

3.3.24 The meeting noted that following the implementation of RVSM in China using a metric FLAS, operational errors between a Chinese FIR and an adjacent FIR applying the feet based RVSM FLAS could result in the aircraft being misaligned by 100 feet. For example, an aircraft that was required to transition to FL331 from FL330 (or vice versa) but failed to do so would be misaligned by plus (or minus) 100 feet. RASMAG agreed that further study was required to ascertain whether operational errors arising as a result of the 100 feet misalignment between the feet based

FLOS and the metric scheme adopted in China should be considered as part of the RVSM safety assessment.

3.3.25 The China RMA informed the meeting that they were continuing to investigate this matter, with the objective of providing updated information for consideration by RASMAG/10 during December 2008.

Outcomes of Global RMA meeting

3.3.26 A global meeting of RVSM RMAs was held from 13-15 May, 2008 in conjunction with SASP/WG/WHL/13 in Montreal, Canada. Representatives from each of the 11 Global RMAs, of which 5 serve the Asia/Pacific RVSM airspace, attended the meeting. The purpose of the meeting was to provide an opportunity for RMAs globally to arrive at a common understanding on the part of all agencies of the tasks and responsibilities of such agencies.

3.3.27 A status report was given by all RMAs in relation to their areas of responsibility, problems being experienced and future plans. In line with the experiences of the Asia/Pacific RMAs, other RMAs reported disproportionately high numbers of LHDs resulting from errors in ATC-to-ATC coordination.

3.3.28 The Global RMA meeting discussed accounting for errors in vertical risk calculations that may not be specific to RVSM. In considering this issue, RASMAG/9 considered that risk due to ‘all causes’ should be considered and adopted this approach for application by all Asia/Pacific RMAs, noting that it was the long standing methodology in use by Asia/Pacific RMAs in any case.

Establishment of Singapore SMA – SEASMA

3.3.29 Recognizing that safety assessment and monitoring capability was urgently necessary to enable the implementation of 50NM lateral/50NM longitudinal reduced separations on RNAV routes L642 and M771 in the South China Sea as proposed for July 2008 by the RNP-SEA/TF, Singapore (in coordination via RASMAG) committed to establishing an SMA for the South China Sea, with the objective of providing full SMA services from 1 July 2008. Singapore has adopted the title “South East Asia Safety Monitoring Agency” (SEASMA) as the name for the SMA and has taken steps to procure the URL www.seasma.com for the SEASMA website which is expected to be operational before the end of 2008.

3.3.30 With support from the external contractor providing training to establish SEASMA, Singapore prepared a safety assessment for implementation of 50/50NM reduced horizontal separation standards on L642 and M771. RASMAG/9 congratulated Singapore on both the professional, thorough and comprehensive safety assessment process and the positive outcomes that had resulted, confirming that from the aspect of the safety assessment there was no impediment to the implementation of 50NM/50NM as planned. Following finalization of implementation strategies by the RNP-SEA/TF, successful implementation of reduced horizontal separations on L642 and M771 occurred in conjunction with the 3 July 2008 AIRAC.

3.3.31 Hong Kong, China led the meeting in congratulating Singapore in this achievement. The additional SMA capability provided by Singapore was welcomed by the meeting and Singapore was invited to consider expanding the provision of SMA services beyond the South China Sea in due course.

SMA Issues

3.3.32 RASMAG had long recognized that although arrangements for monitoring in the vertical plane (RVSM) using RMAs were comparatively advanced, there was a need to further develop regional safety assessment and monitoring capability in the horizontal plane (i.e. lateral and longitudinal). The issue had been brought to APANPIRG's attention previously, resulting in the following Decision, taken during August 2005:

Decision 16/1 – Safety Monitoring Agency (SMA)

That, the term Safety Monitoring Agency (SMA) be used to describe an organization approved by regional agreement to provide airspace safety monitoring and implementation services for international airspace in the Asia/Pacific region for implementation and operation of reduced horizontal separation.

3.3.33 It was clear to RASMAG that the intent of this decision was that Asia/Pacific SMAs would be *"approved by regional agreement"* i.e. an APANPIRG approval in a similar manner to the process adopted for RVSM RMAs. However, there were a number of other agencies supporting different types of safety monitoring in the region, notably the CRA and FIT groups that were investigating the communications and surveillance performance of FANS 1/A datalink. Similar provisions for the "APANPIRG approval" of these agencies had not so far been considered necessary, although their work was essential in demonstrating the technical performance of satellite data link. Recognizing that the adoption of an "APANPIRG Approval" process for SMAs brought with it additional complexities in credentialing and operating these agencies, RASMAG sought reassurance that adopting such a process for the region was warranted.

3.3.34 During RASMAG/9, the Secretariat noted that the fundamental difference between RMAs/SMAs and the other monitoring agencies was that the RMAs and SMAs authorized safety assessments, thereby taking a large and direct responsibility in the implementation and ongoing monitoring of reduced separation implementations. Although the CRAs and FITs were doing essential work in monitoring and correcting technical communications and surveillance performance, their work comprised a component input to a safety assessment, rather than the safety assessment itself. Therefore, as the responsibility level of RMAs and SMAs was higher, it was perhaps logical that an "APANPIRG Approval" was justified for RMAs and SMAs.

3.3.35 However, adopting such an approval mechanism could mean that APANPIRG would essentially need to replicate the mechanisms that were in place for RVSM safety assessment and monitoring throughout the region – with the associated time, administrative and cost burdens. The meeting recognized that horizontal safety assessment capability was essential in implementing reduced horizontal separations, but sought to avoid the additional and onerous aspects that could potentially result from adoption of an "APANPIRG Approval" process for SMAs. The meeting requested that RASMAG take time to fully explore alternative scenarios in this respect and provide updated information to APANPIRG/20 during 2009.

3.3.36 During related discussions, the meeting recognized that the limited availability of regional horizontal safety assessment and monitoring capability would act as an impediment to the accelerated work programme proposed by the Asia/Pacific PBN Task Force, particularly for enroute PBN implementations. Safety assessments of the kind undertaken for the recent 50/50NM implementation on RNAV routes L642 and M771 in the South China Sea (**Appendix C** to the Report on Agenda Item 3.3 refers) were required to support implementation of reduced horizontal separations.

3.3.37 Under ICAO provisions and the terms of APANPIRG Conclusion 16/5 – *No implementation of reduced separation unless compliant with Annex 11*, implementing States (i.e. not RASMAG) held responsibilities to conduct appropriate safety assessments to enable such implementations. Clearly, such activities required additional expertise in safety matters that was not always available to individual States and this had led to the creation of specialized safety agencies such as RMAs and SMAs to do the necessary work. Although the RMA capability was adequate and mature, the general lack of SMA capability in the Asia/Pacific region remained of concern.

SMA Handbook

3.3.38 In an effort to support expansion of horizontal monitoring capabilities, some time ago RASMAG had commenced preparation of a regional handbook (hereinafter 'SMA Handbook') and/or guidance material for planned regional SMAs that would undertake safety assessment and monitoring in the horizontal plane

3.3.39 RASMAG/9, recognizing that the preparation of such guidance material was a complex and time consuming task, thanked the members of the RASMAG drafting team for their concentrated efforts which had resulted in the current advanced version of the SMA Handbook. However, review during RASMAG/9 recognized the need for additional material to be included in the SMA Handbook and the drafting team was requested to continue work on the document with the objective of enabling RASMAG/10 (December, 2008) to accept a final version, for review and recommendation to APANPIRG in due course as regional guidance material.

Updated Data Link Guidance Materials

3.3.40 The meeting noted that RASMAG had adopted and promulgated updates to the *Guidance Material for End-To-End Safety and Performance Monitoring of Air Traffic Service (ATS) Datalink Systems in the Asia/Pacific Region* and the *Guidance Material for the Asia/Pacific Region for ADS/CPLDC/AIDC Ground Systems Procurement and Implementation.* The updates incorporate requirements specified in the recently released *RTCA DO-306/EUROCAE ED-122, Safety and Performance Standard for Air Traffic Datalink Services in Oceanic and Remote Airspace* (known generically as the 'Oceanic SPR') relating to Required Communication Performance (RCP).

3.3.41 The updates also incorporate feedback from discussions at the North Atlantic Systems Planning Group Technical Task Force Meeting on datalink applications communications requirements (NAT SPG/TF RCP, February 2008). During the NAT SPG/TF RCP, in-principle agreement was reached that NAT and APAC parties would work together in order to align, to the extent possible, operational arrangements for datalink. In adopting updates to the Asia/Pacific regional data link guidance materials, RASMAG recognized that the amendments represent important initial steps by NAT and APAC to align data link monitoring requirements. This approach is strongly supported by ICAO Secretariat in ICAOHQ (Montreal), European/North Atlantic Office (Paris) and Asia/Pacific Office (Bangkok) and was commended by the meeting.

Closure of APANPIRG Conclusion 16/9

3.3.42 The meeting recalled that during August 2005, in response to a number of persistent safety issues, APANPIRG/16 was informed that States were having difficulties implementing Annex 11 compliant safety management systems and adopted the following Conclusion:

Conclusion 16/19 – Study of States' preparedness to implement safety management systems

That, a study of States' preparedness to implement ICAO safety management systems in accordance with Annex 11 be undertaken by the Asia/Pacific Regional Office in conjunction with the ATS coordination groups and RASMAG by the first quarter of 2006, and a plan of action developed to be reported to APANPIRG/17 in September 2006.

3.3.43 The meeting recognized that although the Conclusion was raised in 2005 for action, resource limitations at the Regional Office meant that the survey had not yet been carried out. However, since the Conclusion was raised ATS safety management matters had been progressed effectively in other ways. In September 2006, two ICAOHQ SMS courses of 35 participants each were conducted at the Regional Office. The Regional Office had also conducted a SIP during September 2006 on ATS Safety Management System Training, with the objective of assisting States to meet obligations for ATS safety management.

3.3.44 The meeting noted that ATS safety work has also continued in various regional forums including RASMAG, resulting in valuable improvements in terms of the horizontal and vertical safety management issues. Also of significance is the increased tempo of the ICAO USOAP, with a large number of audits already completed in Asia/Pacific Region and more audits scheduled. Annex 11 SMS is one of the areas assessed by USOAP and the State Corrective Action Plans required under the audit programme are an effective way of ensuring that the attention of States is drawn to the implementation of ATS safety management systems.

3.3.45 Accordingly, recognizing that ATS safety management work was progressing consistently in a number of other forums around the region, the meeting accepted RASMAG's recommendation and closed Conclusion 16/9 on the basis that it had been overtaken by events.

Deficiencies List

3.3.46 RASMAG recalled that APANPIRG/18 had raised Conclusion 18/2 requiring that, as a result of the non-provision of safety related data to RMAs, Fiji, Lao PDR, Myanmar, Papua New Guinea and Tahiti be included in the APANPIRG List of Deficiencies in the ATM/AIS/SAR Field.

3.3.47 In reviewing this situation, RASMAG/9 was pleased to note that Fiji, Lao PDR and Tahiti had provided appropriate TSD for December 2007 and had established a reliable record of providing the monthly LHD reports, including 'NIL' reports, to Asia/Pacific RMAs as required by APANPIRG Conclusion 16/4. Accordingly, the meeting accepted RASMAG's recommendation that Fiji, Lao PDR and Tahiti be removed from the APANPIRG list of deficiencies.

3.3.48 Regrettably, RASMAG noted that there was no change in the circumstances for Myanmar, and recommended retention on the deficiency list. Australia was working closely with Papua New Guinea and it was anticipated that the safety data problems would be overcome as a result of this relationship. Unfortunately, data provision from Bangladesh, Philippines and Sri Lanka had ceased recently. RMAs and the Regional Office would attempt to follow up to obtain the required data however, in the absence of improvement, RASMAG would be obliged to recommend to APANPIRG in 2009 that these States be included on the deficiencies list.

APANPIRG Asia/Pacific Airspace Safety Monitoring

RASMAG LIST OF COMPETENT AIRSPACE SAFETY MONITORING ORGANIZATIONS

The Regional Airspace Safety Monitoring Advisory Group of APANPIRG (RASMAG) is required by its terms of reference to recommend and facilitate the implementation of airspace safety monitoring and performance assessment services and to review and recommend on the competency and compatibility of airspace monitoring organizations. In order to assist in addressing these requirements, RASMAG updates and distributes the following list of competent airspace safety monitoring organizations for use by States requiring airspace safety monitoring services. In the context of the list, abbreviations have meanings as follows:

- RMA – Regional Monitoring Agency – safety assessment and monitoring in the vertical plane (i.e. RVSM);
- SMA – Safety Monitoring Agency – safety assessment and monitoring in the horizontal plane (i.e. RHSM, RNAV10, RNP4);
- CRA – Central Reporting Agency – technical performance of data link systems (i.e. ADS/CPDLC); and
- FIT – FANS 1/A Interoperability/Implementation Team – parent body to a CRA.

(last updated 5 September 2008)

Organisation *(including contact officer)*	State	Competency	Status	Airspace assessed (FIRs)
Australian Airspace Monitoring Agency (AAMA) - Airservices Australia Mr Robert Butcher, Manager Human Factors and Analysis, Safety Management Group E-mail: robert.butcher@airservicesaustralia.com	Australia	APANPIRG RMA	Current	Brisbane, Honiara, Jakarta, Melbourne, Nauru, Port Moresby and Ujung Pandang FIRs.
		SMA	Current	Brisbane, Melbourne FIRs.

Organisation *(including contact officer)*	State	Competency	Status	Airspace assessed (FIRs)
China RMA - Air Traffic Management Bureau, (ATMB) of Civil Aviation Administration of China (CAAC) Mr. Tang Jinxiang, Engineer of Safety and Monitoring Technical Group, ATMB E-mail: tangjx@adcc.com.cn	China	APANPIRG RMA	Current	Beijing, Guangzhou, Kunming, Lanzhou, Shanghai, Shenyang, Urumqi and Wuhan FIRs and Sector 01 (airspace over Hainan Island) of the Sanya FIR.
JCAB RMA - Japan Civil Aviation Bureau Mr. Masao Kondo, Special Assistant to the Director, Flight Procedures and Airspace Program Office E-mail: kondou-m2pd@mlit.go.jp	Japan	APANPIRG RMA	Current	Fukuoka FIR
		SMA	Available second quarter – 2009	Fukuoka FIR
Monitoring Agency for the Asia Region (MAAR) – Aeronautical Radio of Thailand LTD Mr. Nuttakajorn Yanpirat, Executive Officer, Systems Engineering, Aeronautical Radio of Thailand Ltd. E-mail: nuttakajorn.ya@aerothai.co.th	Thailand	APANPIRG RMA	Current	Bangkok, Kolkatta, Chennai, Colombo, Delhi, Dhaka, Hanoi, Ho Chi Minh, Hong Kong, Karachi, Kathmandu, Kota Kinabalu, Kuala Lumpur, Lahore, Male, Manila, Mumbai, Phnom Penh, Sanya FIR, Singapore, Taibei, Ulaan Bataar, Vientiane, Yangon FIRs

Organisation *(including contact officer)*	State	Competency	Status	Airspace assessed (FIRs)
Pacific Approvals Registry and Monitoring Organization (PARMO) – Federal Aviation Administration (US FAA) Mr. Dale Livingston, Manager, Separation Standards Analysis Team, FAA, E-mail: dale.livingston@faa.gov	USA	APANPIRG RMA	Current	Anchorage Oceanic, Auckland Oceanic, Incheon, Nadi, Oakland Oceanic, Tahiti FIRs
		SMA	Current	Anchorage Oceanic, Oakland Oceanic
South East Asia Safety Monitoring Agency (SEASMA) - Civil Aviation Authority of Singapore (CAAS) Mr. Kuah Kong Beng, Chief Air Traffic Control Officer, E-mail: KUAH_Kong_Beng@caas.gov.sg	Singapore	Monitoring Authority for Gross Navigational Error (GNE)	Current	Hong Kong, Ho Chi Minh, Manila, Sanya and Singapore FIRs
		SMA for South China Sea	From 1st July 2008	Hong Kong, Ho Chi Minh, Manila, Sanya and Singapore FIRs
FIT - SEA (ICAO Regional Office email icao_apac@bangkok.icao.int & **CRA Japan** Mr. Masahisa Hayashi, Deputy Director, Air Traffic Control Association Japan, E-mail:hayashi@atcaj.or.jp	ICAO Regional Office & CRA Japan	FIT & CRA	Current	South China Sea FIRs

Organisation *(including contact officer)*	State	Competency	Status	Airspace assessed (FIRs)
IPACG/FIT Mr. Takahiro Morishima, JCAB Co-Chair, email: morishima-t2zg@mlit.go.jp & Mr. Reed Sladen, FAA Co-Chair E-mail: reed.b.sladen@faa.gov	Japan & USA	FIT & CRA	Current	North & Central Pacific (Oceanic airspace within Fukuoka FIR, and Anchorage & Oakland FIRs)
CRA Japan Mr. Masahisa Hayashi, Deputy Director, Air Traffic Control Association Japan E-mail:hayashi@atcaj.or.jp	Japan	CRA	Current	Fukuoka FIR for IPACG/FIT Ho Chi Minh, Manila, Singapore FIRs for FIT-SEA
FIT - BOB ICAO Regional Office email icao_apac@bangkok.icao.int & Mr. Bradley Cornell, Boeing Engineering E-mail: Bradley.D.Cornell@Boeing.Com	ICAO Regional Office & Boeing USA	FIT & CRA	Current	Bay of Bengal FIRs, Ujung Pandang and Jakarta FIRs, provides assistance to the members of the Arabian Sea/Indian Ocean ATS Coordination Group (ASIOACG)
ISPACG/FIT Mr. Bradley Cornell, Boeing Engineering E-mail: Bradley.D.Cornell@Boeing.Com	Boeing USA	FIT & CRA	Current	South Pacific FIRs and members of the Informal South Pacific ATS Coordination Group (ISPACG)

Long Term RVSM Height Monitoring Actions – Asia/Pacific Region

APANPIRG/18 (September, 2007) was of the opinion that work should be undertaken as soon as possible in order to assess the consequences for the Asia/Pacific Region of the implementation of ICAO global long term RVSM height monitoring requirements from 2010 and, under the terms of Conclusion 18/4, requested Asia/Pacific Regional Monitoring Agencies (RMAs) in conjunction with the APANPIRG Regional Airspace Safety Monitoring Advisory Group (RASMAG) to prepare a regional impact statement summarizing the estimated consequences for the Region, including consideration of the numbers of airframes required to be monitored.

In order to progress these matters in a timely fashion, RASMAG/8 (December, 2007) formulated six Long Term Height Monitoring (LTHM) Actions for promulgation, as outlined below. More details in respect to each LHTM Action can be found in the RASMAG/8 report, available from the website of the ICAO Asia/Pacific Office at http://www.bangkok.icao.int/ under the "Meetings" menu.

LTHM Action 1: Based on the final draft of the RMA Manual which was expected to be available from June 2008, Asia/Pacific RMAs in conjunction with RASMAG prepare and widely promulgate an information circular detailing, as a minimum, the roles and responsibilities of an RMA, the height monitoring process and equipment required, and the reasons and quantum of the global long term height monitoring requirements.

LTHM Action 2: To maintain effective delivery of existing RMA services and facilitate planning specifically designed to prepare for application of global long-term RVSM height monitoring requirements from 2010, each Asia/Pacific RMA should, as a matter of priority, bring to the attention of State regulators the difficulties being experienced by RMAs in receiving timely and accurate information (including routine large height deviation [LHD] reporting) from States. Asia/Pacific RMAs should seek assistance from States in implementing robust processes to:

a) continuously update RMA databases of operators and aircraft holding State RVSM approvals;

b) enable the expeditious forwarding of all LHD and related reports to RMAs, and

c) ensure availability of current details for State RVSM Point of Contact (POC) officials.

LTHM Action 3: Whilst recognizing that responsibility for compliance with Annex 6 height monitoring provisions remains the responsibility of States, as soon as practicable each Asia/Pacific RMA, in conjunction with State regulatory authorities and airspace user organizations, should develop a methodology for reviewing the RMA database of RVSM approvals in order to develop and promulgate a list of the minimum height monitoring which must be accomplished by each operator to which the RMA provides services. In preparing this list, account should be taken of special circumstances pertaining to infrequent airspace users recognizing that some operators may be required to complete minimum monitoring requirements which are a function of the proposed 1,000-flying-hour limit rather than the two-year limit.

LTHM Action 4: After determining the potential monitoring burden posed by the operators to which it provides service, each Asia/Pacific RMA should examine monitoring results accumulated by all other authorized global RMAs, regardless of region, in order to utilize monitoring results from other regions to avoid duplication and reduce the actual monitoring burden the RMA faces.

LTHM Action 5: Each Asia/Pacific Region RMA should, in light of its anticipated height monitoring burden, propose recommendations through RASMAG to APANPIRG useful in determining the regional ground-based and GPS-based Monitoring System (GMS) height monitoring infrastructure necessary to enable its affiliated operators to meet the global long-term RVSM monitoring requirements applicable from November 2010.

LTHM Action 6: Asia/Pacific RMAs collaboratively investigate the technical feasibility of using the aircraft geometric height produced by ADS-B and Multilateration surveillance systems to support monitoring of aircraft height keeping performance.

…………… *End* ……………

RASMAG/9 – WP/14

International Civil Aviation Organization

The Ninth Meeting of the Regional Airspace Safety Monitoring Advisory Group (RASMAG/9)

Bangkok, Thailand, 26 − 30 May 2008

Agenda Item 5: Airspace safety monitoring activities/requirements in the Asia/Pacific Region

Assessment of the Safety of Implementing 50NM Lateral and Longitudinal Separation Standards On RNAV Routes L642 and M771

(Presented by Singapore)

SUMMARY

This working paper presents the results of an assessment of the risk associated with introducing 50NM lateral and longitudinal separation standards on South China Sea RNAV routes L642 and M771. The safety assessment was conducted using internationally applied ICAO collision risk methodology, making use of relevant results developed in other portions of the Asia and Pacific Region where appropriate. Principal sources of data used in the safety assessment are information extracted from the December 2007 Traffic Sample Data collection, radar-based measurements of position obtained from the Singapore Area Control Center, and the results of monitoring navigational performance on the routes – a process which has been underway on a continuous basis since November 2001. The risk associated with the 50NM lateral separation standard is estimated, with high statistical confidence, to be in compliance with the Regional Target Level of Safety (TLS). Examination of the risk associated with the 50NM longitudinal separation standard also indicates that the TLS is satisfied with high confidence. In light of favorable risk estimates and the ongoing program for monitoring navigational performance, the safety assessment supports introduction of 50NM lateral and longitudinal separation standards on L642 and M771.

1. Introduction

1.1 In March 2006, the First Meeting of the ICAO Required Navigation Performance Task Force (reference 1), RNP/TF-1, agreed that there was a need to increase the capacity of the RNAV routes in the South China Sea. The meeting agreed to introduce 50NM longitudinal separation as a capacity-enhancement option, with initial use of this reduced standard on RNAV routes L642 and M771. The meeting agreed, further, that any introduction of reduced separation minima would be subject to the satisfactory outcome of an assessment of the safety of proposed changes.

1.2 In July 2007, the Asia Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG) Air Traffic Management/Aeronautical Information Services/Search and Rescue Sub-Group held its Seventeenth Meeting (ATM/AIS/SAR/SG/17). At that meeting, the International Air Transport Association emphasized the need for implementation of Required Navigation Performance 10 (RNP 10) based 50NM lateral and longitudinal separation on L642 and M771 in order to meet capacity demands, which were becoming critical (reference 2, paragraphs 4.57 through 4.60).

1.3 At ATM/AIS/SAR/SG/17, Singapore agreed to host a Special Coordination Meeting in September 2007 to address these capacity problems. That meeting agreed (reference 3) to implement RNP 10-based 50NM lateral and longitudinal separation standards on L642 and M771 on 3 July 2008, subject to a favorable outcome of a safety assessment of the change.

1.4 Singapore informed the Special Coordination Meeting that it would arrange for conduct of the necessary safety assessment.

1.5 Arrangements were completed in January 2008; a preliminary safety assessment (reference 4) was presented to the task force fostering implementation of the separation changes, now called the ICAO South-East Asia Required Navigation Performance Implementation Task Force (RNP-SEA/TF), at its Second Meeting (RNP-SEA/TF/2).

1.6 The purpose of this working paper is to present the final assessment of the safety of implementing 50NM lateral and longitudinal separation minima on L642 and M771.

2. Background

2.1 This section summarizes the characteristics and infrastructure of South China Sea airspace, and presents an overview of airspace use based on a recent sample of traffic. The section also describes the operational concept which will guide application of 50NM lateral and longitudinal separation standards to L642 and M771 and reviews the current program for monitoring lateral errors in South China Sea airspace.

2.2 Description of South China Sea Airspace

2.2.1 As is shown in figure 1, South China Sea airspace is organized into six flight information regions (FIRs): Ho Chi Minh, Hong Kong, Kota Kinabalu, Manila, Sanya, and Singapore.

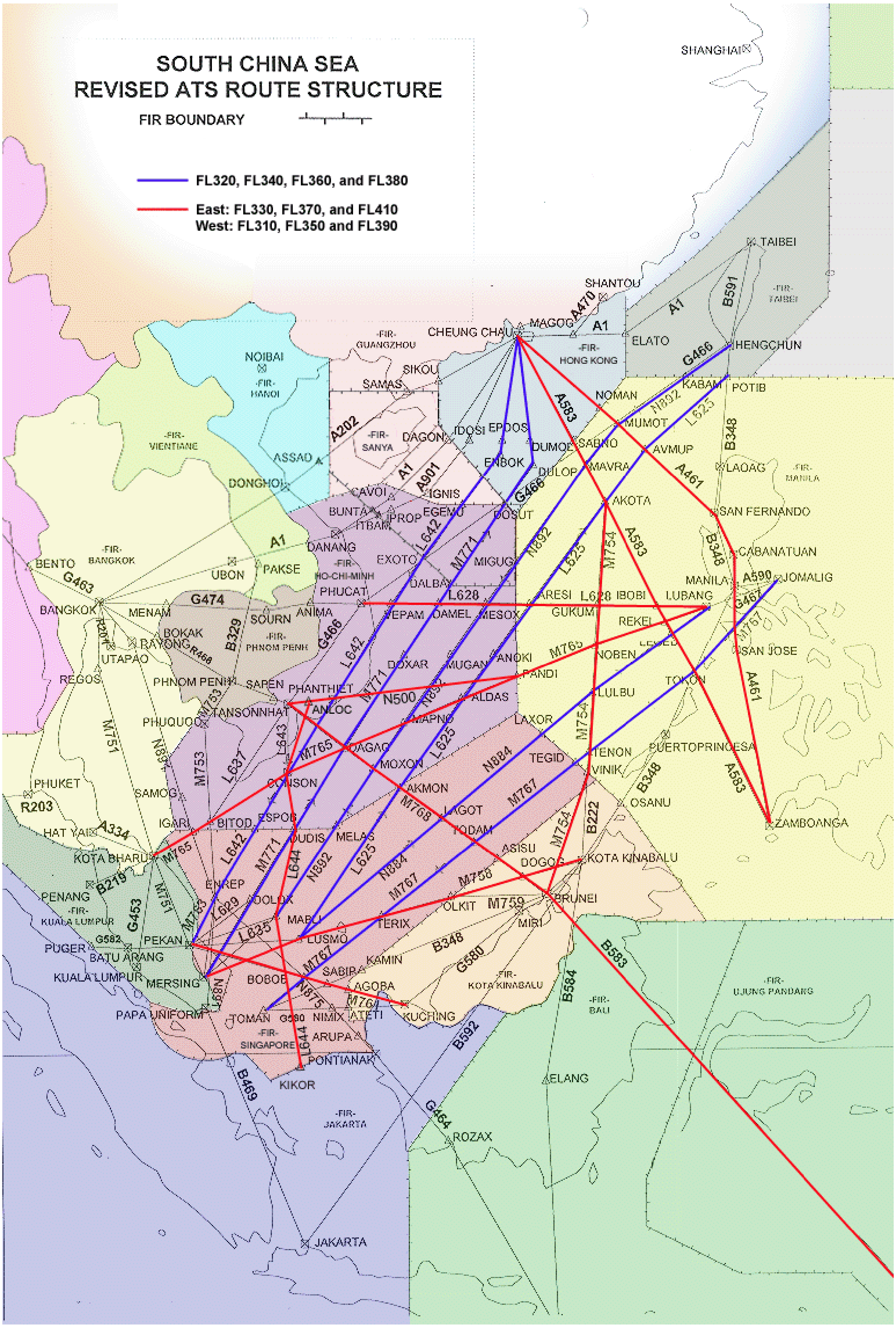

Figure 1. South China Sea Airspace

2.2.2 In response to increased demand for capacity, air navigation service providers revised use of South China Sea airspace in November 2001. The principal change was introduction of six major trunk routes to accommodate the three major northeast-southwest flows in the airspace, as shown in figure 1. These routes, termed “RNAV routes,” are configured as three sets of route-pairs, with a minimum lateral separation of 60NM between the members of a pair. The minimum longitudinal separation between two co-altitude aircraft on one of the routes is either 10 minutes with Mach number technique (MNT) or 80NM if RNAV separation rules apply. All flights at or above flight level (FL) 290 on these routes must be State-approved for RNP 10 operations.

2.2.3 The three route-pairs serve heavy-traffic flows in the airspace: Hong Kong/Singapore and Kuala Lumpur (routes L642 and M771), northeast Asia and Taiwan/Singapore (N892 and L625) and Manila/Singapore (N884 and M767). Routes crossing the RNAV routes in figure 1 accommodate traffic between other important origin-destination pairs in the States bordering the South China and beyond.

2.2.4 The flow on any of the six RNAV routes is unidirectional. Each of the two members of a route-pair provides one-way traffic flow between the origin-destination sets served. Flight-level use on the South China Sea routes is restricted in order to enhance provision of separation between operations on the RNAV and crossing routes. At present, no-pre-departure-coordination (No-PDC) flight levels on the RNAV routes are 300, 320, 340, 360, 380 and 400; No-PDC flight levels available on crossing routes are 330, 370 and 410 for eastbound flights, and 310, 350 and 390 for westbound operations. Effective 2100 UTC on 2 July 2008, as the result of work (reference 5) by the Western Pacific/South China Sea RVSM Scrutiny Working Group (WPAC/SCS RSG), No-PDC flight levels on the RNAV and crossing routes will change. The No-PDC flight levels available on the RNAV routes will be 310, 320, 350, 360, 390 and 400; No-PDC flight levels on the crossing routes will vary by route.

2.2.5 Table 1 summarizes this information concerning South China Sea airspace.

RNAV Route	Principal Service	Direction of Flow	No-PDC Flight Levels Prior to 2 July 2008	No-PDC Flight Levels After 2 July 2008
L642	Hong Kong/Singapore-Kuala Lumpur	Northeast-southwest	300, 320, 340, 360, 380, and 400	310, 320, 350, 360, 390 and 400
M771	Hong Kong/Singapore-Kuala Lumpur	Southwest-northeast	Same as L642	Same as L642
N892	Northeast Asia-Taiwan/Singapore	Northeast-southwest	Same as L642	Same as L642
L625	Northeast Asia-Taiwan/Singapore	Southwest-northeast	Same as L642	Same as L642
N884	Manila/Singapore	Southwest-northeast	Same as L642	Same as L642
M767	Manila/Singapore	Northeast-southwest	Same as L642	Same as L642
Crossing Routes	Various	Bidirectional	Eastbound: 330, 370, and 410 Westbound: 310, 350, and 390	Dependent upon route

Table 1. Characteristics of Air Traffic Service Routes in South China Sea

2.3 South China Sea Airspace Infrastructure

2.3.1 The South China Sea air-ground communications network is a combination of very high frequency (VHF) voice radio, high frequency (HF) voice radio and controller-pilot data link communications (CPDLC). The medium for data link may be VHF, HF or satellite.

2.3.2 The air traffic surveillance function is accomplished in the airspace with a combination of ground-based radars, HF voice reports and data-link-based automatic dependent surveillance-contract (ADS-C) position reports.

2.3.3 Figure 2 presents the South China Sea radar coverage shown in Appendix E of reference 6. As will be noted, there is virtually complete radar coverage of L642 and M771, with the exception of the northern portion of M771. Discussions at RNP-SEA/TF/2 indicated that the radar coverage shown in figure 2 requires updating (reference 7, paragraph 4.6) to reflect the fact that radar coverage of M771 in the Ho Chi Minh, Sanya and Hong Kong FIRs is complete. Further, the same discussions summarized in reference 7 indicated that there is a portion of both L642 and M771 within the Singapore FIR, between the boundary and the required reporting point closest to the boundary, where controllers must rely on voice or ADS position reports since there is no Singapore Area Control Center (ACC) radar coverage of the routes in this region. Radar-based aircraft position measurements from the Singapore ACC automation system, to be presented later in this paper, indicate that the distance of non-radar coverage on L642 is about 100 NM, or about 13 minutes of flying time. Finally, reference 7 indicates that VHF coverage is complete along L642 and M771, with the exception of the region within the Singapore FIR where no radar coverage exists.

2.4 Operations on L642 and M771

2.4.1 At its Sixteenth Meeting (August 2005), the APANPIRG agreed that each FIR where the Reduced Vertical Separation Minimum (RVSM) is applied would collect a sample of traffic movements during the month of December each year. Termed “traffic sample data,” or TSD, the traffic movement data for each flight consists of identifying information (aircraft call sign, aircraft type, origin and destination) and flight progress information (entry fix into RVSM airspace with associated route, time and flight level; and exit fix from RVSM airspace with associated route, time and flight level). Optionally, fix/route/time/flight-level information may be provided for fixes within the RVSM airspace of the FIR.

2.4.2 Reference 8 presents an examination of operations on L642 and M771 based on the December 2007 TSDs provided by the four FIRs – Ho Chi Minh, Hong Kong, Sanya and Singapore - having control responsibility for the routes. This reference notes that 61 individual operators were observed to use one or the other of the routes; these operators, as a group, used 37 unique aircraft types. Of particular interest is that 15 types taken together account for 97 percent of the operations, and that the type accounting for the highest percentage of operations (19 percent) is the A320.

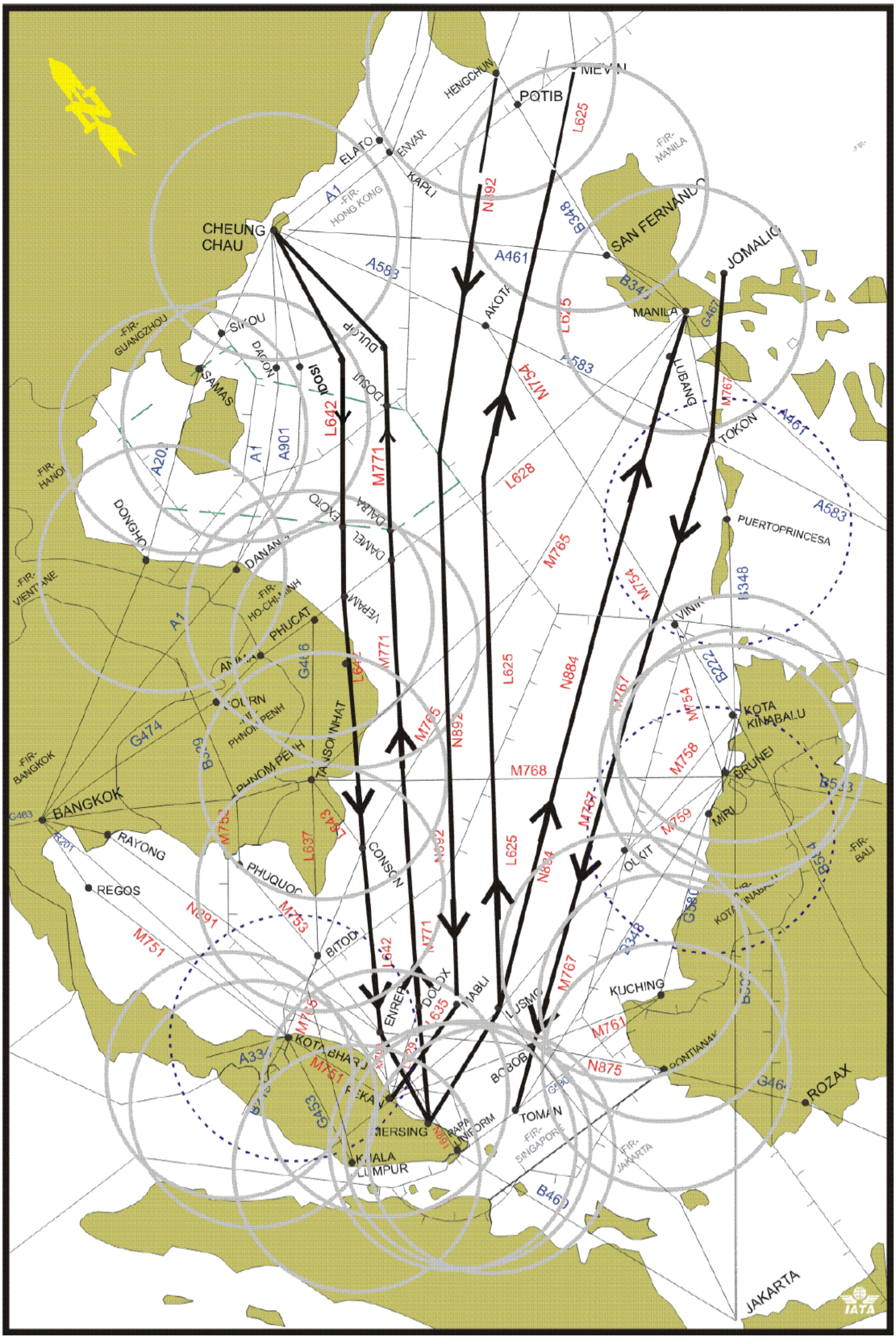

Figure 2. South China Sea Radar Coverage

2.4.3 Requirements for application of 50NM longitudinal separation (reference 9, section 5.4.2.6) include the availability of Direct Controller-Pilot Communications (DCPC) to enable position reports at least every 24 minutes from RNP 10-approved aircraft, if reports are by voice, and every 27 minutes if by ADS-C. Regional experience to date with use of the 50NM longitudinal standard has been limited to Pacific FIRs. Reference 10 lists the aircraft types observed in one such application of the longitudinal standard, none of which are the A320. Further examination of the summary of aircraft types observed in the December 2007 TSD indicates that roughly 38 percent of the operations were conducted by aircraft types which have not evidenced, typically, the ability to employ CPDLC and ADS, the systems which reference 10 describes as having been used to satisfy the DCPC requirement.

2.5 Operational Concept Underlying Planned Application of 50NM Lateral and Longitudinal Separation Standards on L642 and M771

2.5.1 As noted, the current lateral separation standard between the three pairs of RNAV routes is 60 NM. Also as noted, planning calls for introduction of the 50NM lateral separation standard on 3 July 2008.

2.5.2 The application of the 50NM lateral separation standard will not result in any change to the current locations of L642 and M771. Rather, the concept of operation for application of the 50NM lateral separation standard is that air traffic control will have the flexibility to clear an aircraft to deviate up to 10 NM from route centerline – to accommodate a pilot request for a weather-related deviation, for example – without the need for action to ensure maintenance of safe lateral separation from aircraft on the adjacent route.

2.5.3 The concept of operation for application of 50NM longitudinal separation takes advantage of the nearly complete radar and VHF voice radio coverage of the two routes, calling for use of the 50NM standard between any two co-altitude aircraft on either route. The concept of operation does not rely on CPDLC and ADS being fitted to an aircraft; rather, advantage is taken of the highly developed ground communications and surveillance infrastructure. Aircraft not equipped with CPDLC or ADS will be required to provide HF voice position reports during the roughly 13 minutes of flying time where VHF voice and radar are not available in the Singapore FIR.

2.6 Monitoring of Navigational Performance in South China Sea Airspace

2.6.1 A program to monitor the lateral and longitudinal deviations of aircraft assigned to the RNAV routes was implemented when the routes became operational in November 2001. Through a letter of agreement (LOA) signed by the air navigation service providers of the five South China Sea FIRs, there has been uninterrupted radar monitoring of both individual-aircraft lateral and longitudinal errors, and also unexpected changes in longitudinal separation between aircraft pairs, at fixes near the end of flight on routes M771, L625, N884 and N892 since introduction of the RNAV routes. A revised LOA (reference 11) adds, formally, Singapore's surveillance of L642 and M767 to the monitoring program. In fact, Singapore has been monitoring these routes since November 2001.

2.6.2 Under the LOA, all instances of 15NM or greater magnitude lateral errors observed on any of the RNAV routes are reported to Singapore, which has acted as the monitoring program coordinator since introduction of the RNAV routes. To date, two instances of such larger lateral errors have been reported. Neither error occurred on either L642 or M771.

2.6.3 If time-based separation is being applied to a pair of co-altitude aircraft, monitoring of longitudinal errors under the LOA requires that a report be sent to Singapore if: (a) the 10-minute minimum is infringed, (b) the expected time between the pair varies by 3 minutes or more, even if the separation standard is not infringed, or (3) a pilot estimate varies by 3 minutes or more from that advised in a routine position report. If RNAV distance-based separation pertains, a report is to be sent if: (a) the separation standard is infringed, or (b) the expected separation between a pair of aircraft varies by 10 NM or more, even if the separation standard is not infringed.

3. Discussion

3.1 The safety assessment reported in this working paper has been conducted using the internationally applied collision risk methodology which has supported airspace separation changes in several ICAO regions. As applied to a proposed separation change, the methodology consists of using a mathematical model to estimate the risk of midair collision for the proposed standard and comparing the estimated risk to a safety goal, the Target Level of Safety (TLS), which is a value of risk agreed as tolerable by decision makers. If the estimated risk is less than the TLS, the outcome of applying the methodology is to support the proposed change.

3.2 The APANPIRG has adopted the value 5×10^{-9} fatal accidents per flight hour as the TLS for each separation dimension – lateral, longitudinal and vertical – in the Asia and Pacific Region.

3.3 Reference 4 presents a non-mathematical description of the collision risk model applied in this safety assessment. As necessary, descriptions of technical aspects of the model forms and parameters will be presented below, with an invitation to examine reference 4 for more detail.

3.4 The working paper first reviews some overall factors which decision makers may wish to take into account in the interpretation of results presented in the safety assessment.

3.5 Factors Affecting the Risk of Collision in South China Sea Airspace

3.5.1 A horizontal-plane safety assessment addresses separately the risk that a typical pair of aircraft operating at the same flight level loses: (a) all planned lateral separation if assigned to laterally adjacent routes, (b) all planned longitudinal separation if operating on the same route, and (c) all planned horizontal separation if operating on intersecting routes. As described in the previous section, traffic flows on routes intersecting the South China Sea RNAV routes are restricted to operating at flight levels not available to traffic on the RNAV routes. Thus, the risk that a typical pair of aircraft loses all planned horizontal separation if operating on intersecting routes is zero. As a result, the safety assessment addresses only the risk arising from application of the planned lateral and longitudinal separation standards.

3.5.2 As noted in reference 4, an important factor in assessing the risk associated with the lateral separation standard is the packing of aircraft at the same flight level on adjacent routes, termed “lateral occupancy.” Estimation of this risk-model parameter relies on data describing traffic movements in the airspace. The planned July 2008 change in flight levels allocated to RNAV route traffic will likely result in a change to this parameter value. In order to take the uncertainties associated with this change into account, the safety assessment reflects a cautious (that is, higher) value of lateral occupancy than might have been suggested from processing of the combined December 2007 TSDs.

3.5.3 One of the assumptions made in developing the collision risk model is that there is no independent surveillance of aircraft position. As a result, there is no allowance made for the value of air traffic control intervention to reduce the risk that a pair of aircraft loses planned separation. As noted in the previous section, radar surveillance of L642 and M771 is virtually complete. As a result, the risk estimates presented in this working paper should be considered conservative, that is, higher than is likely the case in the airspace. Further detail in this regard will be provided below.

3.5.4 The previous section noted that monitoring of separation-related aircraft performance on South China Sea RNAV routes has been continuous since their 2001 introduction. To date, no 15NM or greater magnitude lateral errors and no longitudinal-error events covered in the monitoring LOA have been reported on L642 and M771. During the interval since monitoring began, it is reasonable to assume there have been several hundred thousand flight operations on these two routes.

3.5.5 With respect to analysis of the proposed 50NM lateral separation standard, the description of the operational concept presented in the preceding section leads to a cautious estimate of lateral risk. This is so since the model-estimation process assumes that all co-altitude operations on L642 and M771 will be conducted with planned lateral separation of 50 NM, when, in fact, this standard will be applied only to those aircraft pairs where one member of the pair is on an approved deviation in the direction of the laterally adjacent route. All normal route operations will be conducted with the current 60NM lateral separation standard unchanged.

3.5.6 Operators and aircraft flying at or above FL 290 on the South China Sea RNAV routes require State RNP 10 approval, as noted above. Compliance with this requirement is equivalent to stating that 95 percent of lateral deviations from route centerline are 10 NM or less. In turn, under the assumptions made in development of the RNP 10 standard, this containment percentage is equivalent to requiring that the standard deviation of lateral errors is roughly 5 NM. Radar-based measurements of the positions of aircraft operating on L642, to be described in more detail in this working paper, indicate that the standard deviation of lateral errors is on the order of 0.5 NM. These results should pertain for M771 operations as well, since the same operators and aircraft use both routes. As a result, decision makers should have high confidence that RNP 10 requirements for lateral navigational performance are being met. This estimate of standard deviation would seem to support the reported results of monitoring lateral errors: there has been no report of a 15NM or greater magnitude lateral error since the November 2001 introduction of the South China Sea RNAV routes. Based on the radar-based evidence, it would seem that, if a 15NM or greater magnitude error were to occur in the future, it would not be the result of typical navigational performance in the airspace.

3.6 Collision Risk Modeling

3.6.1 For nearly 40 years, collision risk modeling has been used as support by decision makers considering changes in separation standards. Technical analysis forming the basis for most en route separation minima – 50NM lateral separation based on RNP 10, the 60NM lateral separation standard applied in North Atlantic airspace, reduced horizontal-plane separation minima and the RVSM – contains a risk-model component.

3.6.2 As noted in reference 4, several assumptions underlie the mathematical development of the model. Principal among these are:

. an aircraft is considered to have the shape of a box, with length, height and width of the box equal, respectively, to the metallic length, wingspan and height from the underside of the fuselage to the top of the vertical tail of a typical aircraft in the system under study

. individual-aircraft navigational errors are independent in the three dimensions

. errors in the three dimensions made an aircraft are independent of the corresponding errors of any other aircraft in the system

. there is no collision-risk mitigation due to collision avoidance based on visual or electronic surveillance

3.6.3 The overall result of these assumptions is that collisions result from flying errors which occur independently among aircraft without the possibility of beneficial intervention.

3.7 Form of the Collision Risk Model

3.7.1 There are slightly different forms of the collision risk model used to assess the safety of separation minima in the three separation-standard dimensions. Reference 12 provides a summary of the derivation and use of the lateral and longitudinal collision risk model forms. The form of the lateral collision risk model is:

$$N_{ay} = P_y(S_y)P_z(0)\frac{\lambda_x}{S_x}\left\{E_y(same)\left[\frac{\overline{|\dot{x}|}}{2\lambda_x}+\frac{\overline{|\dot{y}|}}{2\lambda_y}+\frac{\overline{|\dot{z}|}}{2\lambda_z}\right]+E_y(opp)\left[\frac{\overline{V}}{2\lambda_x}+\frac{\overline{|\dot{y}|}}{2\lambda_y}+\frac{\overline{|\dot{z}|}}{2\lambda_z}\right]\right\} \quad (1)$$

The form of the longitudinal collision risk model is:

$$N_{ax} = P_y(0)P_z(0)\frac{2\lambda_x}{\overline{|\dot{x}|}}\left[\frac{\overline{|\dot{x}|}}{2\lambda_x}+\frac{\overline{|\dot{y}|}}{2\lambda_y}+\frac{\overline{|\dot{z}|}}{2\lambda_z}\right]\times\int_m^M\left(\int_s^M f(s,l)dl\right)ds \quad (2)$$

3.7.2 The mathematical symbols on the left of the two equations are the lateral and longitudinal risks, respectively. Each has the unit of fatal accidents per flight hour. This is the same unit in which the TLS is expressed.

3.7.3 The symbols on the right of the equations are termed “model parameters,” the values of which are, typically, estimated from data taken in the airspace system under study. Reference 4 presents a description of each. In the following, those descriptions will be summarized.

3.8 Data Used in the Safety Assessment

3.8.1 The general data sources used in estimating the parameters are four: (1) information on traffic movements, (2) measurements of navigational performance, (3) records of weather deviations and other operational factors with potential influence on separation maintenance, and (4) archives of errors made by flight crews or air traffic control in following or granting clearances, or in transferring control responsibility between air traffic control units. Global experience has demonstrated that the last of these data sources is vital in estimating the risk associated with the RVSM and in developing remedial actions to reduce risk.

3.8.2 A principal source of information used in the safety assessment is the combined form of the December 2007 TSDs collected in the Ho Chi Minh, Hong Kong, Sanya and Singapore FIRs.

3.8.3 Eight days of radar-based position measurements of aircraft operating on L642, extracted from the automation system at the Singapore ACC, provided the basis for examining actual navigational performance on the RNAV routes. This sample was composed of 245 flights, after excluding radar tracks of aircraft which appeared to be on direct clearances to fixes other than ENREP on L642. Using only the first position of an aircraft after entry into radar coverage, the computed mean and standard deviation of lateral deviations from L642 centerline were -0.88NM and 0.67NM, respectively. It is common practice to use the first position measurement after entry into radar coverage to estimate lateral error in order to diminish the prospect of sampling aircraft navigational performance influenced by ground-based navigational aids. The disadvantage of using the first position measurement is that it is likely to be most influenced by radar error. Using all radar position measurements available between ESPOB and ENREP, the computed mean and standard deviation were -0.79NM and 0.46NM, respectively.

3.8.4 The details of the safety assessment will now be presented.

3.9 Explanation of Model Parameters and Corresponding Estimated Values Used In the Safety Assessment

3.9.1 Parameters Common to the Lateral and Longitudinal Risk Models

Aircraft Length, Wingspan and Height: λ_x, λ_y and λ_z

3.9.1.1 Table 2 of reference 8 presents the 20 aircraft types observed most frequently in the December 2007 TSDs. The most frequently occurring type is the A320, accounting for roughly 19 percent of the observations. The second most frequently observed type is the B-777-200. Of the four most frequently observed types –accounting for 58 percent of the aircraft recorded in the TSD – three are wide-body aircraft, including both the B-777-200 and B-777-300. Based on the results concerning aircraft types presented in reference 8, the safety assessment used the B-777-300 as the typical aircraft. The length, wingspan and height of this aircraft type are 0.0399NM, 0.0329NM and 0.0099NM, respectively.

Probability That Two Aircraft Assigned to the Same Flight Level Are at the Same Geometric Height: $P_z(0)$

3.9.1.2 The value of this parameter depends on the accuracy of height-keeping in the airspace and on the height of the aircraft type chosen to represent the typical aircraft. For purposes of standardization with other risk modeling within the Region, the safety assessment proceeded with the commonly used value of this parameter, 0.538, which is associated with the B-747-400.

The Average Relative Vertical Speed of Two Aircraft Assigned to the Same Flight Level: $\left|\overline{\dot{z}}\right|$

3.9.1.3 As has been the case in all recent safety assessments conducted in the Asia and Pacific Region, the value used in this document is 1.5 knots.

3.9.2 Parameters Used Only in Estimation of Lateral Risk

Same- and Opposite-Direction Lateral Occupancies: E_y(same) and E_y(opp)

3.9.2.1 As noted above, the lateral occupancy parameter reflects the relative density of co-altitude traffic on adjacent routes. Lateral occupancy provides quantitative insight into the likelihood that two co-altitude aircraft on laterally adjacent routes will be in the same relative along-track position - and, thus, subject to the risk of midair collision - should all lateral separation be lost.

3.9.2.2 It should be noted that occupancy is not expressed in a unit of traffic flow, such as the number of aircraft per year using a route. Rather, occupancy is a dimensionless number, like a probability, and increases with an increase in the number of pairs of aircraft on laterally adjacent routes which are at or near the same along-track positions. Insofar as an increase in airspace traffic volume results in an increase in these proximate aircraft pairs, occupancy increases with increasing flights using the airspace.

3.9.2.3 Co-altitude aircraft on adjacent routes may be operating on the same or reciprocal headings. In the expression of the lateral risk model (equation (1), above), there are two parameters, representing the relative density of same- and opposite-direction pairs on adjacent routes, E_y(same) and E_y(opp), to account for these differences in headings.

3.9.2.4 Since L642 and M771 are each unidirectional-flight routes, with flights on the two routes in opposite directions, E_y(same) has the value zero. Because of this, the expression for lateral risk reduces to:

$$N_{ay} = P(S_y) \bullet P_z(0) \bullet (\lambda_x/S_x) \bullet E_y(opp) \bullet [\ ]$$

where the "[ ]" refers to the sum of ratios of relative speeds to aircraft dimensions in equation (1).

3.9.2.5 The December 2007 TSDs provided traffic movement data for estimation of opposite-direction occupancy at several locations along the L642/M771 pair. For example, estimates of opposite-direction occupancy at the northern fixes on L642 and M771 (EPKAL and DOSUT) and southern fixes (ESPOB and DUDIS), were 0.457 and 0.452, respectively. As expected, occupancy values were highest for the most heavily used flight levels: 340, 360 and 380. Estimates at other fix-pairs produced somewhat higher results.

3.9.2.6 The Monitoring Agency for the Asia Region (MAAR) presented a safety assessment of the South China Sea RNAV routes in reference 13. The value for opposite-direction lateral occupancy used in that assessment was 0.78, which was a cautious estimate based on the entire December 2006 TSD for the South China Sea FIRs. To accommodate a possible increase in opposite-direction lateral occupancy resulting from the July 2008 change to flight-level allocation on L642 and M771, the safety assessment employed the MAAR-derived value.

Speed of the Typical Aircraft in the System: $\overline{V}$

3.9.2.7 This parameter represents the speed of the typical aircraft in the system. The combined December 2007 TSD provided information to estimate the value of this parameter. All flights on L642 with reported times over both the EPKAL and ESPOB fixes and all M771 flights with reported times over both the DUDIS and DOSUT fixes were used to produce separate estimates of the parameter for the two routes. The results are shown in table 2.

Route	Fix-Pair	Distance Between Fixes of Fix-Pair (NM)	Number of Flights Used to Compute $\overline{V}$	Estimate of $\overline{V}$ (kts.)	Standard Deviation of Estimate (kts.)
L642	EPKAL – ESPOB	783.6	1970	470.0	17.6
M771	DUDIS – DOSUT	725.5	2125	483.9	17.6

Table 2. Average Aircraft Speeds on L642 and M771 Estimated From December 2007 TSD

Relative Across-Track Speed of Two Aircraft on Parallel Tracks As They Lose All Planned Lateral Separation: $|\dot{y}|$

3.9.2.8 This parameter describes the relative speed of two aircraft as they lose all planned lateral separation. Global experience has shown that the basic track-keeping accuracy of RNP-10-approved aircraft makes it highly unlikely that the loss of 50NM lateral separation would be due to normal navigational performance. The most reasonable circumstance associated with such a separation-loss event is a waypoint insertion error. Monitoring of lateral navigation performance on the South China Sea RNAV routes since their November 2001 introduction has not recorded one such event. Nevertheless, a cautious approach to lateral risk estimation should include use of a value for $\left|\overline{\dot{y}}\right|$ which corresponds to the loss of 50NM lateral separation. Reference 13 contains such a value, 75 kts., which has been used in the safety assessment.

Probability of Lateral Overlap: $P_y(50)$

3.9.2.9 This parameter describes the chance that two aircraft assigned to laterally adjacent routes which are separated by 50 NM will lose all planned lateral separation. Two approaches to treating $P_y(50)$ are possible in lateral collision risk assessment:

(1) Collecting sufficient lateral navigational performance data to estimate the value of $P_y(50)$ directly, and then using this value in equation (1) with the other necessary parameter values to estimate lateral risk for comparison to the TLS, or

(2) Using all the other necessary parameters in risk model, determining that value of $P_y(50)$ which will satisfy exactly the TLS, and then demonstrating from data that this value of $P_y(50)$ is not exceeded in the airspace

3.9.2.10 The first approach requires, typically, many years of recording lateral errors in a parallel-track system in order to demonstrate with high statistical confidence that the TLS is satisfied.

3.9.2.11The second approach takes advantage of the fact that there is a well-established relationship between the probability that two aircraft with planned 50NM separation will lose all planned separation, $P_y(50)$, and the probability that an individual aircraft will commit a lateral error of 15 NM or more in magnitude. Table B-1 of Attachment B to reference 14 is an example of this approach for the case of planned 30NM lateral separation between parallel routes.

3.9.2.12 In applying this second approach, a competent authority organizes a program to monitor lateral errors and employs a statistical decision-making process to evaluate the monitoring results. The decision-making process incorporates a predetermined level of statistical confidence that the TLS is met and uses the observed frequency of 15NM or greater lateral errors to signal, at any time in the monitoring program, one of three decisions:

(1) the TLS is satisfied,

(2) lateral navigational performance is not sufficiently good to meet the TLS, or

(3) there is not yet sufficient monitoring data available to conclude whether the TLS has been satisfied

3.9.2.13 This second approach to demonstrating compliance with the lateral TLS has been applied successfully in several portions of worldwide airspace, and has been adopted in this safety assessment. Details will be provided after review of the lateral risk model parameter values used in the safety assessment.

Summary of Parameter Values Used in the Preliminary Assessment of the Safety of a 50NM Lateral Separation Standard between L642 and M771

3.9.2.14 Table 3 summarizes the details of parameters used in the lateral safety assessment.

Model Parameter	Description	Value Used in Preliminary Safety Assessment	Source for Value
N_{ay}	Risk of collision between two aircraft with planned 50NM lateral separation	5.0×10^{-9} fatal accidents per flight hour	TLS adopted by APANPIRG for changes in separation minima
S_y	Lateral separation minimum	50NM	Goal of RNP-SEA/TF
$P_y(50)$	Probability that two aircraft assigned to parallel routes with 50NM lateral separation will lose all planned lateral separation	2.69×10^{-9}	Value required to meet exactly the TLS of 5×10^{-9} fatal accidents per flight hour, given other parameter values used in safety assessment.
λ_x	Aircraft length	0.0399NM	Combined December 2007 TSD
λ_y	Aircraft wingspan	0.0329NM	
λ_z	Aircraft height	0.0099NM	
$P_z(0)$	Probability that two aircraft assigned to same flight level will be at same geometric height	0.538	Commonly used in safety assessments
S_x	Length of half the interval, in NM, used to count proximate aircraft at adjacent fix for occupancy estimates	120NM, equivalent to the +/- 15-minute pairing criterion used in safety assessment	Arbitrary criterion which does not affect the value of risk
$E_y(same)$	Same-direction lateral occupancy	0.0	Result of direction of traffic flows on L642 and M771
$E_y(opp)$	Opposite-direction lateral occupancy	0.78	MAAR estimate based on December 2006 TSD (reference 13)
$\overline{V}$	Aircraft along-track speed	483.9 kts.	Combined December 2007 TSD
$\lvert\overline{\dot{y}}\rvert$	Average relative speed of aircraft pair at loss of planned 50NM lateral separation	75 kts.	Reference 13
$\lvert\overline{\dot{z}}\rvert$	Average relative vertical speed of a co altitude aircraft pair assigned to the same route	1.5 kts.	Conservative value commonly used in safety assessments

Table 3. Summary of Risk Model Parameters Used in Lateral Safety Assessment

3.10 Outcome of the Lateral Safety Assessment

3.10.1 As noted, monitoring of lateral deviations has been continuous since the November 2001 introduction of the South China Sea RNAV routes, with the criterion to identify a large lateral deviation set at 15NM in magnitude. Singapore has acted as the coordinator of this monitoring program, collecting records of traffic movements and large lateral deviations from all FIRs where monitoring takes place. To date, there has been no report of a large lateral deviation for aircraft operating on either L642 or M771.

3.10.2 Table 4 of reference 8 indicates that the number of flights observed in the merged December 2007 TSD from the Singapore and Hong Kong FIRs was 5743. Assuming that December 2007 is a month representative of the traffic counts on L642 and M771, it is reasonable to conclude that there would be, in a year, about 70,000 flights available for monitoring on the two routes. The value required value of $P_y(50)$ shown in table 3, 2.69×10^{-9} , implies that it would be necessary to have many years of navigational performance observations from the monitoring program in order to show with high confidence that the TLS is being met.

3.10.3 As noted in the discussion of the required value of $P_y(50)$, taking the approach of demonstrating compliance with the TLS through analysis of 15NM or greater errors overcomes this problem. The approach is based on a statistical technique known as sequential sampling and employs a control chart of the type that is used in monitoring the manufacturing quality of many industrial processes. In such an environment, a manufacturer always wants to know if the product manufactured meets the company's standards for quality. As proposed for application in the case of introducing the 50NM lateral separation standard on L642 and M771, the product is system safety, as demonstrated by compliance of risk with the TLS, and the standard for quality is an acceptably low rate of occurrence of 15NM or greater lateral deviations.

3.10.4 Figure 3 shows a control chart which mechanizes the sequential sampling process using the parameter values shown in table 3, with the assumption that decision-makers want to have 95 percent statistical confidence that the TLS is met. The chart permits plotting of the number of reported 15NM or greater errors on the vertical axis against numbers of flights monitored on the horizontal axis.

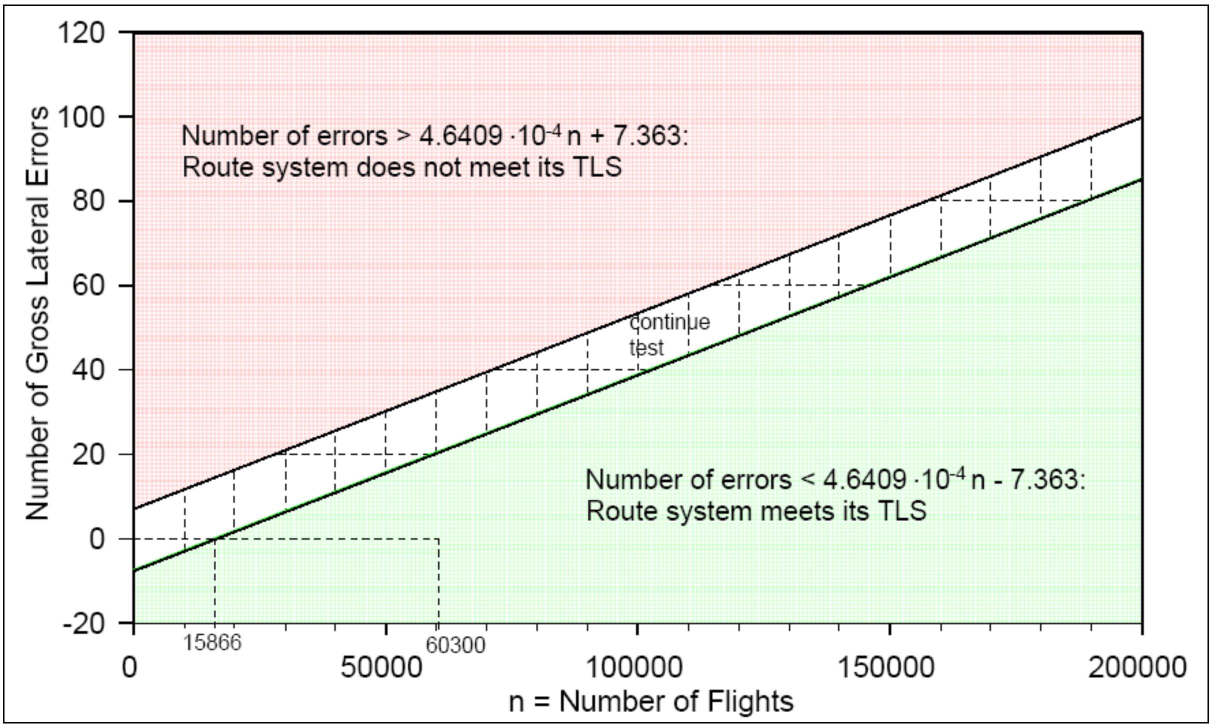

Figure 3. Sequential Sampling Approach to Demonstrating That Lateral Collision Risk for 50NM Lateral Separation Standard Applied to L642/M771 Complies With TLS

3.10.5 The two straight lines of identical slope in the figure divide the chart into three regions, corresponding to the three decisions possible after entering each monitoring observation (number of 15NM or greater errors reported and number of flights monitored) onto the chart:

(1) the number of 15NM or greater errors recorded during observation of the total number of flights monitored leads to the conclusion that the TLS is met (the plot of 15NM or greater errors versus number of monitored flights is within the region below the lower sloped line),

(2) the total number of flights monitored is not yet sufficient to conclude that the TLS is met (the plot of 15NM or greater errors versus number of monitored flights is between the two sloped lines), or

(3) navigational performance, as measured by the number of 15NM or greater errors recorded for the number of flights monitored, is not adequate to meet the TLS and, therefore, investigations must be done to look for any sources of systematic error which, if found, must be eliminated (the plot of 15NM or greater errors versus number of monitored flights enters the region above the upper sloped line).

3.10.6 From the control chart of figure 3, if there are no 15NM or greater magnitude lateral errors reported after roughly 15,900 flights, the plot of 15NM or greater magnitude errors versus number of monitored flights enters the "meets the TLS" region of the chart (the intersection of the horizontal dashed line corresponding to no 15NM or greater magnitude lateral errors and the vertical line corresponding to 15,866 monitored flights). The cumulative total of flights monitored on L642 and M771 for the period 1 January 2007 through 30 April 2008 is roughly 60,300. During this period, no 15NM or greater magnitude errors were reported to Singapore for either route. The location of this point - the intersection of the no-large-lateral-deviation horizontal line and the vertical line corresponding to 60,300 monitored flights - is well within the "meets the TLS" region of the chart, as can be seen from figure 3.

3.10.7 As a result, it can be concluded with 95 percent statistical confidence that the proposed 50NM lateral separation standard for route-pair L642/M771 meets the TLS.

Conclusions and Recommendations from the Safety Assessment Concerning Introduction of the 50NM Lateral Separation Standard on L642 and M771

3.10.8 Use of a sequential-sampling approach in combination with the results of the program to monitor lateral errors in the South China Sea has led to the conclusion that the TLS is met with 95 percent statistical confidence.

3.10.9 As a result, the assessment of the risk of introducing a 50NM lateral separation standard between L642 and M771 supports the decision to proceed with implementation.

3.11 Parameters Used Only In Estimation of Longitudinal Risk

Background Information from the Combined December 2007 TSD Useful for the Estimation of Longitudinal Collision Risk

3.11.1 All flights on L642 with reported times over the EPKAL and ESPOB fixes and all flights on M771 with reported times over the DUDIS and DOSUT fixes were examined to estimate the relative along-track speed of aircraft pairs on the two routes. A pair of aircraft was included in the examination of relative along-track speed if the two aircraft were at the same flight level and passed over the entry fix (EPKAL for M642 flights and DUDIS for M771 flights) within 60 minutes of each other. The same-altitude/close-in-time criteria were intended to minimize the effects of wind on the estimation of relative speeds. Application of these criteria resulted in 650 L642 pairs and 742 M771 pairs available for the examination of relative speed. For any pair, the computed difference in speeds was assigned a positive value if the lead aircraft in the pair was faster and a minus sign if the faster aircraft was the trailing aircraft in the pair. The examination involved computing the average of these signed speeds as well as the average of the speed differences without regard to sign, that is, the average of the absolute value of the speeds.

3.11.2 During the estimation of relative along-track speed, it became apparent that there were clusters of speed differences resulting, it would seem, from the mix of a relatively fast and relatively slow aircraft as members of a pair.

3.11.3 All flights on L642 with times reported over both EPKAL and ESPOB and all M771 flights with reported times over both DUDIS and DOSUT were used to estimate the average transit time between the fix-pairs. There were 1970 such flights identified on L642 and 2125 flights on M771.

3.11.4 Table 4 shows the results of this investigation.

Route	Fix-Pair	Average Signed Relative Speed (kts.)	Standard Deviation of Signed Relative Speed (kts.)	Average Absolute-Value of Relative Speed (kts.)	Standard Deviation of Absolute-Value of Relative Speed (kts.)	Average transit Time (mins.)
L642	EPKAL - ESPOB	-3.34	2.39	16.74	2.40	100.0
M771	DUDIS - DOSUT	-5.89	2.45	14.27	2.51	90.1

Table 4. Average Relative Speeds and Transit Times on RNAV Routes L642 and M771

3.11.5 As can be seen, the average along-track signed speed for each route is negative, indicating that, on the average, a faster aircraft is following a slower one in the pairs used in the examination.

Probability That Two Aircraft Assigned to the Same Route and Flight Level Are in Lateral Overlap: $P_y(0)$

3.11.6 As can be seen from inspection of the longitudinal collision risk model presented in equation (2) above, risk is directly proportional to the value of this parameter. That is, as the value of this parameter increases, longitudinal risk increases.

3.11.7 Experience has shown that use of the Global Positioning System (GPS) produces highly accurate estimates of aircraft position. In turn, these accurate position estimates produce smaller lateral errors from course. Smaller lateral errors produce higher values of $P_y(0)$, thus increasing the risk of losing longitudinal separation, all other things being equal. This "navigation paradox" – improvements in navigation in one dimension increase collision risk in another – is well known.

3.11.8 The ICAO Reduced Vertical Separation Minima Implementation Task Force initiated work to introduce the RVSM into Pacific FIRs in November 1998. Reference 15, presented to the Third Meeting of the Task Force describes analysis of cross track errors exhibited by B-747-400 aircraft known to be using GPS for position-determination. Based on analysis of these errors, reference 15 concluded that, if all Pacific operations were conducted by B-747-400 aircraft equipped with GPS, the estimated value of $P_y(0)$ would be 0.3868. In contrast, if there were no GPS-equipped aircraft in the airspace, the value would be only 0.019. Reference 15 provided evidence that about 27 percent of Pacific operations at the time of the RVSM/TF/3 meeting were conducted by GPS-equipped aircraft. The corresponding value of $P_y(0)$ adopted by the Task Force was 0.052.

3.11.9 Table 2 of reference 8 presents the 15 aircraft types which, taken together, account for 97 percent of the operations on L642 and M771 found in the combined December 2007 TSD. From this table, it is possible to conclude that at least 50 percent of the operations on L642 and M771 were conducted by aircraft types known to be equipped with GPS.

3.11.10 Based on this percentage of GPS equipage, the preliminary safety assessment used a value of 0.20 for $P_y(0)$.

Relative Across-Track Speed of Two Aircraft Assigned to the Same Route and Flight Level - $|\bar{\dot{y}}|$

3.11.11 The effect of GPS in the navigation solution is to reduce aircraft cross-track velocity. Reference 15 provides the value of relative cross-track speed, 1 knot, used in the current estimation of longitudinal risk.

Probability of Longitudinal Overlap: P_x

3.11.12 The remaining terms in the longitudinal risk model shown in equation (2), above, address the estimation of P_x, the probability that a pair of same-route, co-altitude aircraft loses all planned longitudinal separation. While the estimation of this probability is a complex mathematical form in equation (2), involving a double integral, the concept behind the form is relatively straightforward.

3.11.13 If Q(s) is the proportion of aircraft pairs separated initially by s in the longitudinal dimension and $P(S \geq s)$ is the probability of losing at least the separation s, then the probability of losing all longitudinal separation between a pair of aircraft, Px , can be represented by:

$$P_x = (\text{factor dependent on initial separation s}) \bullet \text{summation of } [Q(s) \cdot P(S \geq s)] \text{ for all values of s.}$$

3.11.14 The term in "( )" (factor dependent on initial separation) is represented in equation (2) above by $(1/T) \bullet (2\lambda_x / |\dot{x}|)$, where the relative speed, $|\dot{x}|$, is that necessary for two aircraft to lose longitudinal separation, s, within a time T. The value of T is usually taken to be the time between successive waypoint reports, under the assumption that air traffic control will intervene to correct the case of a serious loss of longitudinal separation at the next waypoint. In oceanic airspace such as the Pacific, T is roughly 60 minutes.

3.11.15 As noted in table 4, the average transit time on M771 between DUDIS and DOSUT is 90 minutes and roughly 100 minutes on L642 between EPKAL and ESPOB. The principal fixes on each route are on the order of 200 NM apart. Assuming three required reporting points between EPKAL and ESPOB and between DUDIS and DOSUT, T for L642 and M771 would be on the order of 30 minutes. If two aircraft were separated longitudinally by 50 NM at a required reporting point, the relative speed difference required to lose exactly 50 NM within 30 minutes is 100 kts. The data on relative speeds presented in table 4 suggest that such an overtake speed is highly unlikely.

3.12 Estimating the Initial Distribution of Along-Track Separation

3.12.1 In longitudinal risk estimation, the term Q(s) is the distribution of initial separations between co-altitude same-route aircraft pairs on entering the airspace. The term $P(S \geq s)$, the chance of losing all planned longitudinal separation of s or more, is usually estimated from data on longitudinal separation erosion available from airspace records.

3.12.2 It is not possible to know in advance how co-altitude aircraft will be spaced longitudinally when a 50NM longitudinal separation minimum is applied. It is, however, possible to infer something about capacity demand and air traffic control response by examining actual system performance.

3.12.3 The combined December 2007 TSD was used to gain insight into both the distribution of initial along-track separation and also separation decrease or increase during operations on L642 and M771. It will be convenient to use the term "separation loss or gain" to describe the decrease or increase in initial separation, but, in using this term, there should be no misunderstanding that "separation loss" means loss of all initial longitudinal separation between the members of an aircraft pair.

3.12.4 The combined December 2007 TSD was processed to determine pairs of co-altitude aircraft on L642 passing over EPKAL within 60 minutes of each other. Similarly, pairs of co-altitude aircraft passing over DUDIS no more than 60 minutes apart were identified. The pair-separations for the L642 pairs passing over ESPOB and the M771 pairs passing over DOSUT were then computed and the data summarized as counts of initial-separation/separation-change. The combined total of L642 and M771 pairs which contributed to the initial-separation/ separation-change analysis is 1392, the same pairs used to examine relative along-track speed.

3.12.5 The distribution of initial separations is shown in figure 4. As can be seen, there are initial separations well below the 10-minute minimum applied on the routes. Examination of the basic data indicated that such smaller initial inter-aircraft separation values were the result of the lead aircraft being faster than the second member of the pair over the fix. Subsequent separation increased as the flights were conducted.

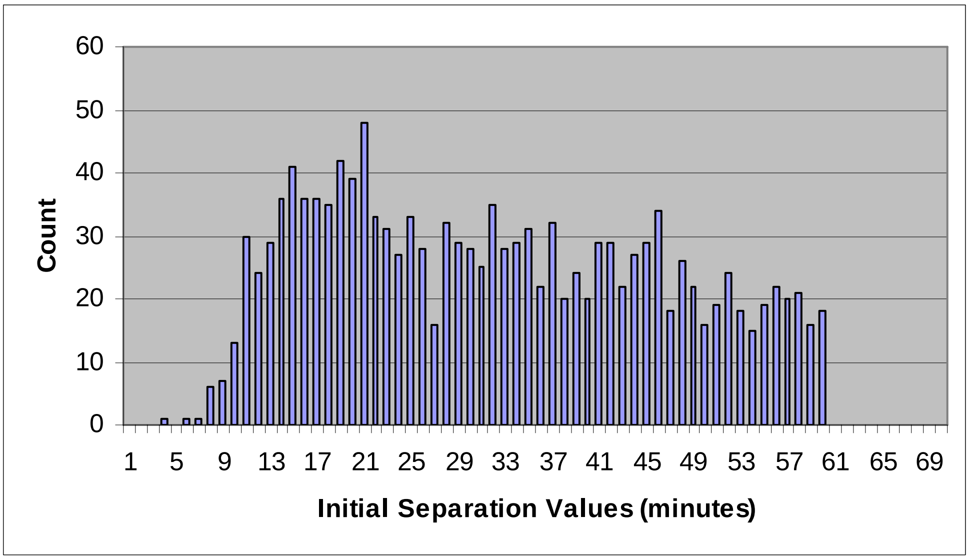

Figure 4. Absolute Frequency of Initial Separation Values

3.12.6 As noted previously, the 10-minute longitudinal minimum is applied with Mach number technique on the RNAV routes. Reference 9, paragraph 5.4.2.4.3, specifies the reduction below minimum which is permissible with this technique. If the preceding aircraft is assigned a speed which is 0.02 units of Mach number higher than the following aircraft, the initial separation may be 9 minutes. For each additional 0.01 unit of difference, the pair may be spaced by 1 minute less, down to a minimum of 5 minutes. Thus, application of Mach number technique explains the apparent anomaly in the data – initial separations well less than the minimum.

3.12.7 Unfortunately, information concerning Mach number is not contained in a TSD. In an attempt to account for the effect of applying Mach number technique, a correction was made to the differences of the 1391 aircraft pairs used to examine longitudinal risk. The details of the correction process are contained in the Attachment.

13.2.8 The results of correcting initial separation for Mach number are shown in figure 5. As will be noted, pairs with apparent initial separations less than 10 minutes in figure 4 have been moved to larger separations, with the exception of a few remaining at 9 minutes. Since the correction process relies on the use of ICAO Standard Atmosphere temperatures, small errors are to be expected. In fact, examination of the initial separations corrected for Mach number shows consistent underestimation of the Mach number difference between a pair of aircraft, with the underestimation growing with increasing difference in groundspeeds between the members of a pair. If a correction of, roughly, 0.01 unit of Mach number is added to the initial separations of figure 5 in order to account for the underestimation of Mach number difference, there are no pairs separated by 9 minutes and the number of pairs at separations near the minimum of 10 minutes decreases. This correction was taken into account in estimation of longitudinal risk.

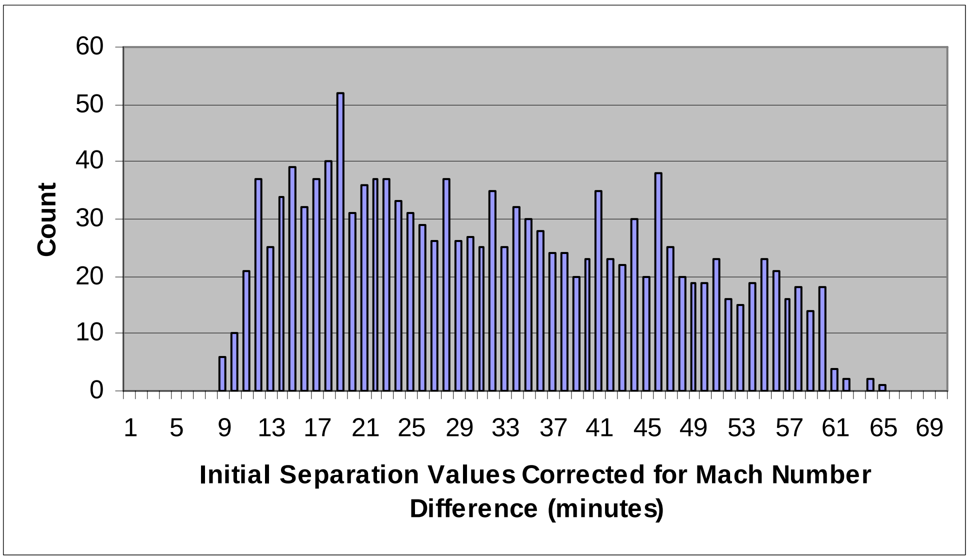

Figure 5. Absolute Frequency of Initial Separation Values Corrected for Mach Number Difference

13.2.9 The form of the distribution in figure 5 suggested that a gamma probability density function might characterize the distribution of initial separations. This distribution is often used to study problems in queuing for service. Since the distribution of initial separations demonstrates the ability of L642 and M771 to respond to demands for service, the gamma distribution is attractive as a means of characterizing the data of figure 5.

13.2.10 Figure 6 presents the data of figure 5 as logarithms of the relative frequency of observed initial separations. The figure likewise suggests that a gamma distribution may fit the data adequately.

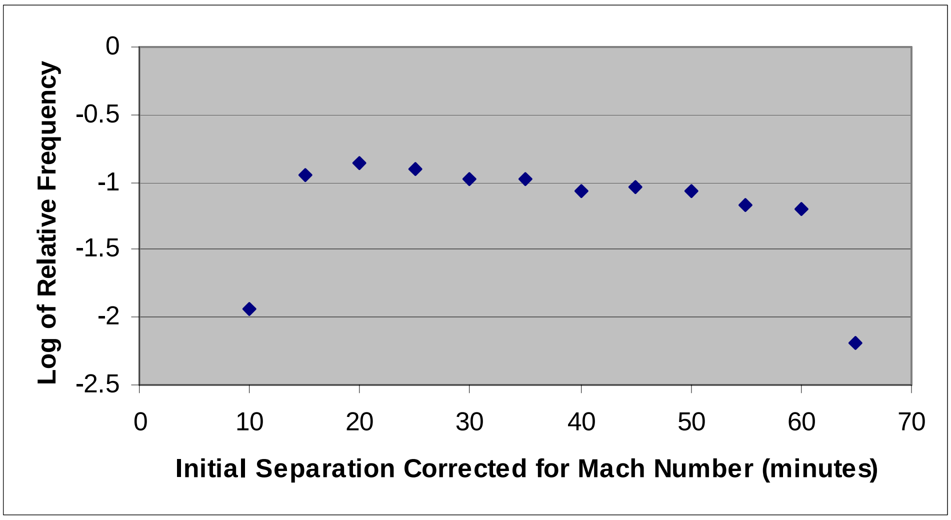

Figure 6. Log of Relative Frequency of Initial Separation Values Corrected for Mach Number

3.13 Estimating the Distribution of Separation Gain or Loss

3.13.1 Figure 7 presents the distribution of separation gain and loss observed for the 1392 aircraft pairs for which initial separations are shown in figure 4. The maximum values of gain and loss were 12 minutes and 12 minutes, respectively. The data of figure 7 need to be treated before use in risk estimation, since there is a clear relationship between separation loss and initial separation.

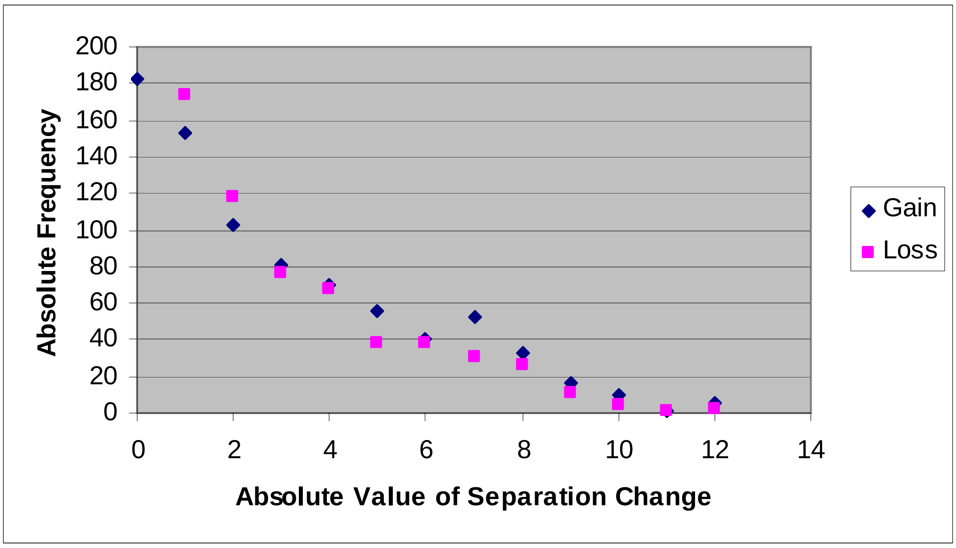

Figure 7. Absolute Frequency Count of Separation Gain or Loss

Separation Gain (+) or Loss (-)	Initial Separation Up to 10 Minutes	Initial Separation Between 11 and 15 Minutes	Initial Separation Between 16 and 20 Minutes	Initial Separation Between 21 and 25 Minutes	Initial Separation Between 26 and 30 Minutes
-12	0	0	0	0	1
-11	0	0	0	0	0
-10	0	0	0	0	2
-9	0	0	1	2	1
-8	0	0	2	3	4
-7	0	0	4	4	6
-6	0	1	3	3	1
-5	0	0	5	2	2
-4	0	4	6	7	11
-3	0	7	12	9	7
-2	0	13	19	14	14
-1	0	18	25	24	17
0	2	32	26	20	15
1	3	24	15	22	13
2	6	12	10	12	13
3	5	9	11	9	6
4	2	10	16	10	5
5	0	8	9	12	3
6	3	6	5	7	5
7	3	6	8	8	2
8	2	5	6	1	3
9	2	2	3	3	0
10	0	3	2	0	0
11	0	0	0	0	1
12	1	0	0	0	0

Table 5. Separation Gain or Loss as Function of Initial Separation

3.13.2 Table 5 shows this relationship. The data of the table are separation gain and loss presented as a function of initial separation. As can be seen, for initial separations up to 10 minutes, there is no separation loss over the course of flight. For initial separations between 11 and 15 minutes, there is some evidence of separation loss. The largest value of loss is 6 minutes, which occurred between a pair separated initially by 15 minutes. One pair with initial separation of 12 minutes lost 4 minutes at the exit fix, producing an 8-minute final separation. Another pair with 13-minutes initial separation also lost 4 minutes, resulting in a 9-minute final separation. As initial separation increases, the data of the table indicate that separation-loss magnitudes increase. None of the separation losses, however, resulted in final separations below 10 minutes.

3.14 Estimation of Longitudinal Risk

3.14.1 Given the values of $P_y(0)$, $P_z(0)$ and other risk model parameters, the value of the summation of $[Q(s) \cdot P(S \geq s)]$ for all values of s needed to meet the TLS is 2.3×10^{-8} for a value of T equal to 30 minutes, the interval between position updates allowing air traffic control to intervene, if necessary, to increase separation.

3.14.2 Implementation of a 50NM longitudinal separation standard will result in the application of a distance-based separation on L642 and M771. All data describing the results of current longitudinal separation practice which were available for the safety assessment are in units of time. As a result, the safety assessment will examine the likelihood that a 6-minute longitudinal separation standard will meet the TLS.

3.14.3 Air traffic controllers focus on maintenance of the applicable separation standards in the airspace. Generally, the term "loss of separation" means that a pair of aircraft is operating below the separation standard being applied.

3.14.4 Collision risk analysis focuses on the loss of all separation, which is equivalent to a collision. Therefore, to meet the TLS, it is necessary to determine whether the summation of $[Q(s) \cdot P(S \geq s)]$ for all values of s is less than 2.3×10^{-8}. From the data in figure 5, initial separation values near the minimum of 10 minutes occur at lower frequencies and increase in frequency up to about 20 minutes. After that point, the frequencies of larger initial separations decrease.

3.14.5 In the safety assessment, this same characteristic of initial separation values is assumed to pertain when 6 minutes is the minimum longitudinal separation standard on 3 July 2008.

3.14.6 From the data of table 5, separation losses for smaller initial separation values were observed to be small relative to the current longitudinal separation standard of 10 minutes. This same characteristic is assumed to apply when the 50NM, or 6-minute, minimum longitudinal separation standard is in effect.

3.14.7 The data of table 5 demonstrate the effectiveness of applying the Mach number technique. As a result, a larger separation loss, 6 minutes or more, between the two aircraft of a pair would require that the at least one of the aircraft exhibit an unexpected change in separation of three minutes or more for which Mach number technique did not account. It would seem that such a significant change would have to be the result of substantial wind gusts affecting only one member of the pair, or some aircraft system failure resulting in a major change in true airspeed since the last position update.

3.14.8 Results from the South China Sea monitoring program are that there was no unexpected change in longitudinal separation of three minutes or more observed for pairs of aircraft during the period 1 January 2007 through 30 April 2008. These results indicate, further, that there was no instance of a significant individual-aircraft longitudinal error – defined as a 3-minute or greater unexpected deviation between a pilot forecast of next waypoint and the actual report at that fix – reported for any of the 60, 300 flights monitored on L642 or M771 during the period.

3.14.9 The fact that there were no individual-aircraft unexpected changes in longitudinal position reported in 60, 300 flights does not mean that the rate at which such errors occur is 0.0. Rather, the conclusion to be drawn from the monitoring data is that the true rate of occurrence of significant individual-aircraft longitudinal errors is so small that none were produced in slightly more than 60,000 operations.

3.14.10 Given the monitoring program results showing that they are rare events, the probability of occurrence of significant individual-aircraft longitudinal errors can be described by a Poisson distribution, where it is assumed that the rate of significant longitudinal errors decreases as the number of flights increase in a way that keeps the product of the two constant. Assuming that each flight is an independent opportunity for a significant individual-aircraft longitudinal error, no occurrence of this event in 60,300 operations is, with 95 percent statistical confidence, consistent with a true rate of occurrence of 8.51×10^{-7} significant longitudinal errors per flight, or less. It is not possible for a pair of aircraft to lose

6 minutes of separation, the equivalent of 50 NM, unless there is an unexpected change in longitudinal position of 3 minutes or more associated with at least one aircraft. As a result, this monitoring-program finding can provide insight into the value of $P(S \geq s)$, the probability that an aircraft pair loses at least as much as longitudinal separation as it has on entering a route.

3.14.11 Given the sparse data on unexpectedly large individual-aircraft longitudinal errors from the monitoring program, it is not possible to propose a probability distribution that characterizes the occurrence of 3-minute or greater individual-aircraft longitudinal errors, that is, the probability of a 3-minute error, 4-minute error, 5-minute error and so on. In attempting to estimate $P(S \geq s)$, it will be assumed that a significant individual-aircraft longitudinal error is equally likely to contribute to an unexpected gain or loss of separation between an aircraft pair. Taking a conservative view, it will be assumed that it is possible to have a significant individual-aircraft longitudinal error as large as 6 minutes, which would require a 100-knot unexpected speed difference from that used by air traffic control to plan separation with other aircraft. Again to be conservative, it will be assumed that 3-minute, 4-minute, 5-minute and 6-minute significant individual-aircraft longitudinal errors are equally likely. As a result:

$$P(\text{3-minute significant individual-aircraft longitudinal error}) = 0.25*8.51 \times 10^{-7}$$
$$= 2.13 \times 10^{-7}$$
$$= P(\text{4-minute error}) = P(\text{5-minute error}) = P(\text{6-minute error})$$

3.14.12 Again, to be conservative, it will also be assumed that the probability of a zero-minute, 1-minute and 2-minute unexpected losses or gains in separation due to significant individual-aircraft longitudinal error will be identical and equal to $(0.2 - 8.51 \times 10^{-7}) \approx 0.2$. In contrast, it will be recalled from the data of table 5 that only 3 of the 1392 pairs examined in the December 2007 TSD evidenced final separations below 10 minutes, with the smallest final separation being 8 minutes.

3.14.13 Finally, it will be assumed that, because of the lack of information to correct adequately the initial separations for Mach number, the frequency of 9-minute separations presented in figure 4 can be added to the 10-minute initial separations count. As a result, when considered to represent the distribution of initial separations for L642 and M771 after 50NM separation is applied, the frequency values of initial separations of 5 minutes or less will all be 0.0.

3.14.14 With these assumptions, 12 minutes is the maximum initial longitudinal separation value which can be lost due to unexpected individual-aircraft longitudinal errors, and would result only when the lead aircraft of a pair loses 6 minutes and the other gains 6 minutes. Because individual-aircraft longitudinal errors are assumed independent between aircraft, the probability that this would happen is the product of the probabilities that each aircraft would have a significant longitudinal error of 6 minutes, or,

$$P(S \geq 12) = P(S = 12) = (2.13 \times 10^{-7}) \bullet (2.13 \times 10^{-7}) = 4.5 \times 10^{-14}$$

This probability is so small that it can be neglected. Likewise, the contribution to summation of $[Q(s) \cdot P(S \geq s)]$ for all values of s made by initial separation values, s, of 11 minutes, 10 minutes and 9 minutes can be disregarded.

3.14.15 As a result, only 8 minutes, 7 minutes and 6 minutes initial separation values require examination in light of unexpected losses or gains in separation due to significant individual-aircraft longitudinal error. Assuming that Aircraft 1 is following Aircraft 2, the combinations of unexpected losses or gains in separation necessary for two aircraft to lose 8 minutes of initial separation are shown in table 6:

Aircraft 1 Unexpected Gain (+) or Loss (-) (minutes)	Aircraft 2 Unexpected Gain (+) or Loss (-) (minutes)	Resulting Separation (minutes)
+6	-2	0
+5	-3	0
+4	-4	0
+3	-5	0
+2	-6	0

Table 6. All Combinations of Unexpected Separation Loss and Gain Resulting in Loss of Exactly 8 Minutes Initial Separation

3.14.16 The value P(S = 8 minutes) is the sum of the products of the probabilities of separation loss and gain in the rows of the table. For example, the contribution to P(S = 8) of the first row is:

$$(2.13 \times 10^{-7}) \bullet (0.2) = 4.26 \times 10^{-8}$$

The contribution of the last row is also 4.26×10^{-8}. The contribution of the products of the probabilities in the other rows is the negligible value 4.5×10^{-14}. Thus, the value of P(S = 8 minutes) is $2 \bullet 4.26 \times 10^{-8}$, or 8.52×10^{-8}.

3.14.17 The value of P(S = 7) can be determined in a similar manner and is $4 \bullet 4.26 \times 10^{-8} = 1.7 \times 10^{-7}$. The value for P(S = 6) is $8 \bullet 4.26 \times 10^{-8} = 3.41 \times 10^{-7}$.

3.14.18 Using the relative frequencies of initial separation values determined from the data shown in figure 5, it is now possible to calculate the quantity summation of [Q(s) · P(S ≥ s)] for all values of s. Table 7 shows the results.

Initial Separation, s (minutes)	Proportion of initial separations, corrected for Mach number, with separation s, Q(s)	P(S ≥ s)	Q(s) • P(S ≥ s)
6	0.011	$(3.41 \times 10^{-7} + 1.7 \times 10^{-7} + 8.52 \times 10^{-8})$	6.85×10^{-9}
7	0.015	$(1.7 \times 10^{-7} + 8.52 \times 10^{-8})$	3.85×10^{-9}
8	0.027	8.52×10^{-8}	2.26×10^{-9}
9 and beyond	0.018	0.0	0.0
Sum Q(s) • P(S ≥ s)			1.30×10^{-8}

Table 7. Computation of the Summation of Q(s) • P(S ≥ s) for All Values of Initial Separation, s

3.14.19 The resulting value for summation of [Q(s) • P(S ≥ s)] for all values of s, 1.30×10^{-8}, is less than the required value of 2.3×10^{-8} required to meet the TLS.

3.15 Conclusions and Recommendations from the Safety Assessment Addressing Introduction of the 50NM Longitudinal Separation Standard on L642 and M771

3.15.1 When the summation value computed in table 7 is substituted into the expression for P_x and used in the model, the resulting value of longitudinal collision risk is 2.8 x 10^{-9} fatal accidents per flight hour, which satisfies the TLS.

3.15.2 In light of the imminent change to the flight level allocation scheme in the South China Sea, decision makers should consider the possibility of collecting a sample of system use similar in content to the TSD. Such a sample would indicate whether assumptions made during conduct of the safety assessment need refinement.

3.15.3 The monitoring program has shown considerable value as source material for the safety assessment. It would be valuable to re-emphasize its importance to all signatories of the monitoring program LOA.

4. Action by the Meeting

4.1 The meeting is invited to

a) Note that the safety assessment supports the implementation of RNP10 (50/50NM) horizontal separation on L642 and M771; and

b) Consider collecting additional traffic movement data after the planned 3 July introduction of the 50NM longitudinal separation.

……………………….

Attachment

Correction to Initial Separation of Aircraft Pairs to Account for Application of Mach Number Technique

Mach number, M, can be computed from true airspeed using the relation

$$V_t = a_0 M \cdot [T_1/T_o]^{1/2} \qquad \text{(A.1)}$$

where:

V_t = true airspeed
a_0 = speed of sound at sea level
T_1 = temperature at the altitude flown
T_o = temperature at sea level

It is well-known that true airspeed is related to groundspeed by:

$$V_g = V_t + V_w$$

where:

V_g = groundspeed
V_w = speed of the wind at the altitude being flown

No information was available concerning either true airspeed or the effect of wind in the airspace during December 2007. The aircraft pairs used in the analysis were, however, chosen to be co- altitude and spaced by no more than 60 minutes. Taking the difference of the groundspeeds of a pair should, therefore, remove much of the effect of wind, leaving the difference in true airspeeds, ΔV_t. Using equation (A.1), this results in:

$$\Delta V_g = a_0 \Delta M \cdot [T_1/T_o]^{1/2} \qquad \text{(A.2)}$$

Since there were no data available describing temperatures at altitude or sea level in South China Sea airspace during December 2007, the temperatures published in the ICAO Standard Atmosphere were used. This introduced some error into the correction process, since temperatures in the ICAO Standard Atmosphere were determined at 45 degrees latitude where are likely to be temperatures cooler than those at flight levels on the RNAV routes.

The initial separation of each of the 1392 aircraft pairs was corrected for estimated difference in Mach number using relation (A.2).

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2. Report of the Seventeenth Meeting of the APANPIRG ATM/AIS/SAR Sub-Group (ATM/AIS/SAR/SG/17), Bangkok, Thailand, 2 – 6 July 2007.

3. "Summary of Discussions for the Special Coordination Meeting Held in Singapore from 25 to 27 September 2007," The Second Meeting of ICAO South-East Asia Required Navigation Performance Implementation Task Force (RNP-SEA/TF/2), Singapore, 4 – 7 March 2008, WP/6.

4. "Preliminary Assessment of the Safety of Implementing 50NM Lateral and Longitudinal Separation Standards on RNAV Routes L642 and M771," Second Meeting of ICAO South-East Asia Required Navigation Performance Implementation Task Force (RNP-SEA/TF/2), Singapore, 4 – 7 March 2008, WP/10.

5. "WPAC/SCS FLAS Comparison Table," Fourth Meeting of the Western Pacific/South China Sea RVSM Scrutiny Working Group (WPAC/SCS RSG/4), Bangkok, 26 – 29 February 2006, WP/6.

6. Report of Thirteenth Meeting of South-East Asia ATS Coordination Group (SEACG/13), Bangkok, 16 – 19 May 2006.

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9. *Procedures for Air Traffic Services Air Traffic Management*, Doc 4444 ATM/501, Fifteenth Edition, International Civil Aviation Organization, Montréal, 2007.

10. "A Summary of Airspace Characteristics Related to the Operational Trial of 30- NM Lateral / 30-NM Longitudinal Separation Standards (30/30) in the Oakland Oceanic Flight Information Region (FIR)," Twenty-Fifth Meeting of the Informal Pacific ATC Coordinating Group (IPACG/25), Tokyo, Japan, 24-27 October 2006, IP/4 Rev. 1.

11. "Revised Letter of Agreement (LOA) for Monitoring of Aircraft Navigation Errors in the South China Sea Area," Eighth Meeting of the Regional Airspace Safety Monitoring Advisory Group (RASMAG/8), Bangkok, Thailand, 10 to 14 December 2007, WP/14.

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14. Annex 11 of the Convention on International Civil Aviation, *Air Traffic Services*, Thirteenth Edition, International Civil Aviation Organization, Montreal, July 2001.

15. "Preliminary Estimate of the Probability of Lateral Overlap, $P_y(0)$, Based on the Percentage of non-GPS-equipped Aircraft in the Pacific Ocean Airspace," Third Meeting of the ICAO Reduced Vertical Separation Minima Implementation Task Force (RVSM/TF3), Honolulu, U.S.A., 10 -13 May 1999, WP/13.

Agenda Item 3.4: CNS/MET

Agenda Item 3: Regional air navigation planning and implementation issues

3.4 CNS/MET matters

3.4.1 The meeting carried out a review of the outcomes of the Twelfth Meeting of the Communications, Navigation and Surveillance/Meteorology Sub-Group (CNS/MET SG/12) held in Bangkok from 21 to 25 July 2008. The meeting noted with appreciation the work done by the Sub-group. The meeting discussed the CNS/MET related issues presented to the meeting and took the following actions on the report of the CNS/MET SG/12.

Aeronautical Fixed Service

Review Report of the Third Meeting of the ATN Implementation Coordination Group

3.4.2 The meeting noted with appreciation the tasks accomplished by the Third ATNICG Meeting which was hosted by Airports Fiji Limited from 5 to 9 May 2008.

3.4.3 The meeting included the requirement of communication support for the amended ATS messaging for Flight Plan in the Subject/Tasks List and adopted the following Decision.

Decision 19/16 - Revision to the Subject/Tasks List of ATNICG

That, the Revised Subject/Tasks List of the ATNICG provided in **Appendix A** to the Report on Agenda Item 3.4 be adopted.

ATN/AMHS Implementation Status

3.4.4 The meeting noted that the ATN implementation status provided on the ICAO Asia/Pacific website http://www.icao.or.th/apac_projects/atn/charts/atn_chart.asp was updated to include significant developments. Some of the major ATN implementation related activities include ATN trials between Singapore and Malaysia, integration of AMHS into NADIN message switch as a sub-application allowing OSI and IP routings, Australia's implementation of AMHS/AFTN/ATN in June 2007 and ATN/AMHS implementation in Beijing, China.

3.4.5 India informed the meeting that in accordance with the regional air navigation plan, India had installed AMHS infrastructure in Mumbai in May 2008. The system will support ICAO ATN and TCP/IP protocols. India is ready to conduct trials with Beijing, Bangkok and Singapore. It is expected to complete this process by December 2008.

System Security

3.4.6 The meeting noted the developments that have taken place in ensuring security for the network and discussed actions that are required to be taken on this matter. The meeting adopted the following Conclusion.

Conclusion 19/17 - Asia/Pacific Aeronautical Telecommunication Network System Security Policy

That, the updated "Asia/Pacific Aeronautical Telecommunication Network System Integrity Policy" provided in **Appendix B** to the Report on Agenda Item 3.4 be adopted as "Asia/Pacific Aeronautical Telecommunication Network System Security Policy".

3.4.7 The meeting was of the opinion that Security is a global issue and hence there should be a global policy on security to maintain uniformity. The meeting agreed that the region should subscribe to the global security structure to the extent possible and noted that the issue will be addressed to the Aeronautical Communication Panel. The meeting also noted that the ATNICG had developed a Checklist on ATN Security. The meeting recognized that a Contingency Plan and Incident Response Plan for the Regions are required to be developed.

Directory Service and AMHS Address Management

3.4.8 The meeting noted that the proposed implementation strategy for ATN Directory Service for Asia/Pacific Region is in two phases, the first phase for the provision of Offline Directory Service and the second phase for the Online Directory Service. The meeting recognized that the availability of AMC Software was essential to ensure effective and efficient management of the AMHS Address. Adoption of the AMC Software in use by Eurocontrol, with modifications to suit the requirements of Asia/Pacific Regions had already been agreed in principle. The meeting therefore adopted the following Conclusion to facilitate early transfer of AMC software and its implementation.

Conclusion 19/18 - ATS Message Management Center (AMC) Software

That, to facilitate implementation and management of ATN in the Asia/Pacific Region, ICAO be urged to facilitate transfer of Eurocontrol AMC Software to Aerothai and to allow Aerothai to modify the Software to suit the requirements of Asia/Pacific Region.

ATS Inter-facility Data Communication (AIDC)

3.4.9 The meeting noted that the ATNICG/3 meeting had discussed the outstanding matters with respect to ATN/AMHS Transition support to AIDC as indicated in Section 3.2 of Part II of the AIDC ICD and agreed to retain them in the Work Programme of ATN Implementation Coordination Group and CNS/MET Sub-Group. The meeting was informed that technical specifications for ATN based AIDC had already been published by ICAO but these provisions might not be practical for implementation at the current stage.

3.4.10 The meeting noted the implementation status of AIDC and the updated planning and implementation information as contained in the updated FASID Table CNS – 1E which was approved in early 2008. Hong Kong China and Philippines proposed some editorial changes for the planned circuit using AMHS for 2009. Japan proposed to add a new requirement for AIDC connection between Fukuoka ATMC and Taibei ACC using AFTN and ICD Version 3.0 with target date for implementation in 2012. The Secretariat informed the meeting that the new requirement needs to be included in the next amendment proposal.

3.4.11 The meeting was of the opinion that introduction of AIDC between ATS facilities would significantly reduce the coordination errors observed in controller to controller verbal communication across FIR boundaries. The meeting reiterated that States should work towards implementation of compatible AIDC capabilities between neighboring ATS facilities as soon as possible in accordance with the regional air navigation plan and the available ICAO guidance material on AIDC including the Asia/Pacific AIDC ICD. In view of the foregoing, the meeting adopted the following Conclusion formulated by the CNS/MET Sub-group.

Conclusion 19/19 - Implementation of AIDC in Asia and Pacific Regions

That, States be urged to expedite implementation of AIDC between neighboring ATS facilities in accordance with the Regional Air Navigation Plan and the Asia/Pacific AIDC ICD.

Implementation of ATN over IPS

3.4.12 The meeting was informed about the availability of draft Manual for the ATN using IPS Standards (Doc 9896). The manual contains minimum communication protocols and services that will facilitate implementation of ATN based on the provision of Internet Protocol Suite (IPS) utilizing Internet Protocol Version 6 (IPv6). The meeting noted that the implementation of IPv4 in ground-ground sub-network is considered to be a regional or local issue. It was envisaged that AFTN is likely to continue in the foreseeable future, though AMHS implementation will continue.

3.4.13 Discussing the outcome of the inclusion of IPS SARPs in Annex 10, Volume 3 in March 2008, the meeting agreed to adopt ATN over IPS in addition to ATN over OSI for the implementation of the BBIS of ATN in the Asia/Pacific Regions.

3.4.14 The meeting noted that a regional survey was carried out to assess the investment already made/committed by the States in the implementation of ATN/OSI. Survey results indicated that almost all the States had made/committed investment towards the implementation of OSI based ATN Router and that the MTAs are dual stack having provision to support both OSI and IP sub-networks. Noting the preparedness of the States to implement the ATN/OSI and ATN/IPS, it was recommended that implementation be completed by 2011 for all the BBIS MTAs to support both ATN/OSI and ATN/IPS. Accordingly, the meeting adopted the following Conclusion.

Conclusion 19/20 - Adoption of ATN over IPS in addition to ATN over OSI

That, considering the inclusion of ATN over IPS SARPs in ICAO Annex 10, Volume 3 and to support global harmonization of ATN implementations, States hosting BBIS be urged to implement ATN over IPS in addition to ATN over OSI and complete this implementation of Dual Stack ATN (ATN/OSI and ATN/IPS) by 2011.

3.4.14.1 The meeting recommended that the following implementation strategy for ATN be considered by States:

1) All States having Backbone Boundary Intermediate Systems (BBIS) in the Asia/Pacific Region should continue to implement ATN/OSI as per the current regional plan (FASID Tables CNS-1B and CNS-1C);

2) For States with Boundary Intermediate System (BIS), deployment of IPS based AMHS and/or inter State ATN circuits may be considered depending on the impact on the regional ATN network connectivity and redundancy, and the agreement with the adjacent States;

3) For AFS interface to adjacent regions, communication with States with only one connection to the APAC region can use IPS on a bilateral basis. States in adjacent regions that have multiple connections to the APAC region are recommended to continue to support ATN/OSI;

4) The region should construct an effective regional ATN ground network that supports both OSI and IPS based services. This could be achieved by upgrading

inter-State circuits to support IPS as well as OSI communication and introducing IPS routers alongside BIS Routers;

5) Any subsequent new services or AMHS Message Transfer Agent (MTA) should be able to support dual stack to assist future transition to "ICAO compliant" IPS network technology; and

6) The ATNICG task list shall be revised to include development of IPS implementation documentation.

3.4.15 In response to a query regarding the ultimate system envisaged, the meeting was assured that dual stack MTA was only a transition plan. Hong Kong, China was of the opinion that ATNICG should develop long and medium term plans for transitioning to ATN based on IPS.

Asia/Pacific Regional AMHS MTA Routing Policy

3.4.16 In light of the operational difficulty of performing connectivity tests between a new MTA and the other MTAs prior to commissioning; permitting the routing configuration of the new MTA to correspond to the AFTN routing table before commissioning may mitigate the problem. Accordingly, the meeting adopted following Conclusion.

Conclusion 19/21 - Amendment to Asia/Pacific Regional AMHS MTA Routing Policy

That, the revised Asia/Pacific AMHS MTA Routing Policy placed at **Appendix C** to the Report on Agenda Item 3.4 be adopted.

Amendment to FASID Tables CNS-1B and CNS-1C

3.4.17 In view of the developments that have taken place lately in the implementation of ATN in the Region, it was felt that the FASID Tables for ATN Router and AMHS Routing Plan provided in ANP (Doc 9673) Vol. II needed updating. FASID Tables 1B and 1C were hence reviewed and changes proposed by the States were incorporated. Accordingly, the meeting adopted the following Conclusion.

Conclusion 19/22- Amendment to FASID Tables CNS – 1B and CNS – 1C

That, FASID Tables CNS – 1B ATN Router Plan and Table CNS – 1C AMHS Routing Plan, be amended by replacing them with the Tables provided in **Appendices D and E** to the Report on Agenda Item 3.4 in accordance with the established procedure.

Asia/Pacific AMHS Manual

3.4.18 An Asia/Pacific AMHS Manual was previously developed to provide guidance to assist States in defining the functional tests to ensure interoperability between AMHSs. These tests are recommended to be conducted after the successful completion of AMHS conformance testing, through which the compliance of all systems with the AMHS SARPs are confirmed. In order to include two more annexes to this document '*Inter-operability trials of States'/ANSPs' AMHS systems subsequent to their implementation*' and '*Pre-operational testing prior to the operational commencement of their AMHS services*' the meeting adopted the following Conclusion.

Conclusion 19/23 - Amendment to Asia/Pacific AMHS Manual

That, Annex E and Annex F provided in **Appendix F** to the Report on Agenda Item 3.4 be adopted as annexes to the Guidance Document for AMHS Conformance Testing (AMHS Manual)

Aeronautical Mobile Service (AMS)

ICAO Web-based aeronautical radio frequency planning

3.4.19 The meeting noted the proposed frequency planning tool which is being developed to be made available to all ICAO Regional Offices to assist States with aeronautical frequency assignment. As part of this effort, an amendment will be needed to the designated operational coverage (DOC) area and separation distances as specified for VHF communication by the ASIA/PAC RAN meeting in 1993. The meeting noted that the proposed DOC is also to be used for all ICAO Regional Offices based on the provisions contained in Annex 10. The meeting noted the following link as an example of a potential graphical interface for the tool http://192.206.28.81/worldops/default.aspx.

3.4.20 The Regional Office will continue to be the coordination point for frequency assignments and the contact point for the development effort. In addition, 25 kHz spacing in the aeronautical VHF communication bands will be used in the tool for the frequency assignments. Regarding the potential use of aeronautical communication bands by defense authorities, the meeting was of the view that all VHF frequency assignments should be considered as part of the planning assignment and thus should be coordinated. The meeting supported this effort. However, before any conclusion could be reached the tool would need to be tested and evaluated. An evaluation version of the tool is planned to be made available by the end of 2008.

Satellite Data Communications Performance

3.4.21 The meeting noted that the United States presented to CNS/MET SG/12 meeting a paper on satellite data communication performance and the work of the Inmarsat instigated FANS Satcom Improvement Team (FANS SIT) to raise awareness on the important global issues affecting the availability of satellite data link services. In response to continuing stakeholder concerns about Satcom data link performance, FANS SIT participants and stakeholders are currently assessing viable short, medium and long term changes to the system to improve both FANS and airline operations communications (AOC) SATCOM data link network performance.

3.4.22 In response to a request made by the CNS/MET SG/12 meeting on the subject, the Secretariat presented a paper on Evolving Satellite Communication Service Provision and Performance. The meeting was informed about the current Inmarsat Satellite Network serving the region and the enhancements to networks which have been taken place recently including launching 3 satellites of their fourth generation (I4) network. The I4 satellites will be connected through separate GES, owned and operated by Inmarsat. The meeting also noted that JCAB operated MTSAT with two geo-stationary satellites and four Ground Earth Stations and was providing a highly reliable service with 100% availability since its commencement of operation. MTSAT is interoperable with the Inmarsat system. In addition, Iridium is another new provider for satellite data link service for air ground communication.

3.4.23 The paper from the Secretariat concluded that usage of two or more such autonomous satellite networks would provide much better availability as compared to using a single network. States and international organization were encouraged to consider using the redundant data link communication networks available rather than relying on the overall availability of a single network.

3.4.24 IATA provided an information paper on the same subject. The paper highlighted the issue and expressed concern about the capabilities of the satellite data communication systems to support current and future operational requirements. The paper broadly outlined the scope of the operational impact resulting from degradation of the associated satellite data communications performance. IATA stated that they do not agree with a proposed solution that operators should pay for multiple networks. The airlines wish to explore what the service provider should do with the legacy systems as alternative solutions would cost more.

3.4.25 The meeting noted the existing technical and funding issues associated with satellite data link service provision and the consequential operational impact due to the rapid growth of civil aviation. The meeting agreed that the operational problem needs solution and the satellite communication issue should be urgently addressed. In view of the foregoing, the meeting adopted the following Conclusion.

Conclusion 19/24 - Satellite Communications Service Performance

That,

a) States and International Organizations be requested to liaise with satellite service providers to establish a mechanism to maintain and modernize the satellite communication infrastructure; and

b) ICAO be invited to organize a meeting by the end 2008 for stakeholders to review the performance and provision of satellite data link communications in the Asia/Pacific Region and find a solution.

Data-link Flight Information Service (DFIS) Seminar

3.4.26 The meeting was informed about a Special Implementation Project (SIP) approved by ICAO for conducting a ‘Seminar on the Implementation of Data-Link Flight Information Service (DFIS) in the Asia and Pacific Regions’. The seminar will be held in the first week of November 2008 and will be conducted jointly with SITA. States which have already implemented DFIS are invited to share their experiences with others. Republic of Korea informed meeting that they will nominate an expert to address at the Seminar. The meeting was informed that confirmation to nominate experts had also been received from China and Singapore. Hong Kong China informed the meeting that D-ATIS has been implemented at Hong Kong International Airport since 2001 and updated recently with two way data links. Hong Kong China agreed to share their experience by nominating their expert for the Seminar.

Navigation Systems

Regional Performance Based Navigation (PBN) Implementation Plan

3.4.27 The meeting reviewed the results of the work accomplished by the PBNTF over the course of three meetings. The work of the Task Force that was accomplished prior to the meetings of the RASMAG/9 and ATM/AIS/SAR/SG/18 was coordinated with those bodies and input was received from the RASMAG for the regional PBN Implementation Plan. The primary task of the PBNTF was to develop a PBN Implementation Plan for the Asia/Pacific Region. That task was completed at the third meeting of the PBNTF. The Twelfth meeting of CNS/MET Sub-group reviewed the plan and thanked the Task Force for its hard work. The meeting noted that since States would be required to develop their State PBN implementation plans by APANPIRG/20 in 2009, the Regional Plan should be made available for use by States without delay. The Regional PBN

Implementation Plan could be revised in the future as necessary to address changes in the aviation environment.

3.4.28 Australia highlighted that PBN implementation should be given a high priority and primacy in the Asia and Pacific Region and indicated that in order to meet the requirement of Assembly Resolution; the Regional PBN Implementation Plan should be adopted by APANPIRG and published for use by the States.

3.4.29 Singapore and Hong Kong China also supported comments made by Australia and emphasized the importance of implementation of PBN in the Region. Hong Kong, China also highlighted the need for ICAO to expedite the provision of relevant guidance material with regard to the Aircraft Operational Approval and Certification to facilitate PBN Implementation in the region.

3.4.30 However, recognizing that the final version of the regional PBN plan had not been coordinated with ATM/AIS/SAR Sub-group of APANPIRG and RASMAG, the meeting considered it more appropriate to adopt the plan as an interim Edition. Accordingly, the meeting adopted the following Conclusion and urged the States to review the plan and provide feedback to ICAO Regional Office and use it as a basis for developing their national PBN Implementation Plans.

Conclusion 19/25 – ASIA/PAC PBN Implementation Plan

That, the Asia/Pacific PBN Implementation Plan as provided in **Appendix G** to the Report on Agenda Item 3.4 be adopted and published as the interim edition based on which, States be urged to developed their national PBN implementation plan and provide feedback to the ICAO Regional Office.

3.4.31 India provided an update on their PBN Implementation plan, informing the meeting that RNAV1 SIDS and STARS, based on GNSS or DME/DME/IRU have been implemented at Delhi, Mumbai and Ahmadabad Airports with effect from 28 August 2008. These procedures are expected to provide structured arrival and departure routes in the terminal phase of flight so as to achieve consistent spacing on the final and thus reducing delays. Similar procedures for other airports are under development in a phased manner.

Sharing DME Infrastructure

3.4.32 Singapore highlighted that it would be some time before most airframes in the Asia/Pacific region were equipped with sufficient GNSS sensors to take full advantage of PBN based procedures in the terminal areas (TMAs). Aircraft equipage would likely occur by operators updating to new aircraft over a period of time rather than undertaking retro-fit programmes. However, a number of fleets were already equipped with DME/DME RNAV capabilities that would enable participation in PBN procedures in TMAs if such procedures were promulgated by States.

3.4.33 Noting that South East Asia was a relatively DME rich environment, Singapore considered that the use of a neighboring States DME as a component of a procedure published by another State may enable a faster transition to PBN in some locations. The meeting supported further investigation of this concept and encouraged States to pursue the matter and adopted the following Conclusion.

Conclusion 19/26 - Agreement for sharing DME Infrastructure

In the interest of efficiency, States with DME coverage extending beyond their FIRs be requested to consider allowing neighboring States to develop PBN procedures utilizing these DMEs.

3.4.34 With regard to implementation of PBN, the meeting was requested to consider the following three PBN Performance Objectives and associated Performance Framework Forms (PFFs) as provided in the **Appendix H** to report on Agenda Item 3.4.

a) Optimization of the ATS route structure in en-route airspace;
b) Optimization of the ATS route structure in terminal airspace; and
c) Implementation of vertically guided RNP approaches

3.4.35 Considering that these objectives need to be further addressed, the meeting agreed to refer the above three PBN Performance Objectives and associated PFFs to the PBN Task Force for its review and inclusion in the regional planning document.

Flight Procedure Design Office

3.4.36 In response to critical deficiencies in procedure design capability in the region identified by the PBNTF, support was solicited for the establishment of an ICAO Asia-Pacific Flight Procedure Design Office (FPO) by mid-2009 to assist States in the Asia and Pacific Regions to enhance the quality of their instrument flight procedures and meet the PBN implementation goals of ICAO Assembly Resolution A36-23. This proposal arose as a result of the recognition that if issues regarding shortfalls in procedure design capability were not addressed, this would become a potential "show-stopper" in meeting the above PBN implementation goals. The concept of operation, anticipated funding sources and requirements, staffing assumptions and goals for the FPO were discussed. The objective of the FPO would be to foster implementation of flight procedures, developed with the appropriate quality systems, especially PBN and vertically guided instrument approach procedures.

3.4.37 The meeting noted that the PBN Task Force had strongly supported the concept of FPO and requested the ICAO Regional Office to send a State Letter, inviting proposals from States interested in hosting and/or contributing to the establishment and operation of the FPO. Accordingly, a State Letter was issued by the ICAO Asia Pacific Office on 2 May 2008 inviting States to submit proposals for hosting the ICAO Flight Procedure Office including financial sponsorship and secondment of experts by 15 June 2008.

3.4.38 The responses to the State letter were very positive. 90% of the 13 States that responded expressed that they would use some of the services of the FPO if established. The strong positive response concerning all proposed services indicated that there is definitely a need for the services that such an FPO would offer. Four States indicated an interest in hosting the FPO. The decision on which State will host the FPO will be based on the merits of the individual proposals and will be made in coordination with the ICAO Asia and Pacific Office and ICAO Headquarters. This decision will be made as soon as possible, in order to proceed with planning for initial operating capability in the 2nd quarter of 2009.

3.4.39 The meeting reviewed and supported the FPO proposal and the basic concept and requested ICAO to continue to develop the proposal taking into account State responses with emphasis on the role, responsibility and financial mechanisms and adopted the following Conclusion.

Conclusion 19/27 – Flight Procedure Design Office

That, ICAO continue to develop the concept of a Flight Procedure Design Office taking into account proposals submitted by the States with emphasis on the role, responsibility and financial mechanisms.

3.4.40 The meeting was informed that the ICAO Headquarters was reviewing the proposals and a decision will be made soon on the establishment of FPO in the Region. The meeting also considered that the publication of a Regional Catalogue of Procedure Design Services providers styled on the Regional Catalogue of Flight Inspection Organisations would be beneficial.

3.4.41 In discussions on APV implementation (Vertical Guidance versus Vertical Advisories) the PBNTF noted the significant level of industry confusion between the provision of vertical advisories and that of true vertical guidance. Many aircraft were capable of providing to the pilot a form of "VNAV", that is a FMS-generated advisory of vertical flight path and often this could be provided while the aircraft was conducting a non-precision RNAV (GNSS) approach – i.e. one with lateral design guidance only. When using this form of VNAV 'advisory' it was essential that the pilot monitored the step down altitude limits on the approach plate. An examination of incident reports showed that there were an increasing number of reports of pilots not abiding with these vertical restrictions as the output from the VNAV path did not take these step downs into account. In a true APV/Baro-VNAV (RNP APCH with Baro-VNAV) approach, the design of the approach will ensure that the VNAV guidance when correctly flown would provide vertical protection on the approach. The PBNTF recommended that the States provide education to operators, pilots and ATC on the differences between VNAV guidance on a true Baro-VNAV approach and vertical 'advisory' that may be available when flying a lateral guidance only RNP APCH (RNAV (GNSS)) approach. In view of the foregoing, the meeting adopted the following Conclusion to address this important safety issue.

Conclusion 19/28 – Constant Descent Final Approach (CDFA) and Baro-VNAV

That, in order to reduce the likelihood of CFIT accidents, States be urged to

a) review non-precision approach procedures with LNAV lines of minima to include CDFA profile; and

b) include the Baro-VNAV design in the current and new RNP APCH approaches and consequent LNAV/VNAV approach minima.

3.4.42 The meeting noted that separation standards for RNAV 5, RNAV 2, RNAV 1 and Basic-RNP 1 navigation specifications had still not been established by the ICAO Separation and Airspace Safety Panel (SASP). As these separation standards are essential for the States to implement PBN in the terminal and continental en-route areas of operation, the meeting requested ICAO to expedite development and publication of these standards and agreed to the following Conclusion.

Conclusion 19/29 – Separation Standards for PBN

That, ICAO be invited to expedite development and publication of separation standards for use in the implementation of the PBN RNAV 5, RNAV 2, RNAV 1 and Basic-RNP 1 navigation specifications.

3.4.43 The PBNTF conducted an extensive review of the PBN Manual and identified a number of significant shortcomings that will adversely impact the implementation of PBN. A number of recommendations for revision to the Manual will be presented to the RNP SORSG by the New Zealand member at its next meeting in November 2008. The PBNTF also developed a model guidance for RNAV 5 operational approval, which is in the draft form pending final technical review of the document.

3.4.44 Given that the PBNTF had completed its primary task, to develop a regional PBN implementation plan, it was felt that while the PBNTF should continue, the focus of the PBNTF should now shift to implementation of that regional plan. The PBNTF reviewed its Terms of Reference (TOR) and proposed amendments to improve the viability of the TOR in terms of PBN implementation. In reviewing the TOR against the provisions of Assembly Resolution A36-23, the meeting also noted that clear references to implementation of approach procedures with vertical guidance (APV/Baro-VNAV and/or augmented GNSS) were not explicitly reflected in the TOR. Although recognizing that APV was effectively inherent in RNP approaches, the PBNTF proposed to expand the TOR to include a clarifying reference to approach procedures with vertical guidance.

3.4.45 The meeting reviewed and agreed to the revised terms of reference proposed by PBNTF and adopted the following Decision.

Decision 19/30 – Revision to the Terms of Reference of the PBN Task Force

That, the Revised Terms of Reference of the PBN Task Force provided in **Appendix I** to the Report on Agenda Item 3.4 be adopted.

3.4.46 Two additional meetings of the PBNTF were tentatively scheduled, 4-6 March 2009 in conjunction with the PBN Seminar being held in Osaka, Japan and the week of 13 July 2009 in Bangkok. The meeting encouraged States to submit their State PBN Implementation Plans to the PBNTF for review by the fifth meeting of the PBNTF in July 2009.

Review of strategies for the Provision of Navigation Service and GNSS Navigation Capability

3.4.47 The PBNTF had also considered the Strategy for the Provision of Navigation Service and the Strategy for the Implementation of GNSS Navigation Capability in the Asia/Pacific Region and had recommended changes to the documents and suggested consolidating the separate strategies to a single navigation strategy.

3.4.48 The meeting noted that CNS/MET SG/12 compared the individual strategies in the navigation field and considered it appropriate to consolidate the two into a single document. The action to review and consolidate the strategies was undertaken by an ad hoc working group. The consolidated strategy incorporates the PBN concept as the prime focus and also accounts for the development and deployment of GNSS. The meeting agreed to the updated strategy and adopted the following Conclusion.

Conclusion 19/31 - Revision of the Strategy for the Provision of Navigation Services in the Asia/Pacific Region

That, the revised Strategy for the provision of navigation services provided in **Appendix J** to the Report on Agenda Item 3.4 be adopted and provided to States.

ILS DME

3.4.49 The meeting was informed that some distance measuring equipment (DME) associated with instrument landing systems (ILS) have been installed with the beacon delay offset to achieve a zero range indication at the ILS touch down point rather than at the origin of the DME antenna. This configuration of installation follows guidance material in Annex 10. These DMEs may also use directional pattern antennas so that an Omni-directional radiation pattern is not achieved. DMEs in this configuration are unsuitable for use in DME-DME navigation and should be excluded from RNAV procedures.

3.4.50 Additional information was provide that the Navigation Systems Panel (NSP) had been asked to review the navigation infrastructure to support PBN and the Panel has recommended that DMEs associated with ILS should be generally excluded from DME-DME RNAV procedures. The exclusion of unsuitable zero-range offset DMEs in the RNAV procedure is the responsibility of the State concerned. The unsuitability of zero-range offset DMEs should be notified in the State's AIP. IATA stated that crews cannot deselect such aids in flight due operational and safety implications.

Flight Inspection

3.4.51 Inspection, testing and validation were identified as important safety and quality processes in the provision of navigation services. Attention was drawn to Standards (2.7.1 Annex 10 Volume 1), Assembly Resolutions (A33-14, A36-23) and manuals which address ground and in-flight testing and validation of navigation aids and procedures. Relevant manuals are the *Performance Based Navigation Manual* (Doc 9613) that defines the requirements of flight inspection and flight validation for PBN procedures and the *Manual on Testing Radio Navigation Aids* (Doc 8071, Volumes I, II and III) which provide general guidance on the extent of testing and inspection normally required to be carried out to ensure that the facilities meet the SARPs provided in ICAO Annex 10.

3.4.52 The Asia/Pacific Region has in the past conducted five workshops on the testing of radio navigation aids with the most recent being in 1998.

3.4.53 The introduction of performance based navigation, recent amendments to the Manual on Testing of Radio Navigation Aids, and the introduction of GNSS and augmentation systems has extended the breadth of inspection and validation tasks. The meeting agreed that a seminar on testing of radio navigation (both ground and satellite based) and surveillance systems, would facilitate the exchange of information and sharing of experience gained by the States. The seminar would also provide information to the participants regarding various technological options available for meeting various flight inspection/validation requirements. Accordingly, the following Conclusion was adopted.

Conclusion 19/32 – Testing of Navigation and Surveillance facilities Seminar

That, ICAO be invited to organize a seminar on 'Testing of Navigation and Surveillance facilities' in 2009 to address issues related to ground and flight inspection/validation.

APEC GIT/12

3.4.54 The Asia Pacific Economic Cooperation (APEC) Transportation Working Group held the Global Navigation Satellite System (GNSS) Technological Innovation Summit and Twelfth meeting of GNSS Implementation Team (GIT/12), hosted by Aeronautical Radio of Thailand, from 26 to 30 May 2008 in Bangkok. The meeting was informed that the summit provided an excellent forum for all Economies to obtain updated information on GNSS technology and its applications in all transport modes, namely road, rail, maritime and aviation.

3.4.55 The twelfth meeting of the APEC GNSS Implementation Team addressed GNSS related activities of APEC Member Economies, GIT initiatives, progress of GNSS Test bed Project and other administrative matters. The meeting was informed that the scope of APEC GNSS Test bed project has been completed.

Update GBAS

3.4.56 The meeting noted updates provided by United States on the Local Area Augmentation System (LAAS) an implementation of Ground Based Augmentation System (GBAS). The FAA is working with Honeywell International to complete the system design approval (SDA) of their Honeywell SLS-4000 against a non-Federal specification (FAA-E-AJW44-2937A). GBAS facility and service approval are expected to be completed at Memphis in early 2009 and this facility is likely to be used for validation and developmental activities. The United States currently considers that GBAS is the only known feasible service that will support GNSS based Category-III approach and landings and seeks to gain experience to get Category III approval for LAAS. The FAA and Boeing have cooperated to develop a feasible set of ground facility and aircraft requirements as an initial proposal.

3.4.57 FAA is also cooperating with Australia, Germany and Spain the other States planning implementation of GBAS. An FAA developed GBAS prototype continues to be operated in Brazil to evaluate the effect of the southern hemisphere ionosphere effects on GBAS and to perform additional operational flight tests.

3.4.58 The meeting also noted that Australia would continue to support GBAS operations with the upgrade of the Sydney trial GBAS to the Honeywell SLS-4000 with the intention of achieving certification in early 2009. Parallel activities to provide Cat I GBAS are also currently conducted in Germany and Spain. It was also noted that the first A380 certified for GBAS operations will enter service in October 2008 and will be using the Sydney GBAS.

Positioning, Navigation and Timing (PNT) Policy

3.4.59 The United States provided an overview of its Space-Based positioning, navigation and timing (PNT) policy and its implementation. This policy is applicable to all United States providers and users of space-based PNT, not only aviation. The December 2004 PNT policy continues United States policy of no direct user fees for GPS services and an open and public signal structure for all civil services. This promotes equal access for user equipment manufacturers, applications development and value added services and facilitates open market competition. The policy is managed by a National Space Based PNT Executive Committee co-chaired by the Deputy Secretaries of the U.S. Departments of Defense and Transportation. It was noted that the GPS International Working Group is a contributing group that provides advice from the wider international community.

Multi-functional Transport Satellite (MTSAT)

3.4.60 The meeting noted the updates provided from Japan on the operational status of the Multi-functional Transport Satellite (MTSAT) which provides aeronautical mobile satellite service (AMSS) and Satellite-based Augmentation System (MSAS). The MTSAT AMSS was stated as being highly reliable. If a GES or a satellite fails, a switchover from failed-one to normally-functioning one is executed. Every switchover is executed without re-logon process since all the GESs share the information of logged-on aircraft. The switchover is initiated in a matter of seconds. There is no interruption to the data link communication. MTSAT AMSS availability has been 100% per month since the commencement of operation of the two satellites and four GESs configuration.

3.4.61 MSAS is a Satellite-based Augmentation System (SBAS) defined in the ICAO SARPs and has interoperability with other SBASs, e.g. WAAS, EGNOS and GAGAN. MSAS is fully compliant with the ICAO standards, and provides significant performance improvement to aircraft in the flight phase of en-route through non-precision approach. Aircraft equipped with MSAS receiver can fly in Fukuoka FIR without using other ground-based navigation aids. MSAS had demonstrated the predetermined performance in terms of accuracy, availability, integrity and continuity before it was commissioned as air navigation system in September 2007. MSAS has been showing very stable performance since its commissioning. The horizontal accuracy is less than 1 meter in most parts of Japan. The ionospheric disturbance is still a challenging issue because of the activity of ionosphere in the region. Studies on the new algorithm to deduce ionospheric error has been conducted, and based on the results, an improvement plan for MSAS is under consideration.

Surveillance Systems

Review Report of the Seventh Meeting of ADS-B Study and Implementation Task Force

3.4.62 The meeting noted the outcome of the Seventh Meeting of ADS-B Study and Implementation Task Force. An ADS-B Seminar and the Seventh Meeting of Automatic Dependent Surveillance – Broadcast (ADS-B) Study and Implementation Task Force (ADS-B SITF/7), both hosted by ATMB China, were held in Chengdu, China from 7 to 11 April 2008.

3.4.63 The objective of the ADS-B Seminar was to provide information to the participants on ADS-B planning and implementation. The Seminar covered a list of topics on the ADS-B implementation and was well received by the participants.

3.4.64 In accordance with the subject/tasks list adopted by APANPIRG/18, the ADS-B SITF/7 had completed the following tasks.

- The Guidance Material on Reporting Probability of ADS-B update;
- Guidance Material on Reporting ADS-B Avionics fitment;
- The Guidance Material on Security issues associated with ADS-B;
- The Guidance Material on the performance criteria for multi-sensor fusion;
- The Guidelines for the development of implementation plan by States; and
- A sample Agreement for ADS-B Data Sharing.

3.4.65 The meeting noted that the ADS-B Study and Implantation Task Force had proposed replacement of “ADS” reference in PANS ATM Doc 4444, Appendix 2 Flight Planning and Surveillance Equipment in the Item 10 with ‘ADS-C”. The proposal was forwarded to the ICAO headquarters for further consideration.

Using ADS-B surveillance service in the North Asia area

3.4.66. A proposal from IATA for the installation of minimum 8 ADS-B ground stations and significant data communication infrastructure to improve surveillance and ATM service covering three major ATS routes in the North Asia area was noted by the meeting.

Examine the feasibility of using ADS-B derived data for height monitoring

3.4.67. The ADS-B SITF/7 meeting reviewed the analysis of the alternative solution of using ADS-B for height monitoring for RVSM operation. The meeting confirmed that ADS-B reports both Mode C barometric altitude and GNSS Geometric height and thus it is a suitable candidate for providing data for RVSM height monitoring. However, a number of limitations on the quality and accuracy of the available data exist. The meeting also expressed concerns regarding the limited resources and expertise on the subject of RVSM within the group. Some experts from Industry indicated that they would further investigate as to how ADS-B derived data could be processed and used for height monitoring. The meeting noted the result of the initial study as shown in **Appendix**

K to the Report on Agenda Item 3.4. The issue was further discussed by the CNS/MET Sub group meeting and the need for further study by technical experts in the field was noted.

Update of ICAO Panels on ADS-B Related issues

3.4.68. The meeting noted that the amendments to PANS-ATM including ADS-B based separation became applicable on 22 November 2007. The Aeronautical Surveillance Panel (ASP) has developed SARPs and supporting technical specifications for a new version of extended squitter messages (named as Version 1) in support of ADS-B, which has also become applicable on 22 November 2007 as part of Amendment 82 to Annex 10. Technical details and Mode S/extended squitter register definitions that were shown in an Appendix of Annex 10, Volume III, have been relocated to a new technical manual (Doc 9871 - Technical Provisions for Mode S Services and Extended Squitter).

3.4.69. The meeting agreed with the Subject/Tasks List updated by the ADS-B SITF and adopted the following Decision.

Decision 19/33 - Subject/Tasks List of ADS-B Study and Implementation Task Force

That, the Subject/Tasks List for ADS-B Study and Implementation Task Force provided in **Appendix L** to the Report on Agenda Item 3.4 be adopted.

Guidance Materials for Implementation of ADS-B

3.4.70. The meeting reviewed several guidance materials for implementation of ADS-B in the Region developed by the ADS-B Study and Implementation Task Force and adopted the following Conclusion:

Conclusion 19/34 – Guidance Materials on Implementation of ADS-B

That, the following Guidance Materials on the implementation of ADS-B Out Services be adopted for use by States in the Asia and Pacific Regions:

- Reporting Probability of ADS-B update as shown in **Appendix M;**
- Reporting ADS-B Avionics fitment as shown in **Appendix N**;
- the performance criteria for multi-sensor fusion as shown in the **Appendix O**.

Advisory Material on ADS-B Security

3.4.71. The meeting noted that the ADS-B Study and Implementation Task Force discussed and agreed that the security threats had to be kept in perspective and that today’s systems like VHF communication, CPDLC/ADS-C and Navaids are also subject to similar threats. In addition aviation security and safety benefits from ADS-B had to be weighed against risks. Suitable mitigators were required against the risks depending on the likelihood and consequence of the identified risks.

3.4.72. The meeting noted that legislation and enforcement of legislation was an important part of reducing risk exercises for all these technologies and that CNS/MET SG/12 endorsed the advisory material on security issues associated with ADS-B as shown in the *Appendix C2* to the Report of ADS-B SITF/7 and recommended to publish it in the restricted page on the ICAO APAC Website. A delegate from USA at CNS/MET SG/12 Meeting identified some shortcomings in the material and agreed to provide written comments to the Secretariat for further consideration by the ADS-B Study and Implementation Task Force at its next meeting.

Guidelines for the development of Implementation Plan

3.4.73. Considering that the guidelines developed by the South East Asia (SEA) ADS-B working group would be useful for other States in developing similar sub-regional or national implementation plans, the meeting adopted the following Conclusion.

Conclusion 19/35- Guidelines for the development of ADS-B Implementation Plan

That, States be advised to use the following guidelines for the development of ADS-B implementation plan.

a) minimize capital and operating costs of ADS-B data facilities;

b) give priority to provide coverage over major traffic flows;

c) provide ADS-B coverage in areas within 150 NM from FIR boundaries;

d) suitable sites with power, shelter, access routes and data communication links shall be preferred; and

e) overlapping of ADS-B coverage is preferred.

Sample Agreement for ADS-B Data Sharing

3.4.74. The meeting reviewed and endorsed the sample agreement for ADS-B Data Sharing and Cost Apportionment developed by the SEA ADS-B working group and comments on the same by the ADS-B SITF. Accordingly, the meeting adopted the following Conclusion.

Conclusion 19/36 – Sample Agreement for ADS-B Data Sharing

That, the sample Agreement for ADS-B Data Sharing and the Cost Apportionment framework provided in the **Appendices P and Q** respectively to the Report on Agenda Item 3.4 be adopted as the regional guidance material.

Requirements for ADS-B Out Avionics

3.4.75. The meeting noted that at CNS/MET SG/12 meeting, IATA proposed a draft Conclusion regarding ADS-B OUT Avionics Equipage Requirements to supersede APANPIRG Conclusion 18/35. It was recalled that APANPIRG/18 had identified the need and benefits of a mandate for aircraft to be equipped with ADS-B OUT. There was a need for early and clear indications to avionics vendors, airframe OEMs, ANSPs, airlines, operators and regulators regarding the future of ADS-B.

3.4.76. IATA stated that there is some confusion about the intent of the conclusion 18/35 with regard to whether the target date meant publication by 2010 or compliance by 2010. The meeting noted that irrespective of the viewpoint, it is now too late to reasonably expect airlines to comply with an equipage mandate by 2010. It was therefore recommended that with many states progressing with their plans to implement ADS-B surveillance, it is vital that some guidelines on the issue of equipage mandate be finalized without delay to ensure that the operational benefits from ADS-B are realized.

3.4.77. The meeting also took into account the comments from ATM/AIS/SAR Sub-group on the proposal from IATA in relation to Conclusion 18/35 that only one State in the Region had mandated ADS-B out. They also noted that due to the requirement of aircraft equipage, especially due to the retrofit requirements, compliance with this mandate was not achievable in the Region by 2010. As such the word “mandate” may no longer be appropriate given that compliance would not be possible in the short time frame specified. Therefore, ATM/AIS/SAR/SG/18 recommended that the CNS/MET Sub-Group review the use of the word “mandate” with the objective of raising a replacement Conclusion for consideration by APANPIRG/19.

3.4.78. However, in their working paper presented to CNS/MET SG/12, IATA still supported the term “Mandate” as being appropriate as originally agreed by APANPIRG/18, but with revised target dates. In view of the foregoing, the meeting adopted the following Conclusion to supersede the APANPIRG Conclusion 18/35.

Conclusion 19/37 –Revised Mandate Regional ADS-B Out Implementation

States intending to implement ADS-B based surveillance service, be urged to

a) determine ADS-B OUT equipage mandates based upon the ability to provide ADS-B OUT separation services;

b) expedite the implementation of ADS-B OUT in accordance with the Regional Air Navigation Plan and the provision of separation services based on ADS-B OUT;

c) publish their equipage mandates as soon as possible, with a target publication date of no later than 2010 so that operators can plan ahead their forward purchasing and retrofit; and

d) choose a date after mid 2012 on which the ADS-B out equipage mandate will become effective in airspace served by ADS-B ground stations with sufficient transition period to enable fleet equipage.

Note: The implementation would require aircraft equipped with avionics compliant with either;

1) *Version 0 ES as specified in Annex 10, Volume IV, Chapter 3, Paragraph 3.1.2.8.6 (up to and including Amendment 82 to Annex 10) and Chapter 2 of the Technical Provisions for Mode S Services and Extended Squitter (ICAO Doc 9871) (Equivalent to DO260) to be used till at least 2020.*

Or

2) Version 1 ES as specified in Chapter 3 of the Technical Provisions for Mode S Services and Extended Squitter (ICAO Doc 9871) (Equivalent to DO260A)

Outcome of South East Asia ADS-B Working Group/3 Meeting

3.4.79. The meeting noted that the South East Asia ADS-B Working Group established by APANIRG/18 met three times:

- 1st meeting was held on 15 and16 November 2007 in Singapore;
- 2nd meeting was held from 27 to 29 February 2008 in Bali, Indonesia; and
- 3rd meeting was held on 2 and3 July 2008 in Putrajaya, Malaysia.

3.4.80. The working group has progressed on following agreed tasks:

- agreed to the Term of Reference of the SEA ADS-B Working Group at the 1st meeting and revised at the 3rd meeting;

- developed the cost apportionment framework for ADS-B Ground Stations and ADS-B Surveillance Data Sharing;

- agreed guidelines to be used for the development of implementation plan;

- developed a sample agreement for ADS-B Data Sharing;

- agreed upon a SEA ADS-B project which outlines implementation issues to be undertaken by IATA and CANSO for the sub-region;

- Phase I –SEA ADS-B Implementation Plan (data sharing among Indonesia, Singapore and Viet Nam) be further enhanced at subsequent meetings; and

- AMC20-24 with proposed changes serves as baseline document for further consideration by ADS-B SITF and CNS/MET Sub-group of APANAPIRG.

3.4.81. The working group recognized that to enable radar like separation, ADS-B based surveillance service must be complemented by the Direct Controller Pilot Communication (DCPC) such as VHF radio voice communication. Without supporting communication infrastructure, the ADS-B based surveillance will provide minimal operational benefits to the air space users. In view of the foregoing, the meeting adopted the following Conclusion.

Conclusion 19/38 - Support provision of VHF radio voice communication associated with ADS-B data sharing between adjacent States

That, States be urged to consider following regional policy on supporting provision of direct controller pilot communication capability associated with ADS-B data sharing between adjacent FIRs of States.

"In order to provide radar like separation services using ADS-B, it is necessary for the controllers to have direct controller pilot communication (DCPC). In some cases, to achieve radar like separation services it may be necessary for the States to provide VHF radio voice communication services for use by adjacent States.

It is therefore recommended that States capable to do so support provision of VHF radio voice communication services to adjacent States when this is required to support the delivery of ADS-B based separation services. Cost of such service provision shall be agreed between the States concerned."

Note of appreciation

3.4.82. The meeting appreciated the efforts and progress made by the ADS-B SITF and the SEA ADS-B WG. The meeting expressed its appreciation and gratitude to the Air Traffic Management Bureau and the Civil Aviation Administration of China for hosting the ADS-B Seminar and ADS-B SITF/7 meeting. The meeting also expressed appreciation to Singapore, Indonesia and Malaysia for hosting the meetings of the SEA ADS-B Working Group.

Time and Venue of Next Meeting

3.4.83. The South East Asia ADS-B Study and Implementation Task Force Working Group meeting is scheduled to be held in the end of 2008 or early 2009 and the next meeting of ADS-B Study and Implementation Task Force is scheduled for April 2009.

Regional Surveillance Strategy for Asia/Pacific Region

3.4.84. The meeting reviewed the surveillance strategy for Asia and Pacific Regions adopted by APANPIRG/18. The meeting noted that the strategy was considered as living document which is regularly updated based on the developments. The meeting noted that the amended strategy had been proposed by an ad hoc working group and endorsed by the CNS/MET SG/12. In view of the foregoing, the meeting adopted a Conclusion as follows.

Conclusion 19/39 – Regional Surveillance Strategy for Asia/Pacific Region

That, the revised Regional Surveillance Strategy for Asia/Pacific Region provided in the **Appendix R** to the Report on Agenda Item 3.4 be adopted.

Multilateration Systems

3.4.85. The meeting noted that Malaysia has introduced the Multilateration (MLAT) at Kuala Lumpur International Airport (KLIA) to supplement the Surface Movement Radar (SMR). MLAT system is able to provide complete coverage of the runways, taxiways/taxi lanes and aprons and also airspace coverage up to 25 NM.

3.4.86. The meeting was informed of the process that would be used by the Civil Aviation Authority New Zealand to certify two proposed multilateration systems. One system would be used to support low visibility operations at Auckland International Airport, and would be certified primarily against EUROCAE ED-117, MOPS for Mode S Multilateration Systems for use in the Advanced Surface Movement Guidance and Control Systems (A-SMGCS). The second system would provide wide area coverage around Queenstown, and it was intended to use the forthcoming EUROCAE ED-142 as the base operational standard. Other certification standards would include Annex 10 SARPs for SSR and ICAO guidance material on SSR and A-SMGCS. The certification would also depend upon the provision of a detailed safety case and development of specific operational and technical procedures, together with evidence of appropriate training and satisfactory acceptance testing and commissioning.

3.4.87. The meeting noted that ICAO headquarters has also worked on the standard based on the EUROCAE for the multilateration standard.

USA ADS-B Update

3.4.88. The United States informed the meeting that the Federal Aviation Administration (FAA) has awarded a national contract to provide Automatic Dependent Surveillance – Broadcast (ADS-B) services. ADS-B technology has been identified as the surveillance solution that can meet these needs by providing critical flight information simultaneously to pilots and air traffic controllers.
The U.S. ADS-B program is deploying communications, weather, and ADS-B stations on oil platforms in the Gulf of Mexico since 1998. The United States wishes to identify the equipped airframes in preparation for an ADS-B service in the Gulf of Mexico.

3.4.89. At the first meeting of the GREPECAS ATM/CNS Sub-group – CNS Committee, Surveillance Task Force in June 2007, several member States in the CAR/SAM region expressed an interest in conducting an ADS-B partnership effort in the region. To determine the feasibility of using

ADS-B as a surveillance tool in the CAR/SAM, which includes E-CAR, it was considered necessary to understand the performance gaps that could be mitigated and benefits possible with improved Surveillance and Broadcast Services. The United States sees benefits from future use of ADS-B and is ready to participate with States by providing ADS-B surveillance service including technical, programmatic and contract management support for procuring surveillance services.

ADS-B Programme in New Caledonia

3.4.90. The meeting was informed that France has been involved in study and implementation of ADS-B technology for many years and has started the deployment of ADS-B ground stations in Corsica and La Réunion Islands since 2007. A decision to implement the ground stations in New Caledonia was made in 2007. Two ground stations will be implemented before the end of 2008: one for Tontouta airport to support the international traffic and the other for Magenta airport for the domestic traffic. A third ground station will be installed by March 2009 to improve the coverage on the South East coast. Along with the above timelines, the ADS-B controller position display should be available in the two ATC sites at Tontouta and Magenta airports by mid 2009. The three ADS-B ground stations should be technically operational in the 3rd quarter of 2009.

SSR Mode S Interrogator Identifier (II) Code

3.4.91. The CNS/MET SG/12 meeting considered a paper presented by the Secretariat on SSR Mode S interrogator identifier (II) and/or surveillance identifier (SI) codes. According to relevant provisions in the Annex 10, these codes are used to reduce garble and to improve performance in the overlapping coverage of SSRs. ICAO SARPs provided for a 4 bit Interrogator Identifier (II) code, which permits 16 code combinations to be available for operational use. In 1998, the SARPs were amended to provide for 63 surveillance identifier (SI) codes in addition to Interrogator Identifier (II) codes to meet the requirement of SSR interrogators in the areas of high density of installations (particularly for maintaining civil/military interoperability). In Asia and Pacific Regions, the density of interrogator installations does not warrant the use of Surveillance Identifier (SI) and hence it was recommended that only Interrogator Identifier be used, till such time the density increases to the extent that 16 Interrogator Identifier codes are found inadequate to provide unique codes for all the interrogators in the overlapping coverage.

3.4.92. The meeting noted that in Europe, ICAO European Air Navigation Planning Group (EANPG) has assigned the responsibility of maintaining the allotment of Interrogator Code to EUROCONTROL.

3.4.93. The meeting was informed that a number of new SSR Mode S installations have been planned in Asia and Pacific Region. In order to avoid interference between installations, States are required to ensure that the SSR Mode S interrogators operating with overlapping coverage should use different Interrogator Identifiers as well as different PRFs. Accordingly, the meeting agreed to the following Conclusion.

Conclusion 19/40 - Coordination for SSR Mode S Interrogator Identifier Code

That,

a) in view of low density of SSR interrogator installations in the region, only Interrogator Identifier (and not Surveillance Identifiers) codes be used for SSRs Mode S in the areas of overlapping coverage

b) while implementing SSR Mode S, States should take into account following issues while assigning Interrogator Identifier codes for these installations:

- for planning the implementation of SSR Mode S interrogators, administrations should ensure that the interrogators with overlapping coverage are not operating with the same Interrogator Identifier (II) codes.

- where, the coverage of the interrogator extends beyond the boundaries of the State, The II code and PRF should be worked out in coordination with the ICAO Asia and Pacific Office and the neighboring States, and

- administrations should inform the ICAO Asia and Pacific Office about the assigned II codes and PRFs for these installations.

3.4.94. The USA informed CNS/MET SG/12 that in the European Region, Interrogator Identifier (II) code '0' is reserved for use by the mobile/temporary installations.

Aeronautical electromagnetic spectrum utilization

Outcome of WRC-2007 and preparatory work for WRC-2011

3.4.95. The meeting noted that the results of WRC –2007 generally conformed to the ICAO position. Out of the seventeen agenda items, results for sixteen agenda items were in conformance with the ICAO position, the result of the remaining agenda item also partially complied with the ICAO position.

3.4.96. It was noted that WRC-11 agenda items are divided into three main groups: important aviation issues, direct threats to aviation and potential threats. The meeting was informed that preliminary ICAO position for WRC-2011 was discussed in ACP in May 2008 and is likely to be available by mid 2009. The Regional Preparatory Group (RPG) meetings will be organized at periodic intervals to inform the States about ICAO position on various Agenda Items. To ensure that a proper coordination is maintained between the States and ICAO Asia Pacific Office on one end and the national telecommunication regulatory authorities at the other end, it was proposed that all the States be urged to identify a Contact Person in their administration, who will be responsible for ensuring inclusion of ICAO Position on relevant WRC-11 Agenda Items in the State Position Paper and in the common proposals developed by the Asia Pacific Telecommunity Conference Preparatory Group (APG). In view of the foregoing, the meeting adopted the following Conclusion.

Conclusion 19/41 – Contact Person for WRC-11 and active participation by the States in WRC-11 related national and regional activities

That, States be urged to:

a) nominate a Contact Person responsible for the preparation for WRC-11 in their administration and inform ICAO Asia and Pacific Office about the contact details of the nominated Contact Person; and

b) actively participate in all the national and regional level activities related to the preparation for WRC-11.

First Meeting of Asia Pacific Telecommunity Conference Preparatory Group

3.4.97. The meeting was also informed about the outcome of the First Meeting of the Asia Pacific Telecommunity Conference Preparatory Group (APG) for WRC-11 held in Bangkok from 6 to 8 March 2008. The meeting noted the new structure of Working Parties established under APG and the distribution of Agenda Items for each Working Party.

Implementation of the World Area Forecast System (WAFS)

Recent and Future WAFS Developments

3.4.98. The meeting was made aware of the need to distribute recent and future WAFS developments that are detailed in **Appendix S** to this Report on Agenda Item 3.4 to the WAFS users via a State letter from the Regional Office. The meeting adopted the following conclusion:

Conclusion 19/42 – Providing ASIA/PAC States with information on recent and forthcoming developments to WAFS

That, in order to increase the regional awareness on the planned developments of the WAFS, SADIS and International Satellite Communication System (ISCS), the information provided by the WAFCs, as shown in **Appendix S** to the Report on Agenda Item 3.4, be circulated by the ICAO Regional Office to the States in the ASIA/PAC Region.

3.4.99. The meeting was informed that the harmonization of the ISCS broadcast with SADIS that was supposed to take place on 29 August 2008 at 0000Z was postponed by the U.S. National Weather Service until at least 5 September 2008 due to critical weather status arising from the hurricanes that had developed in the Atlantic and Gulf of Mexico.

3.4.100. The meeting was informed of the States' need for training be provided by the World Area Forecast Centers (WAFC)s on the new WAFS gridded forecasts for icing, turbulence and cumulonimbus clouds with a target date of 2010 as adopted by the WAFS Operations Group (WAFSOPSG)/4. In order to increase the efficiency of training and decrease cost, modern distant learning methods (computer based training products distributed to States, and web-based training) should be considered as an alternative to the planned regional seminars. The meeting adopted the following conclusion:

Conclusion 19/43 – Training for the new WAFS gridded forecasts

That, in order to facilitate the implementation by the States of the new WAFS gridded forecasts,

a) WAFC Provider States, in coordination with ICAO and WMO, be invited to organize training on the use of the new WAFS gridded forecasts for icing, turbulence and cumulonimbus clouds; and

b) WAFSOPSG be invited to consider, in addition to the planned regional training seminars, developing alternative methods for provision of training to the States on the new gridded forecasts for icing, turbulence and cumulonimbus clouds in order to ensure that a maximum number of WAFS users in the States will have access to the training in the most efficient way.

Note: The alternative training methods include computer based training products distributed to States and web-based training.

3.4.101. The meeting was informed of CNS/MET SG/12 meeting concerns related to the use of administrative messages for errors in the WAFS significant weather (SIGWX) forecasts. Instead of issuing new Binary Universal Form for Representation of meteorological data (BUFR) bulletins which would correct the identified errors in a SIGWX forecast, the WAFC would issue an administrative message indicating the error. The CNS/MET SG/12 meeting requested related operational procedures for the issuance and distribution of the above messages and guidance from ICAO on the use of the WAFS administrative messages that indicate errors in the SIGWX forecasts. In view of the foregoing, the meeting adopted the following conclusion:

Conclusion 19/44 - Use of administrative messages for errors in the WAFS SIGWX forecasts

That,

a) WAFSOPSG be requested to develop as soon as possible the procedures for the issuance of administrative messages by the WAFCs drawing attention to errors identified in the current WAFS SIGWX forecasts (in the BUFR code and PNG chart forms); and

b) ICAO be invited to develop guidance for the meteorological offices and aviation users on the use of the above administrative messages.

3.4.102. The meeting was informed that administrative messages for errors in the WAFS SIGWX forecasts would not be addressed until the WAFSOPSG/5 meeting in September 2009. Based on this, the guidance material would not be available until early 2010.

3.4.103. The National Weather Service (NWS) existing contract with Verizon (MCI) to provide the ISCS satellite broadcast services expires on 31 December 2009. A new service contract will provide ISCS-Generation 3 (G3). Specifications of the hardware/software changes are not yet known and the user may assume some of the upgrade costs. After award of the contract for ISCS-G3 in early 2009, a detailed transition schedule and advisory bulletins will be posted on the ISCS web page (http://www.weather.gov/iscs). In order to keep the ISCS users apprised of ISCS-G3 developments, the meeting adopted the following conclusion:

Conclusion 19/45 – Transition to ISCS 3rd Generation

That, in view of the plans by the ISCS Provider State to upgrade the ISCS broadcast to a new 3rd Generation service (ISCS 3G) by the end of 2009:

a) the ISCS Provider State be urged to provide timely information to the ISCS user States on the planned changes including specifications of the hardware and software changes, transition timeline and expected cost implications for the users if any; and

b) the ISCS user States be urged to keep abreast of the planned developments through the established channels of communication with the ISCS Provider State and plan well in advance any resources required for the transition to the ISCS 3G;

Notes:
1) The ISCS Provider State will use the established network of ISCS focal points as its basis for keeping States informed.

2) The Secretariat will undertake the task to keep the list of ISCS focal points up-to-date to ensure efficient communication between the ISCS Provider State and the ISCS user States in the ASIA/PAC Region.

3) All information on the planned transition will be available on: http://www.weather.gov/iscs

3.4.104 The meeting was made aware of an analysis conducted by Hong Kong, China, which showed significant differences between the trial gridded forecasts of icing, turbulence and cumulonimbus clouds from the two WAFCs and inconsistencies of these forecasts with actual observations of cumulonimbus clouds and turbulence.

3.4.105 The meeting was informed of the necessary implementation of Satellite Distribution System (SADIS) 2G by 5 January 2009, otherwise FTP service will have to be used as a backup to obtain Operational Meteorological (OPMET) data.

Exchange of OPMET Information

New TAF provisions in Amendment 74 to Annex 3

3.4.106 The International Air Transport Association (IATA) identified airports within the ASIA/PAC Region for which Aerodrome Forecasts (TAF)s with 30-hour validity were required to support ultra long-haul flights as listed in **Appendix T** to the Report on Agenda Item 3.4**.** For all other aerodromes in the ASIA/PAC region not explicitly mentioned in **Appendix T**, IATA requests the issuance of TAFs with 24-hour validity. Therefore, the period of validity of TAF for all ASIA/PAC aerodromes listed in FASID Table MET 1A and MET 2A is either 24 or 30 hours. If a State is not in the position to implement requirements, a national plan should be developed to achieve compliance as soon as possible.

3.4.107 The CNS/MET SG/12 meeting proposed a new format for FASID Table MET 1A, meteorological service required at aerodromes, which includes a new column to indicate the hours of the day during which OPMET information for the aerodrome is provided, as shown in **Appendix U** to the Report on Agenda Item 3.4. **Appendix U** includes the updated IATA requirements for TAF validity.

3.4.108 In addition, IATA now requires a 1 hour lead time before the beginning of the period of validity of the TAF. As a result, the CNS/MET SG/12 meeting proposed that an amendment to the ASIA/PAC Basic ANP as presented in **Appendix V** to the Report on Agenda Item 3.4 be made.

In view of the foregoing, the meeting adopted the following conclusion:

Conclusion 19/46 – Amendment proposal to TAF-related provisions in the ASIA/PAC Basic ANP and FASID (Doc 9673)

That,

a) the amendment proposal to the ASIA/PAC Basic ANP, as presented in **Appendix V** to the Report on Agenda Item 3.4, be processed according to the established procedure; and

b) the new format of FASID Table MET 1A, as presented in **Appendix U** to the Report on Agenda Item 3.4, be adopted and the ASIA/PAC States be invited to provide the necessary data to the Regional Office in order to issue an amendment proposal.

3.4.109 The meeting was informed that the change of the validity period and the new requirement for only one TAF valid for the aerodrome at any time requires an update to the Regional OPMET Bulletin Exchange (ROBEX) tables for TAF. This update, conducted by the OPMET Management Task Force (OPMET/M TF), is shown in **Appendix W** to the Report on Agenda Item 3.4. Also, these tables need to be included in the ROBEX Handbook after the amendment proposal for the related FASID Tables is approved and should be sent to all ASIA/PAC States to facilitate the implementation

3.4.110 The meeting was informed that some States were still not aware that the World Meteorological Organization (WMO) TAF code has been changed regardless of the period of validity to be used, i.e., States for which there were no requirements for 30-hour TAF should also implement the code changes beginning 5 November 2008.

In view of the foregoing, the meeting adopted the following conclusion:

Conclusion 19/47 – Regional preparedness for timely implementation of the new TAF provisions

That,

a) the Regional implementation plan for the new TAF provision presented in **Appendix W** to the Report on Agenda Item 3.4 be circulated to all ASIA/PAC States; and

b) States be informed that the new TAF format should be used for all TAFs issued after 00 UTC on 5 November 2008.

3.4.111 The U.S. is providing sample 30-hour TAFs and basic training at the following link: http://www.weather.gov/os/aviation/taf_testbed.shtml. States are invited to forward sample 30-hour TAFs from their State for inclusion to this site. The meeting adopted the following conclusion:

Conclusion 19/48 – Test website for the transition to the new TAF format

That, States in the ASIA/PAC Region be invited to use the special website established by the U.S. NWS to facilitate the transition to the new TAF format and test their procedures for issuance of 30-hour TAF.

Note: The 30-hour TAF test website is accessed on:
http://www.weather.gov/os/aviation/taf_testbed.shtml

TAF in VOLMET

3.4.112 The implementation of the 30-hour TAF is designed to provide aerodrome forecasts for Ultra Long Range (ULR) flights. Amendment 74 to Annex 3 requires that one TAF be valid at any given time at an aerodrome. The 9-hour TAF is typically used for VOLMET in order to obtain relevant meteorological information for en-route alternates, destination alternate and the destination aerodromes. The two different TAFs (9-hour and 30-hour) can not be issued at the same time in accordance with Amendment 74 to Annex 3. There are two problems with using the 30-hour TAF for VOLMET: (1) truncation due to the 5 minute limitation and (2) human factor concerns for pilots possibly having difficulties extracting pertinent information from a long message.

3.4.113 IATA, IFALPA and the International Federation of Air Traffic Controllers Associations (IFATCA) informed the meeting of the need for a short TAF in VOLMET for tactical in-flight operational decision making such as planning a diversion to an alternate airport and optimizing fuel consumption. This message reinforced the results of the regional survey on TAF in VOLMET presented at the CNS/MET SG/12 meeting that is attached in **Appendix X** to the Report on Agenda Item 3.4. Furthermore, IFATCA noted that removing a short TAF from VOLMET is contrary to the present day trend of providing tailored products for aviation users. IFATCA also noted that a 30-hour TAF in VOLMET is not desirable from a human factors perspective due to the long message. The meeting was informed that a MET Service can still provide the short TAF using a local agreement; however, this is not true for pilots.

3.4.114 The meeting was made aware that various solutions, such as splitting the long TAF or utilizing an extended TREND forecast, were examined by States, but were thus far not successful.

3.4.115 The meeting was informed of the State's dilemma in either satisfying Annex 3 and not the users by providing only a long TAF or satisfying the users by providing a long and short TAF and not adhering to Annex 3. The latter scenario requires a State to file a difference to Annex 3 by 5 October 2008.

3.4.116 The meeting noted that information papers on this subject may be presented at the Aerodrome Meteorological Observation and Forecast Study Group (AMOFSG), but that the AMOFSG is not able to provide a solution before the applicability date of 5 November 2008.

3.4.117 The meeting noted that Amendment to Annex 3 that includes paragraph 6.2.7, *when issuing TAF, meteorological offices shall ensure that not more than one TAF is valid at an aerodrome at any given time*, had been through the ICAO Amendment processes and adopted by States. Guidance material for implementation of this Amendment will be provided by the Secretariat and distributed to States before the applicability date via a State letter by the Regional Office. In view of the foregoing, the meeting adopted the following conclusion:

Conclusion 19/49 – Guidance on the period of validity of TAF included in the HF VOLMET broadcasts

That, ICAO

a) be invited to urgently review the concerns expressed with regard to the non-suitability of 30-hour TAF for HF VOLMET broadcasts as described in detail in the report of CNS/MET SG/12 meeting; and

b) provide urgent guidance to the States concerned taking into consideration the user requirements expressed by IATA and IFALPA, before the implementation date of the new TAF provisions.

Other TAF Issues

3.4.118 The meeting discussed the need for clarification and eventual amendment to some TAF provisions and agreed on the following conclusion:

Conclusion 19/50 – Issues related to TAF code

That, ICAO, in coordination with WMO be invited to consider the following issues related to TAF:

a) providing explicit definition of the geographical area that the TAF covers with consistency between this definition for the TAF and METAR;

b) establishment of amendment criteria for the temperature group in the TAF; and

c) establishment of provision for multiple occurrences of operationally significant maximum or minimum temperatures in a 30-hour TAF.

Implementation of the ICAO Advisory & Warning Systems

Volcanic Ash Notification for Aviation

3.4.119 The meeting was informed that the Volcano Observatory Notice for Aviation, (VONA), was developed and included in the U.S. National Volcanic Ash Operating Plan for Aviation to provide volcanic ash information to the associated Area Control Centers (ACC), Meteorological Watch Offices (MWO) and Volcanic Ash Advisory Centers (VAAC). The form, Volcano Observatory Notice for Aviation– VONA, which is included in Doc 9766, *Handbook on the International Airways Volcano Watch (IAVW) – Operational Procedures and Contact List*, incorporates a volcanic alert level system for aviation that uses color codes to succinctly describe conditions at or near a volcano (referenced in ICAO Annex 15, *Aeronautical Information Services)*. The VONA is intended to be used by the selected volcano observatories included in the regional ANPs in FASID Table MET 3C. The meeting adopted the following conclusion:

Conclusion 19/51 — Coordination and Implementation of the Volcanic Ash Notification for Aviation

That States listed in FASID Table MET 3C be encouraged to implement the format VONA developed by the International Airways Volcano Watch Operations Group (IAVWOPSG) in order to:

a) improve communication of information on volcanic activity to ACC, VAAC, and MWO; and

b) provide feedback on the utility of the VONA and refinements that should be considered by the IAVWOPSG.

VONA = Volcano Observatory Notice for Aviation

VA/TC SIGMET Tests

3.4.120 The meeting was informed that numerous States did not participate in the previous Volcanic Ash (VA) and Tropical Cyclone (TC) Significant Meteorological information (SIGMET) tests conducted in early 2008 in the ASIA/PAC region. It was noted that systematic non-participation in the SIGMET tests was considered a deficiency and such States should be added to the APANPIRG List of deficiencies.

3.4.121 The meeting was informed that volcanic ash tests in the ASIA/PAC Region should be developed to include ATM and the airlines.

SIGMET Guidance

3.4.122 The meeting was informed that Hong Kong developed complex tropical cyclone and turbulence SIGMET examples for inclusion in the ASIA/PAC Regional SIGMET Guide. Complex VA SIGMET examples given by Australia were also considered for inclusion in the ASIA/PAC Regional SIGMET Guide. In view of the above discussions on the SIGMET Guide update, the meeting adopted the following conclusion:

Draft Conclusion 19/52 — Update of ASIA/PAC Regional SIGMET Guide

That, the new SIGMET examples developed by Hong Kong, China and Australia given in **Appendix Y** to the Report on Agenda Item 3.4 be included in the new edition of the ASIA/PAC Regional SIGMET Guide.

3.4.123 Posters on WS/VA/TC SIGMET and wind shear were available to meeting attendees. The posters were developed by Hong Kong, China, Australia, New Zealand, IFALPA, and WMO.

3.4.124 The meeting was informed of the implementation of IAVW recent accomplishments, which include: training provided by the Darwin VAAC for Papua New Guinea and the Philippines in the preparation of VA SIGMETs, information exchange between the Australian Bureau of Meteorology with the Indonesian Centre for Volcanology and Geological Hazard Mitigation to improve monitoring of 15 volcanoes that is near completion, and an expected agreement between Rabaul Volcano Observatory and Papua New Guinea Civil Aviation Authority to provide volcanological information to aviation through cost recovery arrangements.

MET/ATM Developments

3.4.125 The meeting was informed of MET/ATM developments, which include: the completion of the MET services for ATM survey, the need for continued work in determining MET requirements for ATM and the need to coordinate a regional MET/ATM meeting and seminar in 2009 and 2010. The meeting adopted the following conclusion:

Conclusion 19/53 - Convening MET/ATM TF meeting and organizing MET/ATM seminar

That, a meeting of MET/ATM Task Force be convened in 2009 to review and update the Work Programme of the group and prepare a programme for the second ASIA/PAC MET/ATM Seminar to be held in 2010.

Note: Coordination with the ATM/AIS/SAR Sub-group is essential for the planned meeting of the MET/ATM TF.

3.4.126 The meeting was informed of new requirements from the airline users (IATA) for the improved provision of aeronautical climatological information that would be used for long term planning and short term strategic decision making. In order to make the climatological information useable for the automated systems it was required in an electronic form. In addition, due to the natural and man-made climate change it was required that the climatological data must be kept up-to-date on an annual or bi-annual frequency and that the period of observations used should cover the last 15 years. IATA also suggested that studies should be initiated regarding the establishment of national, regional or global aeronautical climatological databases. In this regard, the meeting adopted the following conclusion.

Conclusion 19/54 - Improvements to aeronautical climatological information provision

That, ICAO, in coordination with WMO and IATA, be invited to:

a) study the evolving user requirements for the provision of aeronautical climatological information, in view of the increasing importance of climatological data in the decision making process and strategic planning of airline operations;

b) based on the results of the study, consider developing proposal for improvements to aeronautical climatological information provision.

3.4.127 The meeting noted recent work on MET support for operations at aerodromes and terminal areas, such as the potential for increased capacity by reporting slant range visibility versus visibility, the use of dual light detection and ranging (LIDAR) at Hong Kong, China, the development of a thunderstorm nowcasting system at Hong Kong, China and improved fog forecasting in Australia.

3.4.128 The meeting noted that the Korea Aviation Meteorological Agency (KAMA) developed a web-based tool to relay routine/special air reports (AIREP) and pilot reports (PIREP) to the meteorological office and subsequently the WAFCs bypassing the conventional communication method that is less efficient as it involves an often busy ATC unit. In addition, KAMA will use this data to develop more accurate weather forecasting models for aviation.

3.4.129 The web-based tool mentioned is the Low/High Level Air Navigation Meteorological Information Service (LAMIS, HAMIS). The AIREPs and PIREPs can be entered into the web-based system after landing by the pilots or via Aircraft Communication Addressing and Reporting System (ACARS) during flight by aircraft operators. Despite the effort by KAMA to obtain more aircraft observations for improved forecasting, the number of aircraft observations remains low. This is due to a combination of exemptions for aircraft observations in Annex 3 and PANS-ATM for short flights where radar coverage and voice communication services are available. The Incheon FIR meets the exemption category because it provides these services and the time to traverse the FIR is less than 2 hours from a domestic departure. The meeting noted that KAMA encourages greater participation by airlines to provide air reports and pilot reports in the Incheon FIR and that membership can be obtained via http://kama.kma.go.kr. The meeting also noted that the end result of more AIREPs and PIREPs is improved weather forecasting for aviation.

Review CNS/ATM systems planning and implementation

Overview of proposed electronic air navigation plan (eANP) framework

3.4.130 The meeting was informed about the proposed electronic Air Navigation Plan framework (eANP) that is intended to facilitate the coordination and implementation of regional air navigation plans as well as supporting the Global Air Navigation Plan. It will also contribute to the further development of air navigation planning by providing a framework for the efficient implementation of new air navigation systems and services at the national, regional, inter-regional and global levels. The framework will support, in particular, the work of regional planning and implementation groups that plans, monitors and analyses the implementation status of planned facilities and services for inclusion in the regional air navigation plans, and recommends ways to expedite these plans in accordance with ICAO priorities. The availability of this information online will greatly facilitate updating and access to the latest information for States, ICAO regional offices and various other users.

3.4.131 The Secretariat advised that this effort has two primary objectives:

i) at the global level: reconcile the Regional Air Navigation Plan with the ATM operational concept, the new Global ANP provisions and the ICAO new business planning processes; and

ii) at the regional level: expedite regional planning and coordination through simplifying and freeing the core of planning from a long and cumbersome formal approval process, (whilst maintaining the planning and coordination process requirements within the ICAO regional machinery).

3.4.132 To support the above objectives, the following deliverables will be produced:

i) Easy-to-use planning templates that would contain the relevant elements, specifically the homogeneous ATM areas and major international traffic flows, and the agreed Global Air Navigation Plan systems infrastructure necessary to support the implementation of the homogeneous ATM areas and major international traffic flows; and

ii) an integrated Air Navigation Planning environment containing details currently listed in BANP Table ATS 1 and all FASID Tables (AOP, CNS, ATM, MET, SAR, AIS). This will be designed to easily support the coordination, agreement and recording process between States and international organizations' through a user-friendly interface.

3.4.133 The meeting noted the proposed methodology that will be employed to achieve the proposed deliverables to replace the current provisions in volumes I and II of the regional air navigation plans. The meeting was informed that an example of the proposed on-line and standalone applications to support the eANP framework is provided at: http://192.206.28.81/eganp/

3.4.134 The meeting noted the tools that are planned to be available to support the eANP environment and an update on the initialization of the 5LNC management tool. The 5LNC database will be initialized for global application by the end of 2008.

3.4.135 In response to a query as to how the air navigation plan amendment process would be managed using the eANP, the secretariat advised that the air navigation amendment process remained the same with regard to the processing of amendment approvals. What would change would be the time involved with approval coordination. The publication of approved amendments would be available on-line and would not be delayed in being incorporated into the air navigation plans as approved amendments would be published electronically.

3.4.136 The meeting was supportive of this effort but requested that the methodology would allow ICAO to transition to an eANP. The Secretariat advised that the current work program was to establish and deploy the proposed framework for the eANP and after review by both the ANC and Council may propose any required process changes relating to Air Navigation Plans to the ICAO Assembly for adoption.

Review CNS/ATM systems planning and implementation

Overview of proposed electronic air navigation plan (eANP) framework

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iv) an integrated Air Navigation Planning environment containing details currently listed in BANP Table ATS 1 and all FASID Tables (AOP, CNS, ATM, MET, SAR, AIS). This will be designed to easily support the coordination, agreement and recording process between States and international organizations' through a user-friendly interface.

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CNS/ATM Implementation and Planning Matrix

3.4.144 The meeting reviewed the matrix reflecting implementation status of the CNS/ATM systems in the Asia/Pacific Regions. It was noted that the CNS/ATM Implementation Planning Matrix was developed in accordance with the Conclusion 11/37 of APANPIRG and the Matrix has since been regularly updated. CNS/ATM Implementation Matrix reflects the status of implementation of major CNS/ATM elements in the region which includes ATN, AIDC, CPDLC, GNSS, ADS-C and ADS-B. The meeting was informed that the Matrix was updated by the Seventh meeting of ADS-B Study and Implementation Task Force and the Third meeting of ATN Implementation Coordination Group.

3.4.145 The meeting discussed and agreed with a proposal to rename the column of “GNSS” as “Navigation” and create three sub-columns: En-route, Terminal and Approach. It was also agreed to add a footnote for the Navigation indicated in the Column 5 to read ‘Navigation including Performance Based Navigation (PBN), APV and precision approach’. The existing information has been transferred into the new Columns by the Secretariat which may be required to be further verified by the States through correspondence or at the future meetings. The updated Matrix is provided in **Appendix Z** to the Report on Agenda Item 3.4.

3.4.146 Through an Information Paper India informed the meeting about the augmentation of Communication, Navigation and Surveillance infrastructure, it had undertaken to meet the challenges of increasing air traffic. It was also informed that additional RCAG VHF ground stations and Radars are being implemented with an objective to provide seamless VHF and surveillance coverage over the terrestrial Indian airspace.

Key Priorities for the CNS/ATM Implementation

3.4.147 The meeting reviewed the List of Key Priorities for the CNS/ATM Implementation in the Asia/Pacific Region endorsed by the APANPIRG/18 meeting and took into account the comments from ATM/AIS/SAR/SG/18 which identified the need to merge the Key Priority No. 1, 5 and 8. The meeting agreed to merge Key Priority No.1 and No.5 as suggested by the ATM/AIS/SAR/SG/18, but kept the Key Priority No. 8 as a separate item.

3.4.148 The meeting also agreed to add Implementation of AFS (TCP/IP and AMHS) in the list of Key Priorities. The meeting further updated information in the list. The updated List of Key Priorities for the CNS/ATM Implementation is provided in **Appendix A1** to the Report on Agenda Item 3.4.

Network enabled operations (NEO) in weather

3.4.149 The meeting noted the information provided by the U.S. on the progress underway with the development of a Network Enabled Operation for the purpose of supporting weather data exchange between the States. The core of the FAA weather NEO concept was to use extensible Markup Language (XML) to format and disseminate weather information. The US Government was moving towards implementing NEO starting with a US Department of Defense (DOD)-developed capability called the Joint METOC Broker Language (JMBL). JMBL is an XML-based specification which is used to request and receive a wide variety of meteorological and oceanographic information. JMBL provides users with a standard, Web services interface to meteorological and oceanographic data. JMBL specifies a standard language between data providers and user applications. The JMBL schemas and related documentation are available in the public domain and can be downloaded from http://www.cffc.navy.mil/metoc/ with no proprietary use restrictions.

TOR and Subject/Tasks List of CNS/MET Sub-group

3.4.150 The meeting did not identify the need to amend the Terms of Reference. The meeting reviewed and updated the Subject/Tasks List. The new tasks added in the list include comprehensive updating the FASID tables 1B and 1C and preparations for ITU WRC-2011. Additional action items on some MET Tasks were also added. The status of on-going tasks was also updated as necessary. Accordingly the meeting adopted the following Decision.

Decision 19/55 - Updated Subject/Tasks List of the CNS/MET Sub-group

That, the Subject/Tasks List of the CNS/MET Sub-group provided in **Appendix A2** to the Report on Agenda Item 3.4 be adopted.

No.	PERFORMANCE OBJECTIVE	ICAO Srategic Objective	Associated GPI	Tasks/Strategy	Benefits	Deliverables	Target Date	Leader	Supporting Members	ATNICG/3 Update
1	ATN Implementation Coordination	D. Efficiency	GPI-17, GPI-19, GPI-22	(1) Review of implementation problems and develop co-ordinated solutions	Expedite implementation activities, ensure system compatibility through out the region	Co-ordination Report	Ongoing/Semi-annually until (2010)	Ken Morris (Australia)	All members	Updated the information in the ATN Router and AMHS planning tables and the implementation status.
2	ATN Operational Procedures	D. Efficiency	GPI-17, GPI-19, GPI-22	(1) Development of Interim Database for Directory Services	Make available real time and quality assurance addresses for ATN message delivery	(1) Interim Database	(1) (2007)	Robert Hallman(USA)	Thailand, Hong Kong China, Japan	The database was demonstrated. Aerothai will maintain the database on behalf of the regional ICAO Office.
				(2) Develop the operational database management procedures		(2) Operational Procedures	(2) (2007)			Initiated by Aerothai
3	ATN Certification & Validation Process	D. Efficiency	GPI-17, GPI-19, GPI-22	(1) Develop conformance procedures and checklist for AMHS and ATN routers	Expedite implementation activities, ensure global system compatibility	(1) Checklist	(1) (2007)	Sin Hie Sng (Singapore)	China, Hong Kong China, Indonesia,ROK, USA,	The 1st edition Guidance Document for AMHS Conformance Testing was adopted by APANPIRG/18. The 2nd edition of the document is recommended.
				(2) Develop validation process document		(2) Conformance Document	(2) 2007			same as above
						(3) Update to Conformance Document	(3) Ongoing until 2010			Proposed adoption of two additional annexes E & F to the conformance document.

No.	PERFORMANCE OBJECTIVE	ICAO Srategic Objective	Associated GPI	Tasks/Strategy	Benefits	Deliverables	Target Date	Leader	Supporting Members	ATNICG/3 Update
4	**ATN Documentation**	**D. Efficiency**	**GPI-17, GPI-19, GPI-22**	**(1) Study DIR objects/attributes proposed in ACP and follow development within other groups**	**Expedite implementation activities, ensure global system compatibility**	**(1) Directory Report**	**(1) Annually until (2010)**	**Chonlawit B.**	**Thailand**	**Develop the database. Will present the procedure for coordination. Further consequential changes needs to be made and additional annex needs to be added.**
				(2) Development AIDC documentation (including ICD) and follow development within other groups		**(2) AFTN AIDC/ATN Gateway Specification ATN AIDC ICD**	**(2) 2008 (ACP-dependent)**	**(Thailand)**	**Thailand**	**Postpone development of ATN-based AIDC ICD due to lack of implementation of ATN-based AIDC and new AIDC-related specification from ACP WGI**
				(3) Update of AMHS ICD to comply with SARPs 3rd Edition		**(3) Updated AMHS ICD**	**(3) (2007)**		**Japan**	**Provided to ATNICG/2 for endorsement. Adopted by APANPIRG/18. Completed**
5	**ATN Performance**	**D. Efficiency**	**GPI-17, GPI-19, GPI-22**	**(1) Develop/establish/adapt/monitor/identify/analyse performance indicators**	**Assure QOS, service continuity, timely delivery of services**	**(1) AMHS performance report**	**(1) Annually until (2010)**	**Japan**	**Republic of Korea, India**	

No.	PERFORMANCE OBJECTIVE	ICAO Srategic Objective	Associated GPI	Tasks/Strategy	Benefits	Deliverables	Target Date	Leader	Supporting Members	ATNICG/3 Update
6	ATN Service Enhancements	D. Efficiency	GPI-17, GPI-19, GPI-22	(1) Review the impact of the implementation of Directory Services in the Region	Enhancing the service	(1) Report on directory	(1) Annually until (2010)	Fiji	USA, Thailand, New Zealand, Japan, Australia	Review the database developed by Aerothai for the Regional ICAO office.
				(2) Development of profiles for the directory access and exchange protocols (Ref. Decision 7/9)	Enhancing the operation	(2) Report on profiles	(2) (2008)	Fiji		
				(3) Study the use of IP	Lowering the operating cost	(3) Develop/update all Implementation Documents Develop/update IPS Implementation Documents	(3) (2010)	Singapore	Australia, China, India, Fiji, HongKong, China, Japan, and USA	Action item revised at ATNICG/3 to include development of IPS implementation document for Asia/Pac Region
				(4) Study for transition to BUFR code	Enhancing the service	(4) Report on the impact of BUFR code to ATN	(4) (2007)	Japan	New Zealand, USA,	Analysis was presented by Hong Kong China to CNS/MET/11. APANPIRG/18 decided to suspend further action for the time being.
				(5) Study for transition of AFTN-based AIDC as an alternative to ATN based AIDC to ATN environment	Improving the service and lowering the operating cost	(5) Report on the impact of transition of AFTN-AIDC to ATN-AIDC AFTN AIDC/ATN Gateway Specification	(5) (2008)	Thailand	India, Indonesia, New Zealand, USA,	A Draft specification of AFTN AIDC/ATN Gateway was presented.
		D. Efficiency	GPI-17, GPI-19, GPI-22	Analyze Common Address Prefix Proposal	Improving the service and routing efficiency	Report on common prefix based analysis conduced	End of 2008	Mark Brown (Japan)	Australia, Fiji, HongKong China, New Zealand and USA	Action Items developed at ATNICG/2 for follow-up at WG meetings.

No.	PERFORMANCE OBJECTIVE	ICAO Srategic Objective	Associated GPI	Tasks/Strategy	Benefits	Deliverables	Target Date	Leader	Supporting Members	ATNICG/3 Update
7	Security	B. Security	GPI-17, GPI-19, GPI-22	(1) Develop ATN System Security policy	Safe and Secure Inter and Intra Regional Communication and service infrastructure	(1) Policy Document	(1) Annually until (2010)	Vidyut Patel (USA)	Australia, Hong Kong China	USA made a presentation at ATNICG/2. High level guidance document presented to ATNICG/3
				(2) Develop ATN System Security Guidance		(2) Guidance Document	(2) (2008)			
				(3) Develop ATN System Security Solution for Initial and Enhanced Services		(3) Security, Technical, Management and Operational Control	(3) (2008)			
				(4) Co-ordinate and monitor ACP working group and other regions		(4) Report	(4) Semi-Annually until (2010)		Thailand	
				(5) Develop ATN System Security Check List based on Security Control and Regional Incident Response Plan and Contingency Plan		(5) Check List, Regional Incident Response Plan and Contingency Plan	(5) (2009)			
8	ATN Service Enhancements (supporting amended ICAO Flight Plan and ATS Message Formats)	D - Efficiency	GPI - 17, GPI - 19, GPI - 22	1) Review the impact of the impleemntation of Amendment 1 to 15th Edition of Doc. 4444 effective 15 Nov. 2012 (PANS ATM Chapter 4 and Appendix 3 relating to the ICAO Flight Plan and associated ATS Message formats to the AFS	Enhancing the service	1) Report on capability of existing and planned AFS systems to the revised ICAO Flight Plan and ATS Message Format	1) Annually until 2011	xxx		
				2) Indentify the new requirements for AMHS/AFTN to support new message format	Enhancing the operation	2) Report on impact of New ATS message format in AMHS	2) 2010	xxx		

No.	PERFORMANCE OBJECTIVE	ICAO Srategic Objective	Associated GPI	Tasks/Strategy	Benefits	Deliverables	Target Date	Leader	Supporting Members	ATNICG/3 Update
				3) Identify the link control procedure usign the AMHS to support the revised ATS message format to the ATC automation system	**Enhancing the service**	**3) Report whether special link control procedure is required**	**3) 2010**	**xxx**		

The ATN PERFORMANCE OBJECTIVE

The APAC ATN ground-to-ground infrastructure will be fully operational 53 percent at 23 locations by December 2007.

(GPI-22) COMMUNICATION NETWORK INFRASTRUCTURE

Related ATM objectives: AMSS; HF data; VHF data; SSR Mode S; ATN

Scope: To evolve the aeronautical mobile and fixed communication infrastructure, supporting both voice and data communications, accommodating new functions as well as providing the adequate capacity and quality of service to support ATM requirements.

(GPI-19) METEOROLOGICAL SYSTEMS

Objective: To improve the availability of meteorological information in support of a seamless glol ATM system.

(GPI-17) IMPLEMENTATION OF DATA LINK APPLICATIONS

Scope: Increase the use of data link applications

Related ATM objectives: Application of data link; Functional integration of ground systems; with airborne systems; ATS inter-facility data communication (AIDC)

INTERNATIONAL CIVIL AVIATION ORGANIZATION
ASIA AND PACIFIC OFFICE

ASIA/PAC
AERONAUTICAL TELECOMMUNICATION NETWORK
SYSTEM SECURITY POLICY

Second Edition

September 2008

ASIA/PAC AERONAUTICAL TELECOMMUNICATIONS NETWORK SYSTEM SECURITY POLICY

1. Purpose. This document prescribes the system security policy and associated requirements applicable to the Aeronautical Telecommunications Network (ATN). It applies to ATN implementations and defines the rules governing the protection of ATN data, services and resources associated with ATN applications and processes from both unintentional defects and deliberate attack. The design, implementation and operation of the ATN must support the complete and consistent enforcement of this system security policy.

2. Applicability. For the purpose of this policy, the ATN encompasses hardware, software, procedures, standards, facilities, and personnel. System security services provided in support of the ATN protect all data transmitted, stored, or processed by the system, for various levels of sensitivity.

3. Authority. This document is published in accordance with the authority of the International Civil Aviation Organization (ICAO).

4. Implementation and Enforcement. This system security policy defines a minimum set of rules to be enforced for the protection of data, services, and resources under ATN cognizance. Regional and local authorities may apply more stringent rules or constraints, while not degrading the ATN system security posture and maintaining consistency with the minimum essential required system security rules identified in this ATN System security Policy.

5. System security Requirements. System security requirements apply to the protection of the physical information technology, the communications equipment, and the data and information systems. Protection also applies to the facilities, environment, hardware, software, and people associated with the ATN. The fundamental ATN system security requirements are:

(1) Protect all ATN data directly associated with ATN applications and processes including ATN messages and stored information from unauthorized disclosure, modification, or deletion.
(2) Protect ATN services and resources from unauthorized use and denial of service.

6. System Security Services. Safe and secure operation of the ATN depends upon the accurate and consistent enforcement of six high level services: confidentiality, data integrity, authenticity, availability, accountability, and interoperability.

(1) Confidentiality. Ensures data is not disclosed to unauthorized entities. For the ATN, confidentiality, when appropriate, extends to data associated with ATN support applications and processes including system management and security applications.
(2) Data Integrity. Ensures data has not been altered or destroyed in an unauthorized manner.
(3) Authenticity. Ensures that the source of data or the identity of an entity is as claimed.
(4) Availability. Ensures resources, services, and data are accessible and usable on demand or in a timely, reliable manner by an authorized entity.
(5) Accountability. Enables activities to be traced to users and processes that may then be held responsible for those actions.

7. System Security Policy Statements. The ATN system security policy is intended to result in management, operational, and technical controls implemented on a regional or local level to provide system security services meeting the fundamental system security requirements. Accordingly, the following functional policy statements are identified in terms of the defined services:

(1) Functional Policy Statements

a. Confidentiality

(a) ATN data shall be protected from unauthorized disclosure during processing, transmission, and storage commensurate with the designated sensitivity of the data.

b. Data Integrity

(a) ATN data shall be protected from unauthorized or undetected modification during transmission, storage, and processing.

c. Authenticity

(a) ATN users and processes shall be uniquely identified.

(b) ATN users and processes shall be authenticated before being granted access to ATN data, services, and resources.

(c) ATN data, services, and resources shall be protected from unauthorized use or tampering.

(d) ATN users and processes shall have access only to those ATN data, services, and resources for which they have authorization.

d. Availability

(a) ATN data, services, and resources shall be available for use by authorized users and processes.

e. Accountability

(a) An audit trail of use of ATN data, services, and resources by ATN users and processes shall be maintained.

8. Verification and Authorization. The process used by an independent agent to confirm or establish that the management, operational, and technical controls effectively meet the system security requirements is termed *verification*. Verification includes establishing that the system security functional policy is adequately provided. The *authorization* by responsible entities to place a system into operation is based on the verified effectiveness of management, operational, and technical controls.

(1) Verification

a. ATN systems shall be verified to have system security commensurate with the risk and magnitude of harm resulting from unauthorized disclosure, modification, or deletion of ATN data, or unauthorized use and denial of service of ATN services and resources.

(2) Authorization

a. ATN systems shall be formally approved for operation by the cognizant Designated Approving Authority (DAA).

b. Significant changes to ATN systems shall require another formal approval (or re-authorization).

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International Civil Aviation Organization
Asia and Pacific Office

Asia/Pacific Regional AMHS MTA Routing Policy

First Edition

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1.0 Introduction

Within the Asia/Pacific Region, work is underway to implement the ATN AMHS as a replacement and complement to the AFTN. The Region has already prepared planning documents on AMHS naming standards as well as draft guidelines on the implementation of AMHS within the Region. To progress implementation, planning documents for the routing of AMHS message between systems within the Region and to systems outside the Region are needed to serve as guidance.

1.1 Objective

This document presents AMHS routing policies to be used within the Asia/Pacific Region for implementation of AMHS. The development of AMHS message routing policies is based on the need for States and AMHS administrators to be able to control the flow of messages into individual AMHS systems.

1.2 Scope

The MTA routing policy document covers policy for AMHS systems to route AMHS messages between MTAs within Asia/Pacific Region both in the transitional phase and final phase of AMHS implementation. It also outlines the policy for inter-region AMHS connections between the regions. It does not, however, specify the characteristics for MTAs or how the connections between MTAs are established.

1.3 Reference

1) ICAO Doc. 9705-AN/956 *Manual of Technical Provisions for the Aeronautical Telecommunication Network (ATN).* Third Edition 2002.

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

3) ICAO AFSG Operations Group *Routing Directory for AFTN and CIDIN Centres in the EUR/NAT Region.* Part IV COM Charts per ICAO Region, Version 1.2 – March 2004.

4) ATNTTF/6 – *Report of the Sixth Meeting of Aeronautical Telecommunication Network (ATN) Transition Task Force of APANPIRG (ATNTTF/6).* Table CNS-1A AFTN-PLAN, Appendix A – April 2004

5) ATNTTF/6 – *Report of the Sixth Meeting of Aeronautical Telecommunication Network (ATN) Transition Task Force of APANPIRG (ATNTTF/6).* Table CNS-1B ATN Router Plan, Appendix A – April 2004

6) ATNTTF/6 – *Report of the Sixth Meeting of Aeronautical Telecommunication Network (ATN) Transition Task Force of APANPIRG (ATNTTF/6).* Table CNS-1C ATSMHS Implementation Plan, Appendix A – April 2004

7) ATNTTF/6 – WP10. *MTA Transitional Routing Policy.* Presented by Japan.

8) ATNTTF/6 – WP15. *AMHS Routing Impact*. Presented by Hong Kong, China.

2.0 Background

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

The ATN AMHS system at originating station, when it first receives a newly submitted message, must determine the ATN AMHS system that will receive the AMHS message. This may be:

- the destination ATN AMHS,
- a relay ATN AMHS, or
- the AFTN.

If one looks at the Internet and its SMTP-based email system as an example, it becomes clear that routing policies need to be developed for the successful exchange of messages between senders and recipients. First, it is possible for any AMHS system to send a message directly to the destination AMHS system if it has the appropriate NSAP and TSEL of the destination system. This is due to the fact that ATN routing should provide a path between any two ATN end systems. Second, it is logical that some, if not most, ATN operators will choose to manage their systems in a way that limits its use of bandwidth and the amount of information it must maintain. Third, systems will most likely be configured to take advantage of logical cooperation between States and Organizations to minimize costs and complexity.

Of particular concern is the need for ATN system operators to be able to control what systems are able to get connected to its system and to protect the integrity of its systems through access control.

3.0 Routing Overview

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

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

AMHS MTAs perform routing by matching the X.400 O/R address with the routing information maintained by the MTA. The destination MTA affects whether direct delivery or relaying messages is required. The complexity of routing decisions that a particular MTA makes is entirely a local implementation issue.

3.1 Routing Fundamentals

An MTA becomes responsible for the routing and delivery of a message when it is successfully submitted to the MTA either from a UA (or MS), another MTA or directly connected AMHS gateway. The MTA routing process is entirely based upon the destination addresses and the internal routing tables. An MTA compares the destination addresses against its criteria for forwarding to another MTA. If the results of the MTA lookup are not in the current traceable information, the message is forwarded. If it is in the current traceable information, an NDR is generated and the message is discarded.

The central issue in establishing a local MTA routing table is the trade-offs between: routing table size, performance, and security. Routing decisions and security are considered in the next section.

The trade-off between routing table size and performance is due to the nature of routing. For optimal performance – which means a single hop between source MTA and destination MTA – each MTA would potentially need routing information about every other MTA in the ATN. While in early stages of AMHS implementation, the number of MTAs may be small. In later stages the number of MTAs maybe too large for simple routing table to process. As the number of entries rise in the routing table, the costs of searching the table and the complexity of maintaining the table will increase. On the other side, as the number of routing entries is reduced the potential for longer message propagation delays increase as messages are routed and relayed through other MTAs.

The development of routing policies attempts to optimize the performance while maintaining a reasonable sized routing table.

3.2 Routing and Security

Routing can be performed by providing each MTA with sufficient information so that the MTA can send every AMHS message directly to its destination. In other words, AMHS messages would always go directly from the sender to the recipient MTA and leave the routing process for the network infrastructure.

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

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

However, considering security for the first case, an MTA configured to accept all incoming Bind Requests, regardless of the source system, is open to both malicious attacks and traffic. A malicious attacker may launch a Denial of Service (DoS) by sending many Bind Requests (and associated large amounts of data) to a MTA in order to overwhelm it. Similarly, if traffic is being accepted from all MTAs, a system must be engineered to provide for larger number of incoming connections, potentially larger traffic loads are generated and consequently increasing the system complexity. Therefore, both security and network management technique should be implemented together with this policy to prevent the problems, such as authentication using IDRP version 2 or router authentication on network sub-layer.

For the second case, security aspect is already considered when the MTA operator generates the “Access Control List.” The MTA system only accepts Bind Request and messages from MTAs within the list and denies Bind Requests from the rest. This policy is similar with the current AFTN routing table and therefore shares the same deficiencies, such as inflexibility, but it offers greater control for the operator.

It is desirable for MTA operators to be able to provide sufficient security with delivering and receiving messages with minimum resource utilization. However, the policy and implementation of any supporting mechanism are considered a local or bilateral matter for operators.

4.0 AMHS MTA routing policy

4.1 Backbone MTAs

Backbone MTAs are the currently assigned inter-regional MTAs, which are entry/exit points of AMHS connection between Asia/Pacific region and other regions. Each backbone MTA should independently send/receive messages with other (backbone) MTAs of other regions and between each other within the region. Because the networking capability of the ATN, the operation of backbone MTA is more flexible and can handle more capacity than the current AFTN operation. Therefore, unlike the AFTN, the designation of backbone MTAs can be independent of the main inter-region communication links at the respective COMM Centers. The table of proposed location of backbone MTAs within Asia/Pacific region is provided in Appendix B.

4.2 AMHS System Interconnection

Within the Asia/Pacific Region, routing of AMHS messages will be as follows:

- **Messages exchanged within the region:** All MTA within the region should be able to send/receive AMHS message directly with each other or have direct MTA-to-MTA routing. Consequently, the number of hop for sending a message within the region will be one, and the MTA routing table will contain entries of all other MTAs within the region.

- **Messages exchanged between States within the Region and other regions:** All AMHS messages exchanged between States within Asia/Pacific region and others should pass through backbone MTAs. To send AMHS messages to other MTAs outside the region, the source MTA will first send those messages to backbone MTA responsible for sending messages to the destination MTAs. In reverse direction, the backbone MTAs act as a gateway for incoming messages from corresponding MTAs outside of the region and relays the messages to the destination MTA within the region.

However, the aforementioned routing policy will not be fully implemented immediately due to the different AMHS transition timeframes of each State. Instead, there will be a transitional period during which the Aeronautical Fixed Service (AFS) in the region will be provided by a mixture of interoperating AMHS and AFTN sites, with “islands” of directly connected AMHS sites gradually expanding and merging, and AFTN links progressively being eliminated. The transitional routing policy and example figures are presented in Appendix A.

APPENDIX A Transitional Routing Policy

During the transition period, it is proposed that the following transitional policy be adopted to ensure smooth transition from AFTN to AMHS.

- **Message exchanged between states that have implemented AMHS:** States that have implemented AMHS shall use direct MTA-to-MTA routing among themselves, forming an "island" of AMHS sites. However, to ease the transition process, whenever a new AMHS system is implemented, the initial routing configuration should correspond to the AFTN routing table exactly. Once it has been operational, it is necessary to carry out coordination with all States in the island. The coordination should also include connection tests between the MTA system and all other AMHS systems to which it will connect. In conclusion, the following steps are recommended:
  - If the new MTA is introduced to the AMHS Islands, it is recommended that during the initial phase of implementation, the new MTA use AFTN routing table for routing configuration.
  - As the new MTA gain more experience from the operation of AMHS, it should enter bi-lateral agreement with other MTAs to establish direct message exchange at a later stage.

- **Message exchanged between States using AFTN and States using AMHS:** The AMHS/AFTN gateway function should be implemented alongside with the AMHS systems to provide message exchange service with states using AFTN. However, in order to avoid changes in the AFTN routing directory, the AMHS should also route messages to adjacent states, which are using AFTN, based on the current AFTN Routing Directory. It should be noted that even if a state connects to other states using only AMHS, an AMHS/AFTN gateway function would still be necessary to support domestic legacy AFTN networks.

The following figures illustrate the AMHS routing mechanism and transitional routing policy:

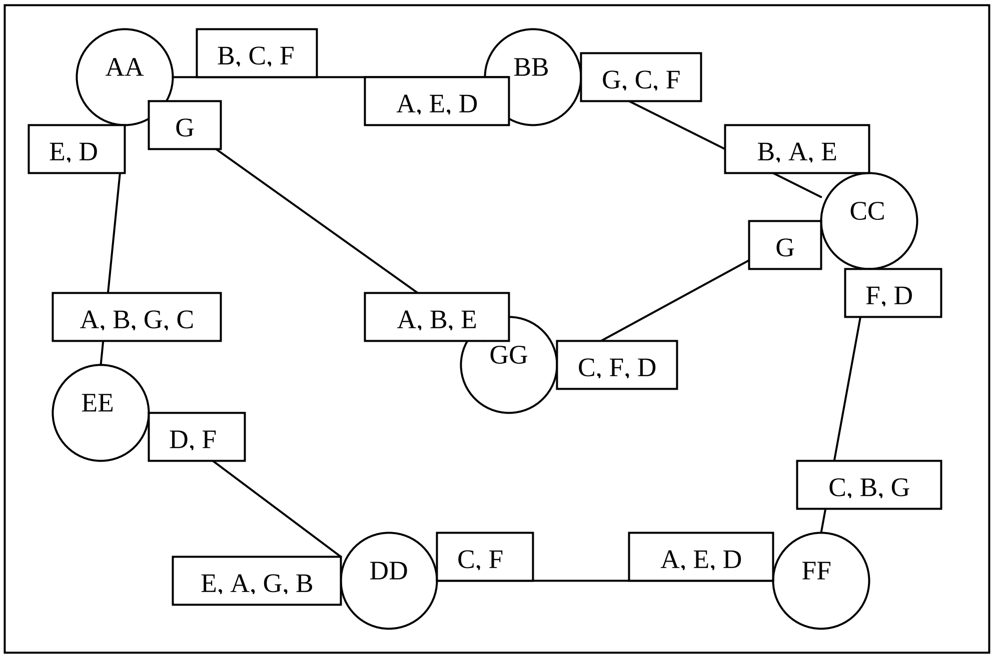

Figure 1 Example of configuration with all organization using AFTN

Figure 1 displays the configuration where all organizations have implemented AFTN and already configured the routing paths among themselves. The circle illustrates an organization with its name inside. The lines between circles illustrate the physical connections between organizations. The box above the line adjacent to the circle shows the routing configuration on that connection. The box with letters ‘C, F’ signifies that all messages with destination addresses starting with C or F will be routed though this connection.

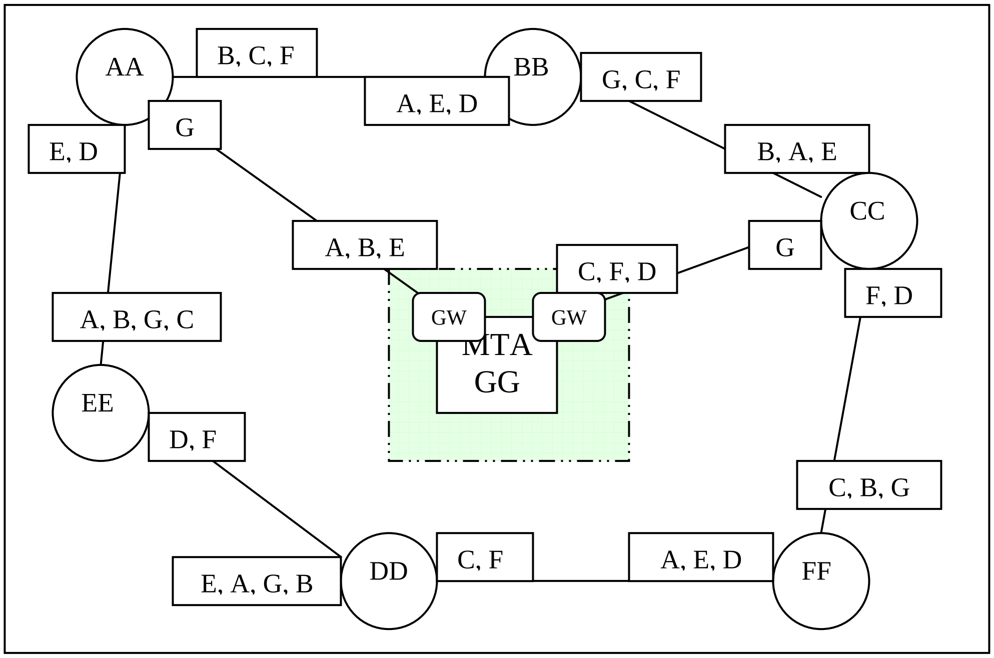

Figure 2 Example of configuration with only one MTA presented among AFTN nodes

Figure 2 displays the configuration when one organization has started implementing AMHS and setting up MTA. In this example, the organization GG is the first to implement MTA. However both organization AA and CC, to whom GG is connected, have not implemented AMHS. Furthermore, the MTA of GG will require function of AFTN/AMHS gateway to be able to seamlessly transmit messages with AFTN sites. Therefore, following the transitional policy, the messages from GG to AA and CC will follow the same AFTN configuration as in figure 1. For GG, messages with destination addresses starting with C, F and D will be routed through AFTN/AMHS gateway and to organization CC, and messages with destination addresses starting with A, B, and E will be routed through gateway to organization AA.

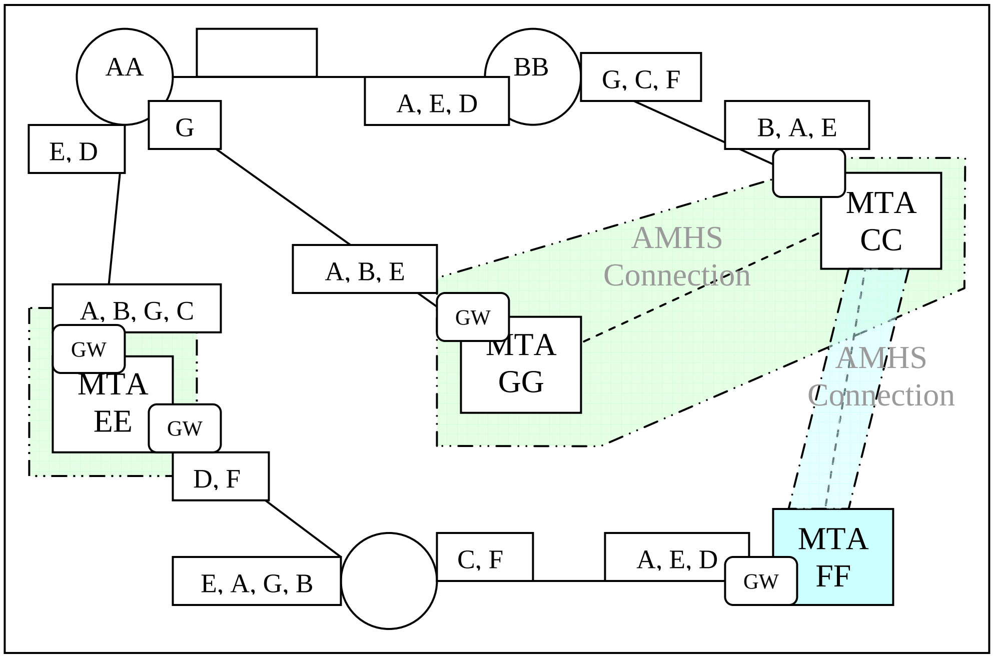

Figure 3 Example configuration with more than one MTAs

Figure 3 displays the situation when more than one organizations have implemented AMHS in the region. In this example, organization GG, CC, FF, and EE have implemented MTA systems. Because the MTA of EE does not have direct connections to other MTAs, it will connect with neighbor AFTN using gateway functions as described in figure 2. As previously stated in the policy, the gateways should be configured to be compatible with the routing table configuration as defined in figure 1. Organization GG establishes AMHS connection with CC with the route configuration corresponding with AFTN routing table. Organization FF also establishes AMHS connection and exchanges all AMHS messages with CC only. As FF and GG become confident in AMHS operation, they may enter bi-lateral agreement with each other to test and later establish AMHS connection.

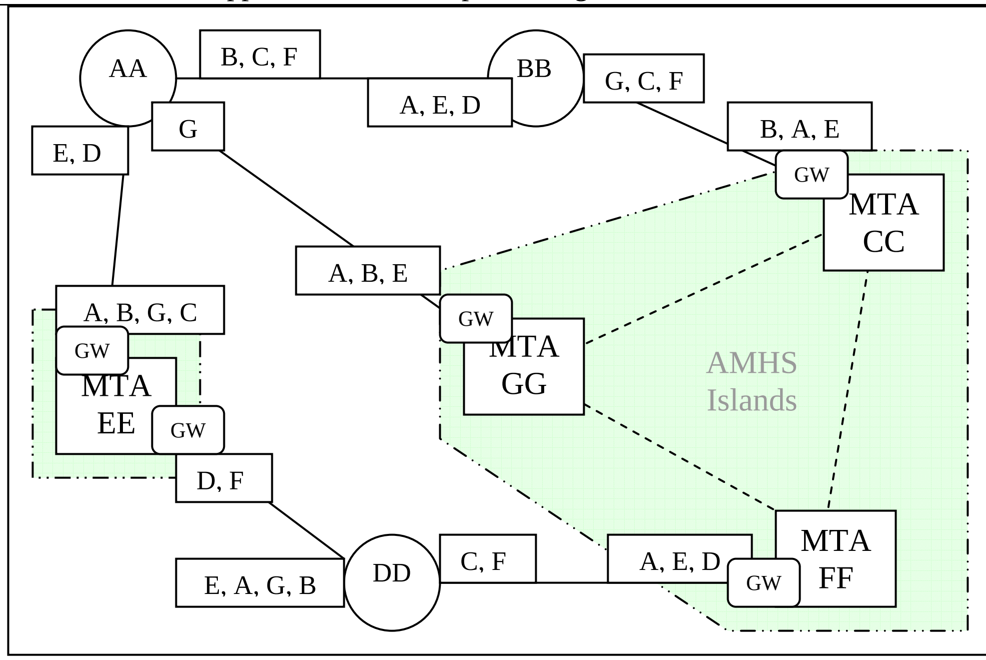

Figure 4 Example configuration with more than one MTAs presented

Figure 4 displays the situation when more than one organizations have implemented AMHS in the region. Following figure 3, after organization FF becomes confident with the AMHS operation and request bi-lateral agreement with organization GG, it establishes 'logical AMHS connection' with GG. Consequently, all MTAs within the island establish logical 'direct MTA-to-MTA[1]' connections, which are illustrated as dotted lines, for transmitting AMHS messages between themselves. The AFTN/AMHS gateway functions are still required at the edge of the island where messages are transmitted from AMHS MTAs to AFTN.

[1] The above "direct MTA-to-MTA" connection shows a logical connection and it may not be necessarily the same as a physical connection using ATN Routers. At least two physical connections are necessary between the organization GG, CC and FF in the above case.

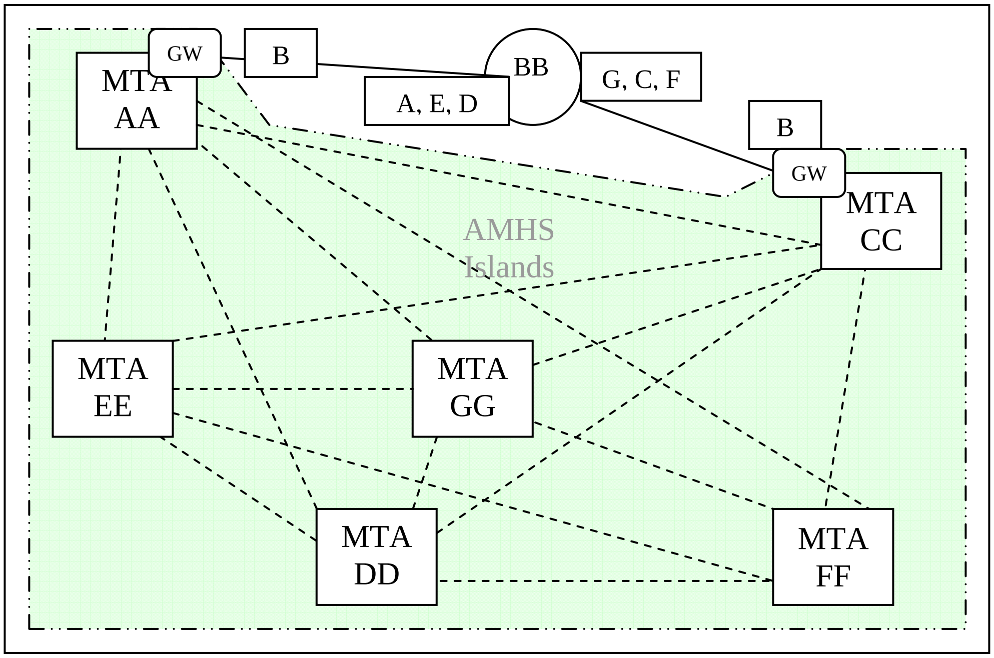

Figure 5 displays the situation when more organizations have implemented AMHS than AFTN. All MTAs will from AMHS islands and have logical 'direct MTA-to-MTA[2]' connection between them. At the edge of the island, MTAs will connect with AFTN using AFTN/AMHS gateway functions. From the figure, however, only organization BB has not implemented AMHS MTA, thus the gateways are configured to send messages with destination addresses starting with B only.

[2] The above "direct MTA-to-MTA" connection shows a logical connection and it may not be necessarily the same as a physical connection using ATN Routers. At least one physical path must exist between the MTAs.

APPENDIX B Table of Proposed Backbone MTAs Site in Asia/Pacific Region

The following table contains the proposed location of Backbone MTAs within the Asia/Pacific region:

Name and location of Proposed Backbone MTA
NFFN – Nadi International Airport, Fiji
NZCH – Christchurch International Airport, New Zealand[3]
RJAA – New Tokyo International Airport, Japan
VABB – Mumbai/Jawaharlal Nehru International Airport, India
VHHH – China (Hong Kong) COMM Center
VTBB – Bangkok ACC/FIC/COM, Thailand
WSSS – Singapore Changi Airport, Singapore
YBBB – Brisbane (FIS/FIC/ACC/COM/MET/NOF), Australia
ZBBB – Beijing City, China

Table 1 Proposed Backbone MTA in Asia/Pacific Region[4]

[3] The connection between New Zealand and the US will be considered as a restricted link for AMHS use only.
[4] KSLC [Salt Lake City, US] is considered to be in the North America region and thus is outside the scope of this table. However, there are many pacific islands with connections with KSLC. They will be considered exceptions because they will become UAs to the KSLC AMHS as stated in the table CNS-1C [5].

APPENDIX C ACRONYMS

AFS	(Aeronautical Fixed Service)
AFTN	(Aeronautical Fixed Telecommunication Network)
AMHS	(ATS message handling system)
ATN	(Aeronautical Telecommunication Network)
ATS	(Air Traffic Service)
ATSMHS	(ATS Message Handling Service)
DoS	(Denial of Service)
IDRP	(Inter-domain Routing Protocol)
MS	(Message Storage)
MTA	(Message Transfer Agent)
NDR	(Non-Delivery Report)
NSAP	(Network Service Access Point)
O/R Address	(Originator/Recipients Address)
SARPs	(Standards and Recommended Practices)
SMTP	(Simple Mail Transfer Protocol)
TBD	(To Be Determined)
TBP	(To Be Proposed)
TSEL	(Transport Selector)
UA	(User Agent)

TABLE CNS 1B – ATN ROUTER PLAN

Explanation of the Table

Column

1 Administration – the name of the Administration, State or Organization responsible for management of the router

2 Location of Router

3 Type of Router:

BBIS - Backbone Boundary Intermediate System
BIS - Boundary Intermediate System

4 Type of Interconnection:
Inter – Regional
Intra – Regional
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

TBD- To be determined

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			United States				Intra-domain
Australia	Brisbane			Timor Leste				Intra-domain
		BBIS	Sub-Regional	Fiji	19200 bps	X.25	2009	Implemented
		BIS	Sub-Regional	Indonesia	9600 bps	X.25	2008	Implemented
		BBIS	Intra-Regional	Japan	64000 bps	X.25	2010	Not implemented
				Nauru				Intra-domain
		BIS	Sub-Regional	New Zealand	9600 bps	X.25	2010	Circuit implemented
				Papua New Guinea				Intra-domain
		BBIS	Inter-Regional	South Africa	64000 bps	X.25	TBD	Circuit implemented
				Solomon Islands	VPN		2008	Intra-domain
				Vanuatu	VPN		2008	Intra-domain
	Melbourne	BBIS	Intra-Regional	Singapore	64000bps	X.25	2008	Circuit implemented
		BBIS	Inter-Regional	United States	64000 bps	X.25	2009	Circuit implemented
Bangladesh	Dhaka	BIS	Sub-Regional	India	9600 bps	X.25	TBD	(India)
		BIS	Sub-Regional	Thailand	9600 bps	X.25	2009-2010	(Thailand)
Bhutan	Paro	BIS	Sub-Regional	India	9600 bps	X.25	TBD	(India)
Brunei Darussalam	Brunei	BIS	Sub-Regional	Malaysia	64000 bps	X.25	TBD	(Malaysia)
		BIS	Sub-Regional	Singapore	9600 bps	X.25	TBD	(Singapore)

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**
Cambodia	Phnom Penh	BIS	Sub-Regional	Thailand	9600 bps	X.25	2009-2010	(Thailand)
China	Beijing	BIS	Sub-Regional	DPR Korea	9600 bps	X.25	2010	ATN Router Implemented
		BBIS	Intra-Regional	Hong Kong, China	64000 bps	X.25	2009	ATN Router Implemented
		BBIS	Intra-Regional	India	64000 bps	X.25	2008	ATM Router Implemented
		BBIS	Intra-Regional	Japan	64000 bps	X.25	2010	ATN Router Implemented
		BBIS	Inter-Regional	Kuwait	64000 bps	X.25	TBD	ATN Router Implemented
		BIS	Sub-Regional	Macau, China	9600 bps	X.25	2009	ATN Router Implemented
		BIS	Sub-Regional	Mongolia	9600 bps	X.25	2010	ATN Router Implemented
		BIS	Sub-Regional	Myanmar	9600 bps	X.25	2010	ATN Router Implemented
		BIS	Sub-Regional	Nepal	9600 bps	X.25	2010	ATN Router Implemented
		BIS	Sub-Regional	Pakistan	9600 bps	X.25	2010	ATN Router Implemented
		BIS	Sub-Regional	Republic of Korea	64000 bps	X.25	2011	ATN Router Implemented
		BBIS	Inter-Regional	Russian Federation	19200 bps	X.25	TBD	ATN Router Implemented
		BBIS	Intra-Regional	Thailand	64000 bps	X.25	2009	ATN Router Implemented
		BIS	Sub-Regional	Vietnam			TBD	(Vietnam)
	Taibei	BIS	Sub-Regional	Hong Kong, China	9600 bps	X.25	2009	
		BIS	Sub-Regional	Japan	9600 bps	X.25	2009	
Hong Kong, China	Hong Kong	BBIS	Intra-Regional	China	64000 bps	X.25	2009	
		BIS	Sub-Regional	Macau, China	9600 bps	X.25	2009	
		BBIS	Intra-Regional	Japan	64000 bps	X.25	2010	
		BIS	Sub-Regional	Philippines	9600 bps	X.25	2009	

Administration	Location of Router	Type of Router	Type of Interconnection	Interconnection, Connected to router of:	Link Speed	Link Protocol	Target date of Implementation	Remarks
1	2	3	4	5	6	7	8	9
		BIS	Sub-Regional	Taibei	9600 bps	X.25	2009	
		BBIS	Intra-Regional	Thailand	64000 bps	X.25	Implemented	
		BIS	Sub-Regional	Viet Nam	9600 bps	X.25	2006	
Macau, China	Macau	BIS	Sub-Regional	China	9600 bps	X.25	2009	
		BIS	Sub-Regional	Hong Kong, China	9600 bps	X.25	2009	
Cook Islands	Rarotonga			New Zealand	9600 bps	X.25		Intra-domain
DPR Korea	Pyongyang	BIS	Sub-Regional	China	9600 bps	X.25	2010	(China)
Fiji	Nadi	BBIS	Intra-Regional	Australia	19200 bps	X.25	2009	Circuit implemented
		BIS	Sub-Regional	Kiribati	9600 bps	X.25	TBD	Intra-domain
				New Caledonia		TBD	TBD	Intra-domain
		BIS	Sub-Regional	Tuvalu			TBD	Intra-domain
		BBIS	Inter-Regional	United States	19200 bps	X.25	2009	Circuit implemented
				Wallis Islands			TBD	Intra-domain
French Polynesia	Papeete			New Zealand			TBD	Intra-domain
India	Mumbai	BIS	Sub-Regional	Bangladesh	9600 bps	X.25	TBD	
		BIS	Sub-Regional	Bhutan	9600 bps	X.25	TBD	
		BBIS	Intra-Regional	China	64000 bps	X.25	2008	
		BIS	Inter-Regional	Kenya	19200 bps	X.25	TBD	
		BIS	Sub-Regional	Nepal	9600 bps	X.25	TBD	
		BIS	Inter-Regional	Oman	19200 bps	X.25	TBD	
		BIS	Sub-Regional	Pakistan	9600 bps	X.25	TBD	

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**
		BBIS	Intra-Regional	Singapore	64000 bps	X.25	2008	
		BIS	Sub-Regional	Sri Lanka	9600 bps	X.25	TBD	
		BBIS	Intra-Regional	Thailand	64000 bps	X.25	2008	
Indonesia	Jakarta	BIS	Sub-Regional	Australia	9600 bps	X.25	2010	
		BIS	Sub-Regional	Singapore	9600 bps	X.25	2009	
Japan	Tokyo	BBIS	Intra-Regional	Australia	64000 bps	X.25	2010	
		BBIS	Intra-Regional	China	64000 bps	X.25	2010	
		BBIS	Intra-Regional	Hong Kong, China	64000 bps	X.25	2010	
		BBIS	Inter-Regional	Europe	64000 bps	X.25	TBD	
		BIS	Sub-Regional	Republic of Korea	64000 bps	X.25	2011	
		BBIS	Inter-Regional	Russia Federation	64000 bps	X.25	TBD	
		BBIS	Intra-Regional	Singapore	64000 bps	X.25	2010	
		BIS	Sub-Regional	Taibei	64000 bps	X.25	2008	
		BBIS	Inter-Regional	United States	64000 bps	X.25	Implemented	
Kiribati	Tarawa	BIS	Sub-Regional	Fiji	9600 bps	X.25	TBD	Intra-domain
Lao PDR	Vientiane	BIS	Sub-Regional	Thailand	9600 bps	X.25	2009-2010	(Thailand)
		BIS	Sub-Regional	Viet Nam	9600 bps	X.25	2010	(Vietnam)
Malaysia	Kuala Lumpur	BIS	Sub-Regional	Brunei	64000 bps	X.25	TBD	
		BIS	Sub-Regional	Singapore	64000 bps	X.25	2007	Implemented
		BIS	Sub-Regional	Thailand	64000 bps	X.25	2008	

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**
Micronesia Federated State of	Chuuk			United States				Intra-domain
	Kosrae			United States				Intra-domain
	Ponapei			United States				Intra-domain
	Yap			United States				Intra-domain
Mongolia	Ulaanbaatar	BIS	Sub-Regional	China	9600 bps	X.25	2010	(China)
Myanmar	Yangon	BIS	Sub-Regional	China	9600 bps	X.25	2010	(China)
		BIS	Sub-Regional	Thailand	9600 bps	X.25	2009-2010	(Thailand)
Nauru	Nauru			Australia				Intra-domain
Nepal	Kathmandu	BIS	Sub-Regional	China	9600bps	X.25	2010	(China)
		BIS	Sub-Regional	India	9600bps	X.25	TBD	(India)
New Caledonia	Noumea			Fiji			TBD	Intra-domain
New Zealand	Christchurch	BIS	Sub-Regional	Australia	9600 bps	X.25	2010	
				Cook Is				Intra-domain
				French Polynesia	9600 bps	X.25	TBD	Intra-domain
				Niue	9600 bps	X.25		Intra-domain
				Samoa	9600 bps	X.25		Intra-domain
				Tonga	9600 bps	X.25		Intra-domain
		BIS	Inter-Regional	USA	9600 bps	X.25	2010	
Niue Islands	Niue			New Zealand	9600 bps	X.25		Intra-domain

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
Pakistan	Karachi	BIS	Sub-Regional	China	9600 bps	X.25	2010	(China)
		BIS	Sub-Regional	India	9600 bps	X.25	TBD	(India)
Papua New Guinea	Port Moresby			Australia				Intra-domain
Philippines	Manila	BIS	Sub-Regional	Hong Kong, China	9600 bps	X.25	2009	Circuit Implemented
		BIS	Sub-Regional	Singapore	32000 bps	X.25	2009	Circuit Implemented
Republic of Korea	Seoul	BIS	Sub-Regional	China	64000 bps	X.25	2011	
		BIS	Sub-Regional	Japan	64000 bps	X.25	2011	
Samoa	Faleolo			New Zealand				Intra-domain
Singapore	Singapore	BBIS	Intra-Regional	Australia	64000 bps	X.25	2008	Circuit Implemented
		BIS	Inter-Regional	Bahrain	64000 bps	X.25	TBD	Circuit Implemented
		BIS	Sub-Regional	Brunei	9600 bps	X.25	TBD	Circuit Implemented
		BBIS	Intra-Regional	India	64000 bps	X.25	2008	
		BIS	Sub-Regional	Indonesia	9600 bps	X.25	2008-2009	Circuit Implemented
		BBIS	Intra-Regional	Japan	64000 bps	X.25	2010	Circuit Implemented
		BIS	Sub-Regional	Malaysia	64000 bps	X.25	2007	Circuit Implemented
		BIS	Sub-Regional	Philippines	32000 bps	X.25	2009	Circuit Implemented
		BIS	Sub-Regional	Sri Lanka	64000 bps	X.25	2010	Circuit Implemented
		BBIS	Intra-Regional	Thailand	64000 bps	X.25	2009-2010	Circuit Implemented
		BBIS	Inter-Regional	United Kingdom	64000 bps	X.25	2008-2009	Circuit Implemented
		BIS	Sub-Regional	Viet Nam	9600 bps	X.25	2010-2011	Circuit Implemented

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
Solomon Islands	Honiara			Australia	VPN		2008	(Australia) Intra-Domain
Sri Lanka	Colombo	BIS	Sub-Regional	India	64000 bps	X.25	2010	
		BIS	Sub-Regional	Maldives	9600bps	X.25	2010	
		BIS	Sub-Regional	Singapore	64000 bps	X.25	2010	
Thailand	Bangkok	BIS	Sub-Regional	Bangladesh	9600 bps	X.25	2009-2010	
		BIS	Sub-Regional	Cambodia	9600 bps	X.25	2009-2010	
		BBIS	Intra-Regional	China	64000 bps	X.25	2009	
		BBIS	Intra-Regional	Hong Kong, China	64000 bps	X.25	Implemented	
		BBIS	Intra-Regional	India	64000 bps	X.25	2009-2010	Circuit Implemented
		BBIS	Inter-Regional	Italy	64000 bps	X.25	TBD	Circuit Implemented
		BIS	Sub-Regional	Lao PDR	9600 bps	X.25	2009-2010	
		BIS	Sub-Regional	Malaysia	9600 bps	X.25	2009-2010	
		BIS	Sub-Regional	Myanmar	9600 bps	X.25	2009-2010	
		BBIS	Intra-Regional	Singapore	64000 bps	X.25	2009-2010	Circuit Implemented
		BIS	Sub-Regional	Viet Nam	9600 bps	X.25	2009-2010	
Timor Leste	Dili			Australia				Intra-domain
Tonga	Tongatapu			New Zealand	9600 bps	X.25		Intra-domain
Tuvalu	Funafuti			Fiji			TBD	Intra-domain
United States	Salt Lake City	BBIS	Inter-Regional	Australia American Samoa	64000 bps	X.25	2007	Circuit Implemented Intra-domain

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**
		BBIS	Inter-Regional	Fiji	19200 bps	X.25	2007	Circuit Implemented
		BBIS	Inter-Regional	Japan	64000 bps	X.25	2006	Circuit Implemented
				Marshall Islands				Intra-domain
				Micronesia, Federated State of				Intra-domain
		BIS	Inter-Regional	New Zealand	9600 bps	X.25	2010	Circuit Implemented
				Palau	9600 bps	X.25	2005	Intra-domain
Vanuatu	Port Vila			Australia	VPN		2008	Intra-domain (Australia)
Viet Nam	Ho Chin Minh/Hanoi	BIS	Sub-Regional	China			TBD	
		BIS	Sub-Regional	Hong Kong, China	9600bps	X.25	2010	
		BIS	Sub-Regional	Lao PDR	9600bps	X.25	2010	
		BIS	Sub-Regional	Singapore	9600bps	X.25	2010	
		BIS	Sub-Regional	Thailand	9600bps	X.25	2010	
Wallis Islands	Wallis			Fiji		X.25	TBD	Intra-domain

TABLE CNS-1C
ATS MESSAGE HANDLING SERVICE (ATSMHS)
IMPLEMENTATION PLAN

Explanation of the Table

Column	
1	Administration – the name of the Administration, State or Organization responsible for management of the facility
2	Location of Facility
3	Facility Type: AMHS UA (Location of AMHS)
4	Target Date of Implementation – date of implementation of the ATSMHS TBD – To be determined
5	Remarks

AMHS – ATS Message Handling System which may include Message Transfer Agents and AFTN/AMHS gateways services.

TABLE CNS-1C ATS MESSAGE HANDLING SERVICE (ATSMHS) IMPLEMENTATION PLAN

Administration	Location of Facility	Facility Type	Target Date of Implementation	Remarks
American Samoa	Pago Pago	UA (Salt Lake City)	2005	
Australia	Brisbane	AMHS	2006	
Bangladesh	Dhaka	AMHS	2007	
Bhutan	Paro	UA (Mumbai)	2008	
Brunei Darussalam	Brunei	AMHS	2007	
Cambodia	Phnom Penh	AMHS	2007	
China	Beijing	AMHS	2008	Implemented
	Taibei	AMHS	2006	
Hong Kong, China	Hong Kong	AMHS	2009	
Macau, China	Macau	AMHS	2009	
Cook Island	Rarotonga	UA (Christchurch)	2006	
DPR Korea	Pyongyang	AMHS	2007	
Fiji	Nadi	AMHS	2009	
French Polynesia	Papeete	AMHS	TBD	
India	Mumbai	AMHS	2008	
Indonesia	Jakarta	AMHS	2009	
	Ujung Pandang	AMHS	2010	
Japan	Tokyo	AMHS	Implemented	
Kiribati	Tarawa	UA (Nadi)	2010	
Lao PDR	Vientiane	AMHS	2005	

TABLE CNS-1C ATS MESSAGE HANDLING SERVICE (ATSMHS) IMPLEMENTATION PLAN

Administration	Location of Facility	Facility Type	Target Date of Implementation	Remarks
Malaysia	Kuala Lumpur	AMHS	2009	
Maldives	Male	AMHS	2005	
Marshall Island	Majuro	UA (Salt Lake City)	2005	
Micronesia Federated State of	Chuuk	UA (Salt Lake City)	2005	
	Kosrai	UA (Salt Lake City)	2005	
	Ponapei	UA (Salt Lake City)	2005	
	Yap	UA (Salt Lake City)	2005	
Mongolia	Ulaanbaatar	AMHS	2006	
Myanmar	Yangon	AMHS	2005	
Nauru	Nauru	UA (Brisbane)	2006	
Nepal	Kathmandu	AMHS	2010	
New Caledonia	Noumea	AMHS	TBD	
New Zealand	Christchurch	AMHS	2010	
Niue Is	Niue	UA (Christchurch)	2006	
Pakistan	Karachi	AMHS	2006	
Palau	Koror	UA (Salt Lake City)	2005	
Papua New Guinea	Port Moresby	UA (Brisbane)	2006	
Philippines	Manila	AMHS	2006	Implemented
Republic of Korea	Seoul	AMHS	2011	
Samoa	Faleolo	UA (Christchurch)	2006	
Singapore	Singapore	AMHS	2006	Implemented

TABLE CNS-1C ATS MESSAGE HANDLING SERVICE (ATSMHS) IMPLEMENTATION PLAN

Administration	Location of Facility	Facility Type	Target Date of Implementation	Remarks
Solomon Is	Honiara	UA (Brisbane)	2006	
Sri Lanka	Colombo	AMHS	2006	
Thailand	Bangkok	AMHS	2006	
Timor Leste	Dili	UA (Brisbane)	2006	
Tonga	Tongatapu	UA (Christchurch)	2006	
Tuvalu	Funafuti	UA (Nadi)	2010	
United States	Salt Lake City	AMHS	Implemented	
Vanuatu	Port Vila	UA (Brisbane)	2006	
Viet Nam	Ho Chi Minh	AMHS	2012	2010 for Test, 2012 for deployment
Wallis Is.	Wallis	AMHS	TBD	

Annex E - AMHS Inter-Operability Tests

and

Annex F - AMHS Pre-Operational Tests

of

AMHS Manual

ANNEX E

AMHS Inter-Operability Tests

ANNEX E

of

AMHS Manual

Document Control Log

Edition	Date	Comments	Section/pages affected
1.0	15/06/2007	Creation of the document.	all

Table of Contents

References

[1] ICAO Annex 10 – Aeronautical Telecommunications, Volume II: Communication Procedures

[2] ICAO DOC 9705-AN/956: The Manual of technical provisions for the ATN, Sub-volume III, Section 3.1 –Edition 3 (2002) – Referred to as AMHS SARPs

[3] ASIAPAC AMHS Manual, Main Part

[4] ASIAPAC AMHS Manual, Annex D, AMHS Testing Requirements

Table of Figures

List of Tables

1 Introduction

1.1 Purpose of the Document

The purpose of the document is to define the functional tests for AMHS Interoperability in order to ensure the end-to-end interoperability between AMHS systems under test. These tests are performed after the successful completion of AMHS conformance testing, through which the compliance of all systems under test to the AMHS SARPs has been demonstrated.

For this reason the data used in the interoperability tests are generated either:

- manually; or,
- using records obtained by copy (duplication) and storage of some real traffic occurred among users in service; or
- using parallel duplicated traffic.

Implementations tested in this phase will not be operational systems, but test beds in order to neither disturb the real traffic nor cause potential outages in the operational systems.

As a summary, the correct performance of the interoperability tests included in this document is the previous step to progress the IUT towards a future operational system; this will be done by means of a transition plan to real traffic in the future operational environment.

•

1.2 Document Structure

Chapter 2 presents the test environment used for AMHS interoperability testing.

Chapter 3 defines the addressing plan implemented in the test environment.

Chapters 4 and 5 contain the general description of the bilateral and trilateral test procedures with subsections for each AMHS functional area. Each test procedure is presented in a structured way consisting of

- defined test criteria,
- a (brief) scenario description,
- reference to the relevant part of the standard specification (SARPs section),

Chapters 6 and 7 contain the detailed test-case descriptions for the bilateral and trilateral test procedures.

Chapter 8 contains the templates for the test messages.

1.3 Test Identification Scheme

Each Interoperability Test procedure has an identifier in the form

ITxnn where:

IT is an acronym for Interoperability Test, *x* is a number identifying the test group[1] and *nn* is a consecutive number identifying the individual test procedure.

Test procedures are classified in two blocks: Bilateral Tests and Trilateral Tests.

The bilateral test groups consist of tests using messages specifically generated by IUTs for trials. The following six groups have been identified:

- testing of submission, transfer and delivery operations (x = 1),

- testing of gateway operations converting a user message from AFTN to AMHS (x=2),
- testing of gateway operations converting a user message from AMHS to AFTN (x=3),
- testing of gateway operations converting a user message from AFTN to AMHS and back to AFTN (x=4),
- testing of gateway operations – special cases (x=5)and
- testing of stress traffic situations (x=6)

The two trilateral test groups are:
- testing of transfer (relay) operations (x=7),
- testing of special situations (alternate routing, traffic loop) (x=8). [1]

[1] Test groups for AMHS conformance tests have been identified in [4].

2 AMHS Interoperability Test Environment

2.1 Application infrastructure

Both AMHS Implementations Under Test (IUTs) are complete systems constituted by AFTN, AMHS and AFTN/AMHS gateway components, with corresponding AFTN and AMHS user terminals and supervision positions, as decided locally by the corresponding organization.

In each IUT, an AMHS User Agent is used in submission and delivery tests. Gateway tests involve an AFTN user terminal. The use of the Monitor & Control Position is required in order to observe the outcome of the conversion processes, especially in out-of-line situations.

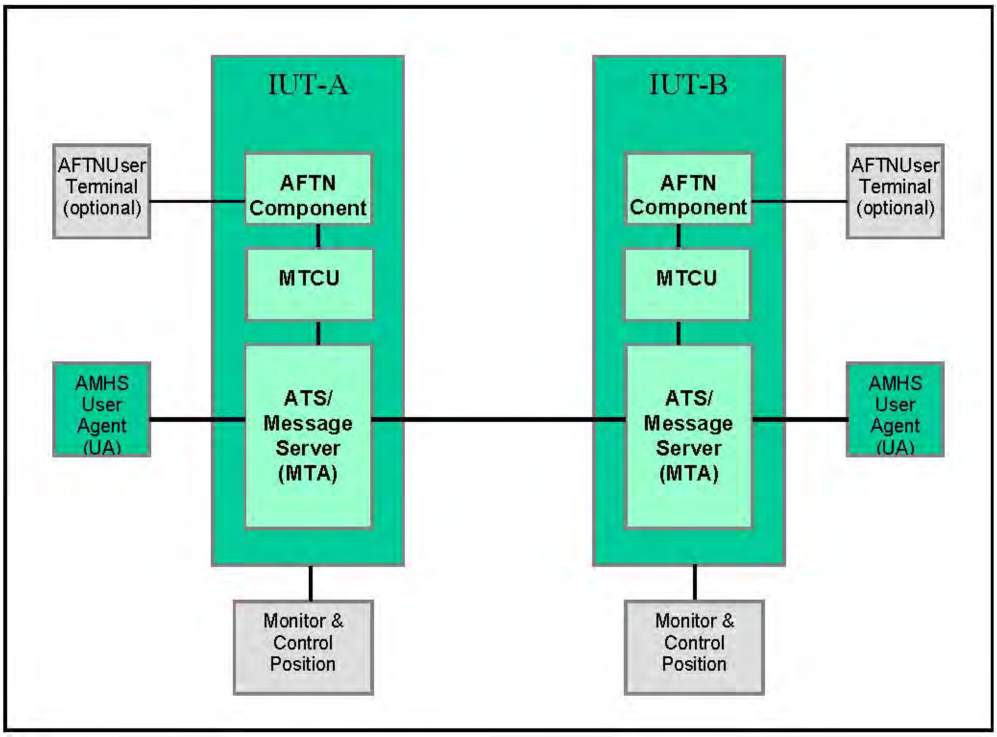

Figure E- 1: AMHS Inter-operability Test Environment

Figure E-1 shows the test environment used for AMHS interoperability tests. Both IUTs will be interconnected via AMHS transfer ports supporting the X.400/P1 protocol over a TCP/IP/LAN.

Note. – In Figure E-1 the AFTN Terminal is directly connected to the AFTN Component in an abstract way. There may exist different implementations with an AFTN component only connected to an AFTN switch or integrated AFTN/AMHS switches. For the interoperability tests it does not matter whether the AFTN Terminal *is connected directly or indirectly.*

The components of the test environment as depicted in Figure 1 are involved in the test procedures in following way:

Submission, Transfer and Delivery operation tests (AMHS => AMHS) (x=1):
AMHS User Agent => ATS Message Server => ATS Message Server => AMHS User Agent

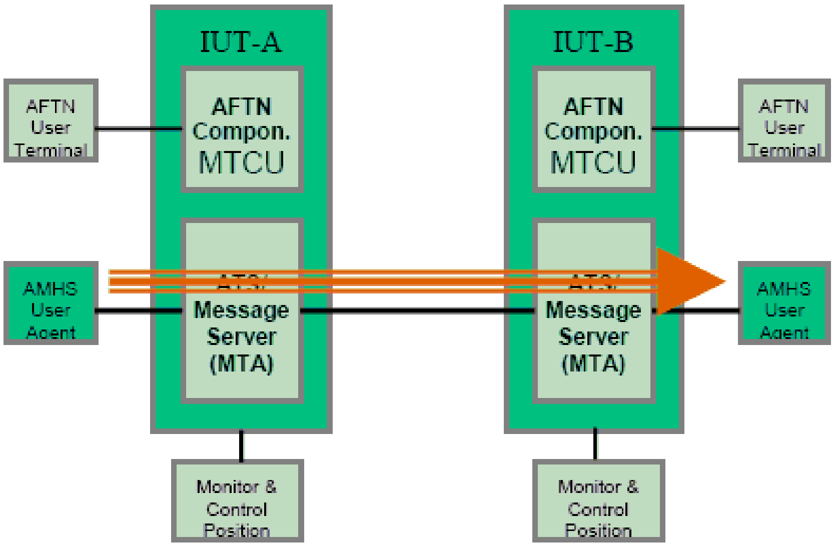

Figure E- 2: UA to UA (IUT-A to IUT-B)

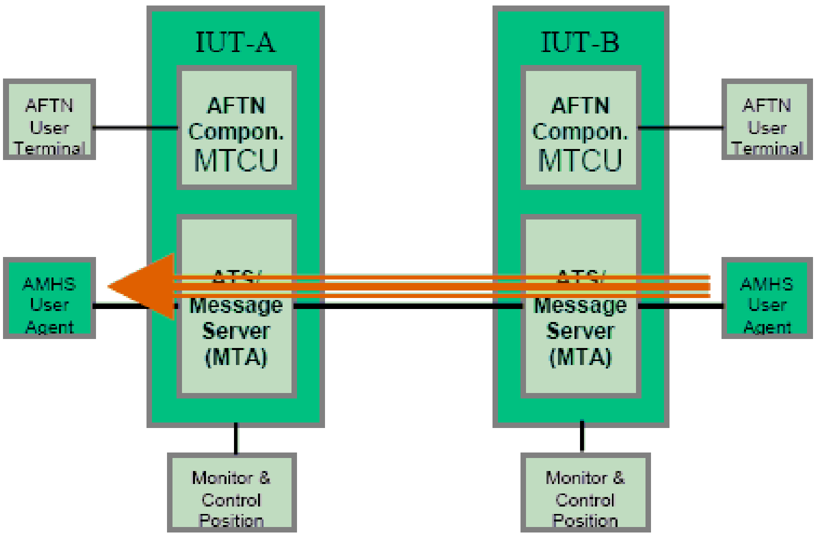

Figure E- 3: UA to UA (IUT-B to IUT-A)

AMHS / AFTN gateway tests (AFTN => AMHS) (x=2):
AFTN Terminal => Gateway and ATS Message Server => UA

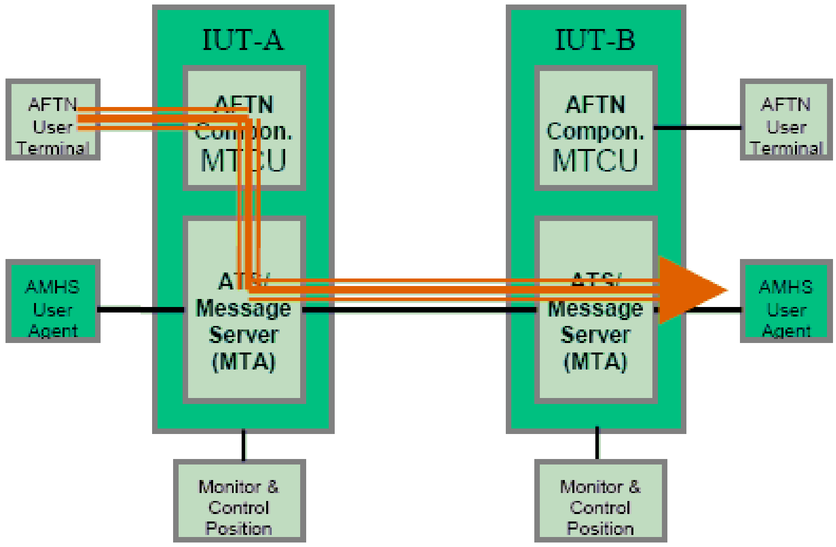

Figure E- 4: AFTN Terminal to UA (IUT-A to IUT-B)

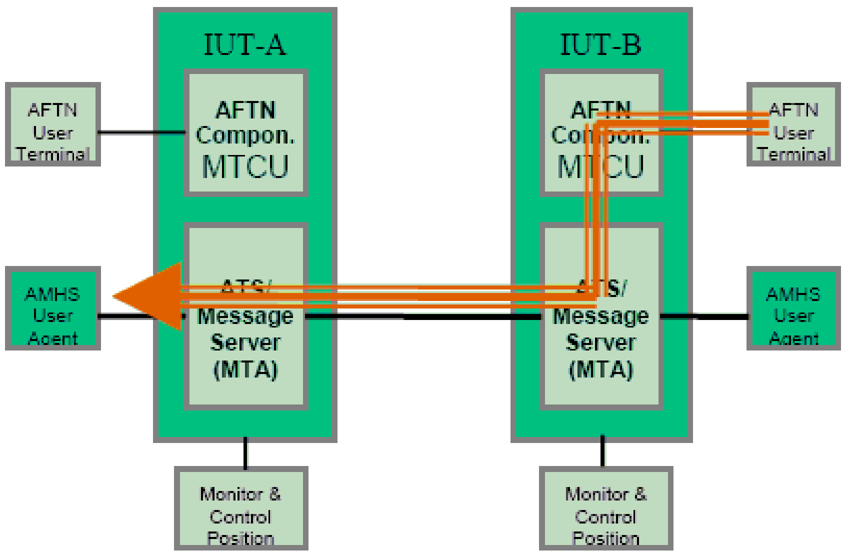

Figure E- 5: AFTN Terminal to UA (IUT-B to IUT-A)

AMHS / AFTN gateway tests (AMHS => AFTN) (x=3):
UA => ATS Message Server and Gateway => AFTN Terminal

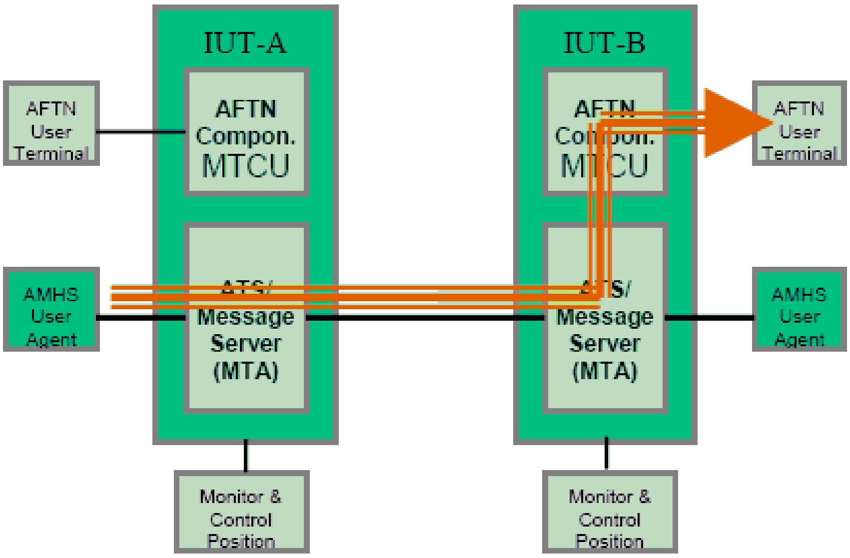

Figure E- 6: UA to AFTN Terminal (IUT-A to IUT-B)

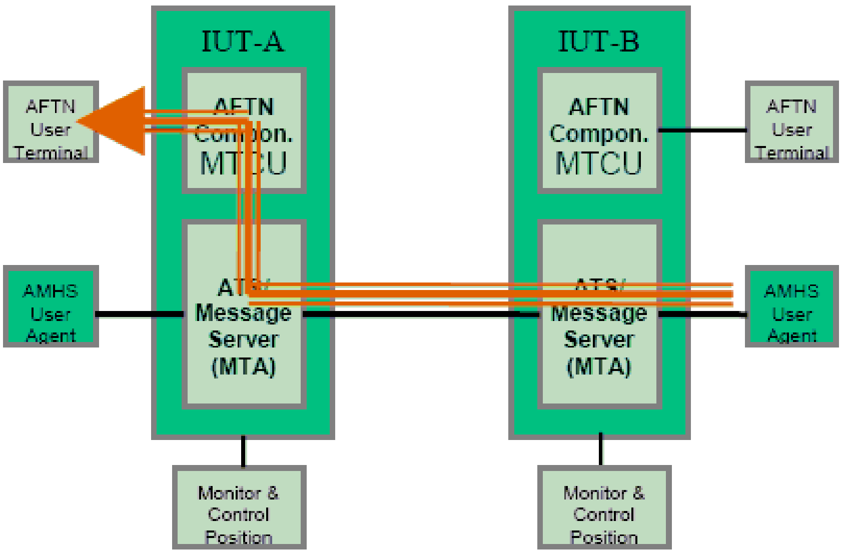

Figure E- 7: UA to AFTN Terminal (IUT-B to IUT-A)

AMHS / AFTN gateway tests (AFTN => AMHS => AFTN) (x=4):
AFTN Terminal => Gateway => ATS Message Servers => Gateway => AFTN Terminal

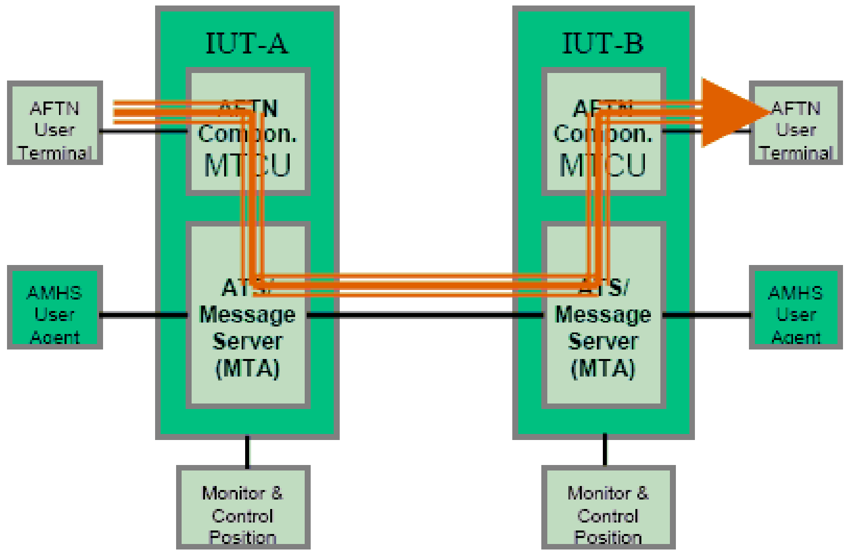

Figure E- 8: AFTN Terminal to AFTN Terminal (IUT-A to IUT-B)

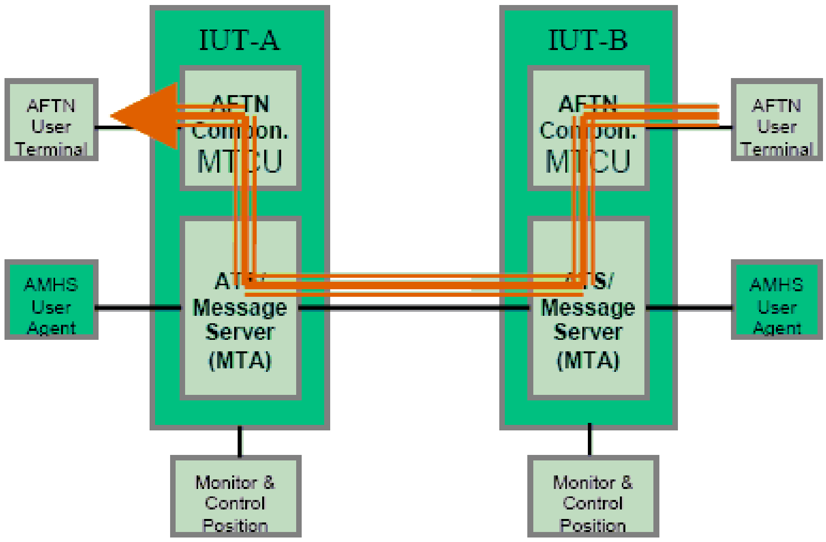

Figure E- 9: AFTN Terminal to AFTN Terminal (IUT-B to IUT-A)

Gateway Operations – special case scenarios (x=5)
For the special case scenarios different combinations of the flows shown above are used.

Stress traffic situations (x=6)
Depending on the stress scenario chosen combinations of the flows shown above are used.

"Relay" operation tests (x=7) – (optional - additional test partner required – IUT-C)
Peer IUT => IUT (ATS Message Server) => peer IUT

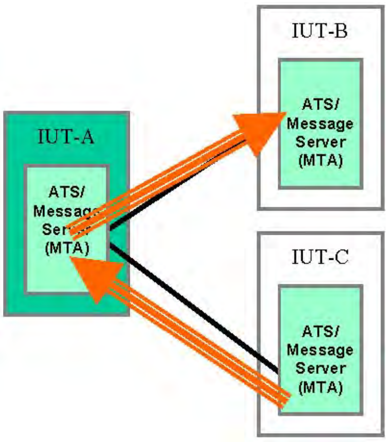

Figure E- 10: "Relay" operation tests

Testing of special situations (x=8) – (optional - additional test partner required – IUT-C and – additional connectivity required IUT-B - IUT-C)

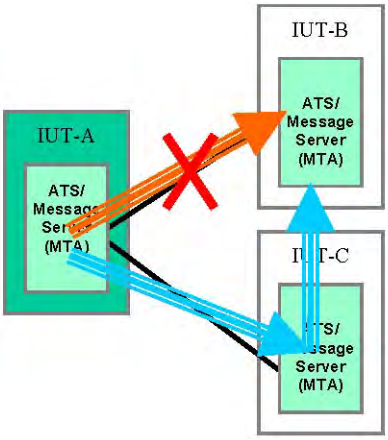

Figure E- 11: Alternate MTA routing

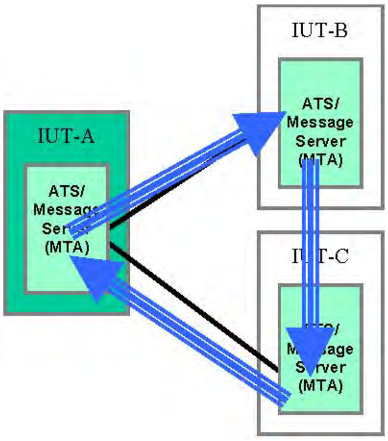

Figure E- 12: Traffic loop test

2.2 Transport infrastructure

To perform the bilateral interoperability tests, an underlying infrastructure for message transport between the two IUTs has to be agreed. In case of multilateral tests an underlying infrastructure for message transport between the involved IUTs (minimum three) has to be agreed. Other “non-standard” solutions may be used for testing. Those refer to the actual network environment or other means offered by communications suppliers, such as ADSL, public internet; in this case, agreement among the parties is necessary due to the potential impact of this solution on the configuration of the timers of the systems concerned, as compared to the standard solution.

2.3 General parameters to be agreed

The following entries and/or parameter shall be agreed between the test partners. Preferred the default values should be used.

2.3.1 Default MTA names and passwords

IUT	MTA name	Remarks
IUT-A	MTA-IUTA-1	
IUT-B	MTA-IUTB-1	
IUT-C	MTA-IUTC-1	

Table 1: Default MTA names

IUT	password	Remarks
IUT-A	ICAO-IUTA-1	
IUT-B	ICAO-IUTB-1	
IUT-C	ICAO-IUTC-1	

Table 2: Default passwords

2.3.2 TSAP addresses

IUT	TSAP address	Remarks
IUT-A	to be agreed bilaterally	
IUT-B	to be agreed bilaterally	
IUT-C	to be agreed	

Table 3: TSAP addresses

2.3.3 IP addresses

IUT	IP address	Remarks
IUT-A	to be agreed bilaterally	
IUT-B	to be agreed bilaterally	
IUT-C	to be agreed	

Table 4: IP addresses

2.3.4 Type and number of associations

IUT	Type of associations	Number of associations	Remarks
IUT-A	monologue	5	
IUT-B	monologue	5	
IUT-C	monologue	5	

Table 5: Default type and number of associations

3 Addressing Plan for AMHS Interoperability Testing

3.1 User addresses

To meet the scope of testing, the test-address space used by AMHS Interoperability Testing should include, for each IUT, the respective AFTN and AMHS addresses and the corresponding AMHS PRMD.

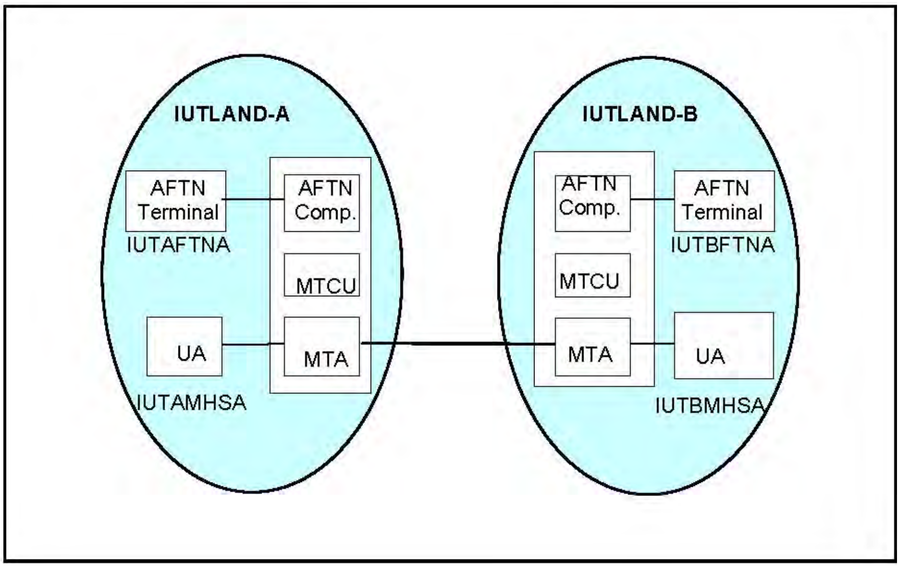

Figure E- 13: Addressing Plan

The original, operational AMHS and AFTN addresses assigned to the COM Centre could be used as test addresses for each IUT. To distinguish between operational and test addresses it is recommended to use alternatively, a generic address space taken from fictitious PRMD/AFTN countries IUTLAND-A and IUTLAND-B.

This includes generic user addresses IUTAFTNA and IUTAMHSA for IUTLAND-A as well as IUTBFTNA and IUTBMHSA for IUTLAND-B, which may be mapped either according to the CAAS (preferred, or a more comprehensive set of addresses in case of CAAS with multiple "O" values) or the XF addressing scheme.

The following tables show the generic address space assigned to the two IUTs and a third IUT if trilateral network tests are performed.

CAAS (preferred) – single "O"	CAAS – multiple "O"	XF
C = XX ADMD = ICAO PRMD = IUTLAND-A O = A-REGION OU1 = IUTA CN = IUTAFTNA ... IUTAMHSA	C = XX ADMD = ICAO PRMD = IUTLAND-A O = A-REGION1 OU1 = IUTA CN = IUTAFTNA ... IUTAMHSA O = A-REGION2 OU1 = IUAA CN = IUAAFTNA ... IUAAMHSA	C = XX ADMD = ICAO PRMD = IUTLAND-A O = AFTN OU1 = IUTAFTNA ... IUTAMHSA

Table 6: Generic address spaces of IUTLAND-A

CAAS (preferred) – single "O"	CAAS – multiple "O"	XF
C = XX ADMD = ICAO PRMD = IUTLAND-B O = B-REGION OU1 = IUTB CN = IUTBFTNA ... IUTBMHSA	C = XX ADMD = ICAO PRMD = IUTLAND-B O = B-REGION1 OU1 = IUTB CN = IUTBFTNA ... IUTBMHSA O = B-REGION2 OU1 = IUBB CN = IUBBFTNA ... IUBBMHSA	C = XX ADMD = ICAO PRMD = IUTLAND-B O = AFTN OU1 = IUTBFTNA ... IUTBMHSA

Table 7: Generic address spaces of IUTLAND-B

<table>
<tr><th>CAAS (preferred) – single "O"</th><th>CAAS – multiple "O"</th><th>XF</th></tr>
<tr><td>C = XX
ADMD = ICAO
PRMD = IUTLAND-C
O = C-REGION
OU1 = IUTC
CN = IUTCFTNA
...
IUTCMHSA</td><td>C = XX
ADMD = ICAO
PRMD = IUTLAND-C
O = B-REGION1 OU1 = IUTC
CN = IUTCFTNA ...
IUTCMHSA
O = B-REGION2 OU1 = IUCC
CN = IUCCFTNA ...
IUCCMHSA</td><td>C = XX
ADMD = ICAO
PRMD = IUTLAND-C
O = AFTN
OU1 = IUTCFTNA
...
IUTCMHSA</td></tr>
</table>

Table 8: Generic address spaces of IUTLAND-C

3.2 DL addresses

Distribution List name	Addresses included in the DL	Remarks
IUTADLLO	IUTBFTNA IUTBFTNB IUTBMHSA	
IUTADLRE	IUTAFTNA IUTAFTNB IUTAMHSA	

Table 9: DL addresses of IUT-A

Distribution List name	Addresses included in the DL	Remarks
IUTBDLLO	IUTAFTNA IUTAFTNB IUTAMHSA	
IUTBDLRE	IUTBFTNA IUTBFTNB IUTBMHSA	

Table 10: DL addresses of IUT-B

3.3 AFTN and X.400 Routing Tables

3.3.1 AFTN and X.400 Routing Tables of IUT-A

AFTN Routing Indicator	Routing direction	Remarks
IUTAFT*	AFTN Terminal	
IUTA*	MTCU	
IUTB*	MTCU	
IUTC*	MTCU	

Table 11: AFTN Routing Table of IUT-A X.400

Routing Indicator X.400 Routing Indicator	Routing direction	Remarks
/C=XX/A=ICAO/P=IUTLAND-A /O=A-REGION/OU1=IUTA/CN=IUTAMHSA/	UA IUT-A	If CAAS "single "O" type
/C=XX/A=ICAO/P=IUTLAND-A /O=A-REGION/OU1=IUTA/CN=IUTAMHSB/	UA IUT-A	If CAAS "single "O" type
/C=XX/A=ICAO/P=IUTLAND-A /O=A-REGION/OU1=IUTA/CN=IUTAMHSC/	UA IUT-A	If CAAS "single "O" type
/C=XX/A=ICAO/P=IUTLAND-A /O=AFTN/OU1=IUTAMHSA/	UA IUT-A	If "XF" type
/C=XX/A=ICAO/P=IUTLAND-A /O=AFTN/OU1=IUTAMHSB/	UA IUT-A	If "XF" type
/C=XX/A=ICAO/P=IUTLAND-A /O=AFTN/OU1=IUTAMHSC/	UA IUT-A	If "XF" type
/C=XX/A=ICAO/P=IUTLAND-A	MTCU	
/C=XX/A=ICAO/P=IUTLAND-B	MTA-IUTB-1	
/C=XX/A=ICAO/P=IUTLAND-C	MTA-IUTC-1	
/C=XX/A=ICAO/P=IUTLAND-X	MTA-IUTB-1	

Table 12: X.400 Routing Table of IUT-A

3.3.2 AFTN and X.400 Routing Tables of IUT-B

AFTN Routing Indicator	Routing direction	Remarks
IUTBFT*	AFTN Terminal	
IUTA*	MTCU	
IUTB*	MTCU	
IUTC*	MTCU	

Table 13: AFTN Routing Table of IUT-B

X.400 Routing Indicator	Routing direction	Remarks
/C=XX/A=ICAO/P=IUTLAND-B /O=B-REGION/OU1=IUTB/CN=IUTBMHSA/	UA IUT-B	If CAAS "single "O" type
/C=XX/A=ICAO/P=IUTLAND-B /O=B-REGION/OU1=IUTB/CN=IUTBMHSB/	UA IUT-B	If CAAS "single "O" type
/C=XX/A=ICAO/P=IUTLAND-B /O=B-REGION/OU1=IUTB/CN=IUTBMHSC/	UA IUT-B	If CAAS "single "O" type
/C=XX/A=ICAO/P=IUTLAND-B /O=AFTN/OU1=IUTBMHSA/	UA IUT-B	If "XF" type
/C=XX/A=ICAO/P=IUTLAND-B /O=AFTN/OU1=IUTBMHSB/	UA IUT-B	If "XF" type

X.400 Routing Indicator	Routing direction	Remarks
/C=XX/A=ICAO/P=IUTLAND-B /O=AFTN/OU1=IUTBMHSC/	UA IUT-B	If “XF” type
/C=XX/A=ICAO/P=IUTLAND-B	MTCU	
/C=XX/A=ICAO/P=IUTLAND-A	MTA-IUTA-1	
/C=XX/A=ICAO/P=IUTLAND-C	MTA-IUTC-1	
/C=XX/A=ICAO/P=IUTLAND-X	MTA-IUTC-1	

Table 14: X.400 Routing Table of IUT-B

3.3.3 AFTN and X.400 Routing Tables of IUT-C

AFTN Routing Indicator	Routing direction	Remarks
IUTCFT*	AFTN Terminal	
IUTA*	MTCU	
IUTB*	MTCU	
IUTC*	MTCU	

Table 15: AFTN Routing Table of IUT-C

X.400 Routing Indicator	Routing direction	Remarks
/C=XX/A=ICAO/P=IUTLAND-C /O=C-REGION/OU1=IUTC/CN=IUTCMHSA/	UA IUT-C	If CAAS “single “O” type
/C=XX/A=ICAO/P=IUTLAND-C /O=C-REGION/OU1=IUTC/CN=IUTCMHSB/	UA IUT-C	If CAAS “single “O” type
/C=XX/A=ICAO/P=IUTLAND-C /O=C-REGION/OU1=IUTC/CN=IUTCMHSC/	UA IUT-C	If CAAS “single “O” type
/C=XX/A=ICAO/P=IUTLAND-C /O=AFTN/OU1=IUTCMHSA/	UA IUT-C	If “XF” type
/C=XX/A=ICAO/P=IUTLAND-C /O=AFTN/OU1=IUTCMHSB/	UA IUT-C	If “XF” type
/C=XX/A=ICAO/P=IUTLAND-C /O=AFTN/OU1=IUTCMHSC/	UA IUT-C	If “XF” type
/C=XX/A=ICAO/P=IUTLAND-C	MTCU	
/C=XX/A=ICAO/P=IUTLAND-A	MTA-IUTA-1	
/C=XX/A=ICAO/P=IUTLAND-B	MTA-IUTB-1	
/C=XX/A=ICAO/P=IUTLAND-X	MTA-IUTA-1	

Table 16: X.400 Routing Table of IUT-C

3.4 Look-up Table

3.4.1 Generic look-up Table for all Implementations Under Test (IUT) (CAAS single "O" type)

AFTN address	O/R Address (CAAS single "O" type)
IUTAFTN*	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/
IUTAFTA*	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/
IUTAFTU*	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/ ***Note. – This address has to be unknown and not defined in IUT-A***
IUTAMHSA	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAMHSA/
IUTAMHSB	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAMHSB/
IUTAMHSC	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAMHSC/
IUTADLLO	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTADLLO/
IUTADLRE	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTADLRE/
IUTBFTN*	/C=XX/A=ICAO/P=IUTLAND-B/O=B-REGION/OU1=IUTB/
IUTBFTA*	/C=XX/A=ICAO/P=IUTLAND-B/O=B-REGION/OU1=IUTB/
IUTBFTU*	/C=XX/A=ICAO/P=IUTLAND-B/O=B-REGION/OU1=IUTB/ Note. – This address has to be unknown and not defined in IUT-B
IUTBMHSA	/C=XX/A=ICAO/P=IUTLAND-B/O=B-REGION/OU1=IUTB/CN=IUTBMHSA/
IUTBMHSB	/C=XX/A=ICAO/P=IUTLAND-B/O=B-REGION/OU1=IUTB/CN=IUTBMHSB/
IUTBMHSC	/C=XX/A=ICAO/P=IUTLAND-B/O=B-REGION/OU1=IUTB/CN=IUTBMHSC/
IUTBDLLO	/C=XX/A=ICAO/P=IUTLAND-B/O=B-REGION/OU1=IUTB/CN=IUTBDLLO/
IUTBDLRE	/C=XX/A=ICAO/P=IUTLAND-B/O=B-REGION/OU1=IUTB/CN=IUTBDLRE/
IUTCFTNC	/C=XX/A=ICAO/P=IUTLAND-C/O=C-REGION/OU1=IUTC/CN=IUTCFTNA/
IUTCMHSA	/C=XX/A=ICAO/P=IUTLAND-C/O=C-REGION/OU1=IUTC/CN=IUTCMHSA/
IUTXLOOP	/C=XX/A=ICAO/P=IUTLAND-X/O=X-REGION/OU1=IUTX/CN=IUTXLOOP/

Table 17: Generic look-up table (CAAS single "O" type)

3.4.2 Generic look-up Table for all Implementations Under Test (IUT) (“XF” type)

AFTN address	O/R Address (“XF” type)
IUTAFTN*	/C=XX/A=ICAO/P=IUTLAND-A/
IUTAFTA*	/C=XX/A=ICAO/P=IUTLAND-A/
IUTAFTU*	/C=XX/A=ICAO/P=IUTLAND-A/ ***Note. – This address has to be unknown and not defined in IUT-A***
IUTAMHSA	/C=XX/A=ICAO/P=IUTLAND-A/O=AFTN/OU1=IUTAMHSA/
IUTAMHSB	/C=XX/A=ICAO/P=IUTLAND-A/O=AFTN/OU1=IUTAMHSB/
IUTAMHSC	/C=XX/A=ICAO/P=IUTLAND-A/O=AFTN/OU1=IUTAMHSC/
IUTADLLO	/C=XX/A=ICAO/P=IUTLAND-A/O=AFTN/OU1=IUTADLLO/
IUTADLRE	/C=XX/A=ICAO/P=IUTLAND-A/O=AFTN/OU1=IUTADLRE/
IUTBFTN*	/C=XX/A=ICAO/P=IUTLAND-B/
IUTBFTA*	/C=XX/A=ICAO/P=IUTLAND-B/
IUTBFTU*	/C=XX/A=ICAO/P=IUTLAND-B/ Note. – This address has to be unknown and not defined in IUT-B
IUTBMHSA	/C=XX/A=ICAO/P=IUTLAND-B/O=AFTN/OU1=IUTBMHSA/
IUTBMHSB	/C=XX/A=ICAO/P=IUTLAND-B/O=AFTN/OU1=IUTBMHSB/
IUTBMHSC	/C=XX/A=ICAO/P=IUTLAND-B/O=AFTN/OU1=IUTBMHSC/
IUTBDLLO	/C=XX/A=ICAO/P=IUTLAND-B/O=AFTN/OU1=IUTBDLLO/
IUTBDLRE	/C=XX/A=ICAO/P=IUTLAND-B/O=AFTN/OU1=IUTBDLRE/
IUTCFTNC	/C=XX/A=ICAO/P=IUTLAND-C/O=AFTN/OU1=IUTCFTNA/
IUTCMHSA	/C=XX/A=ICAO/P=IUTLAND-C/O=AFTN/OU1=IUTCMHSA/
IUTXLOOP	/C=XX/A=ICAO/P=IUTLAND-X/O=AFTN/OU1=IUTXLOOP/

Table 18: Generic look-up table (“XF” type)

Note. – There are further possibilities: IUT-A could have XF addressing scheme whilst IUT-B has CAAS, or vice-versa. In such a case, the corresponding table entries should be selected. To simplify matters it is recommended to use CAAS single “O” type or “XF” type only.

3.5 Local AMHS User address book

3.5.1 Local AMHS User address book for UA of all Implementations Under Test (IUT) (CAAS single “O” type)

Nick name	O/R Address (CAAS single “O” type)
IUTAFTNA	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTNA/
IUTAFTNB	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTNB/
IUTAFTNC	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTNC/
IUTAFTND	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTND/
IUTAFTNE	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTNE/
IUTAFTNF	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTNF/
IUTAFTNG	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTNG/
IUTAFTNH	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTNH/
IUTAFTNI	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTNI/
IUTAFTNJ	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTNJ/
IUTAFTNK	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTNK/
IUTAFTNL	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTNL/
IUTAFTNM	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTNM/
IUTAFTNN	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTNN/
IUTAFTNO	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTNO/
IUTAFTNP	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTNP/
IUTAFTNQ	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTNQ/
IUTAFTNR	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTNR/
IUTAFTNS	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTNS/
IUTAFTNT	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTNT/
IUTAFTNU	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTNU/
IUTAFTNV	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTNV/
IUTAFTNW	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTNW/
IUTAFTNX	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTNX/
IUTAFTNY	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTNY/
IUTAFTAA	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTAA/
IUTAFTAB	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTAB/
IUTAFTAC	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTAC/
IUTAFTAD	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTAD/
IUTAFTAE	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTAE/
IUTAFTAF	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTAF/
IUTAFTAG	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTAG/
IUTAFTAH	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTAH/
IUTAFTAI	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTAI/
IUTAFTAJ	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTAJ/

IUTAFTAK	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTAK/
IUTAFTAL	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTAL/
IUTAFTAM	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTAM/
IUTAFTAN	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTAN/
IUTAFTAO	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTAO/
IUTAFTAP	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTAP/
IUTAFTAQ	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTAQ/
IUTAFTAR	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTAR/
IUTAFTAS	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTAS/
IUTAFTAT	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTAT/
IUTAFTAU	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTAU/
IUTAFTAV	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTAV/
IUTAFTAW	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTAW/
IUTAFTAX	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTAX/
IUTAFTAY	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTAY/
IUTAFTUU	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAFTUU/
IUTAMHSA	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAMHSA/
IUTAMHSB	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAMHSB/
IUTAMHSC	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTAMHSC/
IUTADLLO	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTADLLO/
IUTADLRE	/C=XX/A=ICAO/P=IUTLAND-A/O=A-REGION/OU1=IUTA/CN=IUTADLRE/
IUTBFTNA	/C=XX/A=ICAO/P=IUTLAND-B/O=B-REGION/OU1=IUTB/CN=IUTBFTNA/
IUTBFTNB	/C=XX/A=ICAO/P=IUTLAND-B/O=B-REGION/OU1=IUTB/CN=IUTBFTNB/
IUTBFTNC	/C=XX/A=ICAO/P=IUTLAND-B/O=B-REGION/OU1=IUTB/CN=IUTBFTNC/
till	**To be continued till**
IUTBFTNY	/C=XX/A=ICAO/P=IUTLAND-B/O=B-REGION/OU1=IUTB/CN=IUTBFTNY/
IUTBFTAA	/C=XX/A=ICAO/P=IUTLAND-B/O=B-REGION/OU1=IUTB/CN=IUTBFTAA/
till	**To be continued till**
IUTBFTAY	/C=XX/A=ICAO/P=IUTLAND-B/O=B-REGION/OU1=IUTB/CN=IUTBFTAY/
IUTBFTUU	/C=XX/A=ICAO/P=IUTLAND-B/O=B-REGION/OU1=IUTB/CN=IUTBFTUU/
IUTBMHSA	/C=XX/A=ICAO/P=IUTLAND-B/O=B-REGION/OU1=IUTB/CN=IUTBMHSA/
IUTBMHSB	/C=XX/A=ICAO/P=IUTLAND-B/O=B-REGION/OU1=IUTB/CN=IUTBMHSB/
IUTBMHSC	/C=XX/A=ICAO/P=IUTLAND-B/O=B-REGION/OU1=IUTB/CN=IUTBMHSC/
IUTBDLLO	/C=XX/A=ICAO/P=IUTLAND-B/O=B-REGION/OU1=IUTB/CN=IUTBDLLO/
IUTBDLRE	/C=XX/A=ICAO/P=IUTLAND-B/O=B-REGION/OU1=IUTB/CN=IUTBDLRE/
IUTCFTNC	/C=XX/A=ICAO/P=IUTLAND-C/O=C-REGION/OU1=IUTC/CN=IUTCFTNA/
IUTCMHSA	/C=XX/A=ICAO/P=IUTLAND-C/O=C-REGION/OU1=IUTC/CN=IUTCMHSA/
IUTXLOOP	/C=XX/A=ICAO/P=IUTLAND-X/O=X-REGION/OU1=IUTX/CN=IUTXLOOP/

Table 19: Local AMHS User address book (CAAS single "O" type)

3.5.2 Local AMHS User address book for UA of all Implementations Under Test (IUT) ("XF" type)

Nick name	O/R Address ("XF" type)
IUTAFTNA	/C=XX/A=ICAO/P=IUTLAND-A/O=AFTN/OU1=IUTAFTNA/
IUTAFTNB	/C=XX/A=ICAO/P=IUTLAND-A/O=AFTN/OU1=IUTAFTNB/
IUTAFTNC	/C=XX/A=ICAO/P=IUTLAND-A/O=AFTN/OU1=IUTAFTNC/
till	**To be continued till**
IUTAFTNY	/C=XX/A=ICAO/P=IUTLAND-A/O=AFTN/OU1=IUTAFTNY/
IUTAFTAA	/C=XX/A=ICAO/P=IUTLAND-A/O=AFTN/OU1=IUTAFTAA/
till	**To be continued till**
IUTAFTAY	/C=XX/A=ICAO/P=IUTLAND-A/O=AFTN/OU1=IUTAFTAY/
IUTAFTUU	/C=XX/A=ICAO/P=IUTLAND-A/O=AFTN/OU1=IUTAFTUU/
IUTAMHSA	/C=XX/A=ICAO/P=IUTLAND-A/O=AFTN/OU1=IUTAMHSA/
IUTAMHSB	/C=XX/A=ICAO/P=IUTLAND-A/O=AFTN/OU1=IUTAMHSB/
IUTAMHSC	/C=XX/A=ICAO/P=IUTLAND-A/O=AFTN/OU1=IUTAMHSC/
IUTADLLO	/C=XX/A=ICAO/P=IUTLAND-A/O=AFTN/OU1=IUTADLLO/
IUTADLRE	/C=XX/A=ICAO/P=IUTLAND-A/O=AFTN/OU1=IUTADLRE/
IUTBFTNA	/C=XX/A=ICAO/P=IUTLAND-B/O=AFTN/OU1=IUTBFTNA/
IUTBFTNB	/C=XX/A=ICAO/P=IUTLAND-B/O=AFTN/OU1=IUTBFTNB/
IUTBFTNC	/C=XX/A=ICAO/P=IUTLAND-B/O=AFTN/OU1=IUTBFTNC/
till	**To be continued till**
IUTBFTNY	/C=XX/A=ICAO/P=IUTLAND-B/O=AFTN/OU1=IUTBFTNY/
IUTBFTAA	/C=XX/A=ICAO/P=IUTLAND-B/O=AFTN/OU1=IUTBFTAA/
till	**To be continued till**
IUTBFTAY	/C=XX/A=ICAO/P=IUTLAND-B/O=AFTN/OU1=IUTBFTAY/
IUTBFTUU	/C=XX/A=ICAO/P=IUTLAND-B/O=AFTN/OU1=IUTBFTUU/
IUTBMHSA	/C=XX/A=ICAO/P=IUTLAND-B/O=AFTN/OU1=IUTBMHSA/
IUTBMHSB	/C=XX/A=ICAO/P=IUTLAND-B/O=AFTN/OU1=IUTBMHSB/
IUTBMHSC	/C=XX/A=ICAO/P=IUTLAND-B/O=AFTN/OU1=IUTBMHSC/
IUTBDLLO	/C=XX/A=ICAO/P=IUTLAND-B/O=AFTN/OU1=IUTBDLLO/
IUTBDLRE	/C=XX/A=ICAO/P=IUTLAND-B/O=AFTN/OU1=IUTBDLRE/
IUTCFTNC	/C=XX/A=ICAO/P=IUTLAND-C/O=AFTN/OU1=IUTCFTNA/
IUTCMHSA	/C=XX/A=ICAO/P=IUTLAND-C/O=AFTN/OU1=IUTCMHSA/
IUTXLOOP	/C=XX/A=ICAO/P=IUTLAND-X/O=AFTN/OU1=IUTXLOOP/

Table 20: Local AMHS User address book ("XF" type)

4 Bilateral Test Procedures

4.1 Submission, Transfer and Delivery Operation (AMHS to AMHS)

4.1.1 IT101 – Submit, transfer and deliver an IPM (UA IUT-A to UA IUT-B)

IT101	**Submit, transfer and deliver an IPM (UA IUT-A to UA IUT-B)**
Test criteria	This test is successful, if the MTA of the sending IUT transfers the submitted ATS messages (IPM) correctly to a peer MTA which delivers the ATS messages (IPM) to the UA of the receiving IUT.
Scenario description	From the UA of IUT-A send a sequence of five ATS messages (IPMs) to the IUT addressing a remote AMHS user in the peer IUT, via AMHS. • Message 1 (IT101M01) shall have ATS-message-priority KK. • Message 2 (IT101M02) shall have ATS-message-priority GG. • Message 3 (IT101M03) shall have ATS-message-priority FF. • Message 4 (IT101M04) shall have ATS-message-priority DD. • Message 5 (IT101M05) shall have ATS-message-priority SS. Each message shall have different ATS-filing-time and ATS-message-text. The *optional-heading-information* element shall be empty. Verify the messages received by the remote UA. In particular, verify: • ATS-message-priority, • ATS-message-filing-time, • ATS-message-text.
AMHS SARPs reference	3.1.2.2.1 (ATS Message User Agent), 3.1.2.2.2 (ATS Message Server), 3.1.2.2.3.2.3 (ATS-Message-Header)
Test class	Normal AMHS communications (N)

4.1.2 IT102 – Submit, transfer and deliver an IPM (UA IUT-B to UA IUT-A)

IT102	**Submit, transfer and deliver an IPM (UA IUT-B to UA IUT-A)**
Test criteria	This test is successful, if the MTA of the sending IUT transfers the submitted ATS messages (IPM) correctly to a peer MTA which delivers the ATS messages (IPM) to the UA of the receiving IUT.
Scenario description	From the UA of IUT-B send a sequence of five ATS messages (IPMs) to the IUT addressing a remote AMHS user in the peer IUT, via AMHS. • Message 1 (IT102M01) shall have ATS-message-priority KK. • Message 2 (IT102M02) shall have ATS-message-priority GG. • Message 3 (IT102M03) shall have ATS-message-priority FF. • Message 4 (IT102M04) shall have ATS-message-priority DD. • Message 5 (IT102M05) shall have ATS-message-priority SS. Each message shall have different ATS-filing-time and ATS-message-text. The *optional-heading-information* element shall be empty. Verify the messages received by the remote UA. In particular, verify: • ATS-message-priority, • ATS-message-filing-time, • ATS-message-text.
AMHS SARPs reference	3.1.2.2.1 (ATS Message User Agent), 3.1.2.2.2 (ATS Message Server), 3.1.2.2.3.2.3 (ATS-Message-Header)
Test class	Normal AMHS communications (N)

4.2 Gateway Operations (AFTN to AMHS)

4.2.1 IT201 – Convert an AFTN message to AMHS format (IUT-A)

IT201	**Convert an AFTN message to AMHS format (IUT-A)**
Test criteria	This test is successful, if the sending IUT converts AFTN messages correctly to AMHS messages (IPM).
Scenario description	From the sending IUT send a sequence of AFTN messages addressing a remote AMHS user, consisting of five messages: • AFTN message 1 (IT201M01) shall have priority KK. • AFTN message 2 (IT201M02) shall have priority GG. • AFTN message 3 (IT201M03) shall have priority FF. • AFTN message 4 (IT201M04) shall have priority DD. • AFTN message 5 (IT201M05) shall have priority SS. The filing time shall be different in each message and the OHI field of each message shall be empty. Check the IPMs that the AMHS user receives in the receiving IUT. Verify that the IUT has converted the messages correctly according to Table 3.1.2-8 of the AMHS SARPs – see section 3.1.2.3.4.2. In particular: • verify that each message has different ATS-filing-time; • verify that the optional-heading-information element is empty; • check the correct format of the ATS message; • verify the ATS-message-priority and the related message transfer priority for each received message; • compare the ATS-message-text with the original AFTN message text.
AMHS SARPs reference	3.1.2.3.4.2
Test class	Normal AMHS communications (N)

4.2.2 IT202 – Convert an AFTN message to AMHS format (IUT-B)

IT202	**Convert an AFTN message to AMHS format (IUT-B)**
Test criteria	This test is successful, if the sending IUT converts AFTN messages correctly to AMHS messages (IPM).
Scenario description	From the sending IUT send a sequence of AFTN messages addressing a remote AMHS user, consisting of five messages: • AFTN message 1 (IT202M01) shall have priority KK. • AFTN message 2 (IT202M02) shall have priority GG. • AFTN message 3 (IT202M03) shall have priority FF. • AFTN message 4 (IT202M04) shall have priority DD. • AFTN message 5 (IT202M05) shall have priority SS. The filing time shall be different in each message and the OHI field of each message shall be empty. Check the IPMs that the AMHS user receives in the receiving IUT. Verify that the IUT has converted the messages correctly according to Table 3.1.2-8 of the AMHS SARPs – see section 3.1.2.3.4.2. In particular: • verify that each message has different ATS-filing-time; • verify that the optional-heading-information element is empty; • check the correct format of the ATS message; • verify the ATS-message-priority and the related message transfer priority for each received message; • compare the ATS-message-text with the original AFTN message text.
AMHS SARPs reference	3.1.2.3.4.2
Test class	Normal AMHS communications (N)

4.3 Gateway Operations (AMHS to AFTN)

4.3.1 IT301 – Convert an IPM generated by the UA of IUT-A to AFTN format

IT301	**Convert an IPM to AFTN format (IUT-B)**
Test criteria	This test is successful, if the receiving IUT converts IPMs correctly into AFTN format.
Scenario description	Send from IUT-A (UA) a sequence of ATS messages (IPMs) to the IUT-B, addressing an AFTN terminal. • Message 1 (IT301M01) shall have ATS-message-priority KK. • Message 2 (IT301M02) shall have ATS-message-priority GG. • Message 3 (IT301M03) shall have ATS-message-priority FF. • Message 4 (IT301M04) shall have ATS-message-priority DD. • Message 5 (IT301M05) shall have ATS-message-priority SS. Each message shall have different ATS-filing-time and ATS-message-text. The *optional-heading-information* element shall be empty. The implicit-conversion-prohibited attribute of the AMHS message must be set to “false”. Check the correct format of the AFTN message. Verify the AFTN priority and filing time for each received message. Compare the AFTN message text with the original ATS-message-text.
AMHS SARPs reference	3.1.2.3.5.2 (AMHS IPM conversion)
Test class	Normal AMHS communications (N)

4.4 Gateway Operations (AFTN to AMHS to AFTN)

4.4.1 IT401 – Convert an AFTN message to AMHS and back to AFTN format

IT401	**Convert an AFTN message to AMHS and back to AFTN format**
Test criteria	This test is successful, if the sending IUT-A converts AFTN user messages correctly to AMHS messages (IPM) and the IPMs are converted back to AFTN in IUT-B.
Scenario description	From IUT-A send a sequence of AFTN messages addressing a remote AFTN user in IUT-B, consisting of five messages: • AFTN message 1 (IT401M01) shall have priority KK. • AFTN message 2 (IT401M02) shall have priority GG. • AFTN message 3 (IT401M03) shall have priority FF. • AFTN message 4 (IT401M04) shall have priority DD. • AFTN message 5 (IT401M05) shall have priority SS. The filing time shall be different in each message and the OHI field of each message shall be empty. Check the AFTN message received by the AFTN user in the IUT-B. • Check the correct format of the AFTN message. • Each AFTN message shall have original filing time. • Each message shall have an empty OHI. • Verify the AFTN priority for each received message. • Compare the AFTN message text with the original AFTN message text.
AMHS SARPs reference	3.1.2.3.4.2, 3.1.2.3.5.2
Test class	Normal AMHS communications (N)

4.4.2 IT402 – Convert an AFTN message to AMHS and back to AFTN format

IT402	**Convert an AFTN message to AMHS and back to AFTN format**
Test criteria	This test is successful, if the sending IUT-B converts AFTN user messages correctly to AMHS messages (IPM) and the IPMs are converted back to AFTN in IUT-A.
Scenario description	From IUT-B send a sequence of AFTN messages addressing a remote AFTN user in IUT-A, consisting of five messages: • AFTN message 1 (IT402M01) shall have priority KK. • AFTN message 2 (IT402M02) shall have priority GG. • AFTN message 3 (IT402M03) shall have priority FF. • AFTN message 4 (IT402M04) shall have priority DD. • AFTN message 5 (IT402M05) shall have priority SS. The filing time shall be different in each message and the OHI field of each message shall be empty. Check the AFTN message received by the AFTN user in the IUT-A. • Check the correct format of the AFTN message. • Each AFTN message shall have original filing time. • Each message shall have an empty OHI. • Verify the AFTN priority for each received message. • Compare the AFTN message text with the original AFTN message text.
AMHS SARPs reference	3.1.2.3.4.2, 3.1.2.3.5.2
Test class	Normal AMHS communications (N)

4.5 Gateway Operations – special case scenarios

Note – The following special case scenarios are symmetric. That means, all test-cases have to be performed by IUT-A as well as IUT-B.

4.5.1 IT501 – Distribute an IPM to AMHS and AFTN users

IT501	**Distribute an IPM to AMHS and AFTN users**
Test criteria	This test is successful, if the receiving IUT distributes an IPM addressing both an AMHS and an AFTN user correctly.
Scenario description	From the sending IUT send an ATS message (IPM), addressing both AMHS and AFTN users, at the receiving IUT. The IPM Heading of the message shall contain two primary recipients, which are one AMHS and one AFTN user. The IPM Heading of the next message shall contain additionally, two copy recipients, which are also one AMHS and one AFTN user. Finally the IPM Heading of the last message shall contain additionally two blind copy recipients, which are also one AMHS and one AFTN user. Verify that all the users, whose addresses have been included in the IPM, receive the message correctly.
AMHS SARPs reference	3.1.2.2.1 (ATS message user agent), 3.1.2.2.2 (ATS message server), 3.1.2.3.5.2 (IPM conversion)
Test class	Normal AMHS communications (N)

4.5.2 IT502 – Expand a DL addressing both AMHS and AFTN users

IT502	**Expand a DL addressing both AMHS and AFTN users**
Test criteria	This test is successful, if the receiving IUT distributes an IPM, addressing AMHS and AFTN users in a distribution list, correctly.
Scenario description	From the sending IUT send an ATS message (IPM) to the receiving IUT. The recipient contained in the MTE addresses a distribution list, for which the receiving IUT is responsible. The distribution list shall have the addresses of one AMHS user and two AFTN users as members. The message shall have the *dl-expansion-prohibited* attribute set to "false". Check the messages received in each AFTN user address verifying that each one contains its corresponding address.
AMHS SARPs reference	3.1.2.2.2.1.1 (DL functional group), 3.1.2.3.5.2 (IPM conversion)
Test class	Normal AMHS communications (N)

4.5.3 IT503 – Convert an IPM, if the ATS-message-text contains more than 1800 characters

IT503	**Convert or reject an IPM, if the ATS-message-text contains more than 1800 characters**
Test criteria	This test is successful, if the IUT, when it receives an ATS message with ATS-message-text longer than 1800 characters, a) rejects the message and returns a NDR, or b) splits the received IPM into several messages and converts the resulting messages into AFTN format as specified in ICAO Annex 10, Attn. B [1], or c) converts the received IPM into a "long" AFTN message. Note. – The AMHS SARPs (3.1.2.3.5.2.1.7) specify that the message can be rejected (case a) or split into several messages (case b).

Scenario description	From the sending IUT send an ATS message (IPM) containing ATS-message-text of 4500 characters to an AFTN recipient of the receiving IUT. If case a is implemented*:* Verify that the receiving IUT does not convert the IPM into AFTN format, but returns a NDR. Check the NDR contents received at the sending User Agent. Verify that the NDR contains the following elements: • "unable-to-transfer" for the non-delivery-reason-code; • "content-too-long" for the non-delivery-diagnostic-code; and • "unable to convert to AFTN due to message text length" for the supplementary-information. If case b is implemented: Verify that (at least) three AFTN messages are received by the AFTN recipient. Check the correct format of the AFTN messages. Check the text field of all received AFTN messages. Verify that the text is complete and unchanged, i.e. compare the received data with the *ATS-message-text* provided in the original IPM. Verify that the received messages contain the sequence indicators as specified in Attm. B of ICAO Annex 10, Vol. II [1]. If case c is implemented: Verify that the AFTN message is received by the AFTN recipient. Check the correct format of the received AFTN message. Verify that the text is complete and unchanged, i.e. compare the received data with the *ATS-message-text* provided in the original IPM.
AMHS SARPs reference	3.1.2.3.5.2.1.7
Test class	Normal AMHS communications (N)

4.5.4 IT504 – Split an incoming IPM addressing more than 21 AFTN users

IT504	**Split an incoming IPM addressing more than 21 AFTN users**
Test criteria	This test is successful, if the receiving IUT receives an ATS message (IPM) addressing more than 21 AFTN users and splits the received IPM into several messages each addressing 21 or less AFTN users. *Note. – PDR M4050004 (Title: AMHS - Too Many Recipients) is resolved. Therefore the message shall be split into several messages.*
Scenario description	From the sending IUT send an ATS message (IPM) to the receiving IUT. The message shall address 50 (primary) recipients. Verify that the receiving IUT converts the IPM into AFTN format and sends three AFTN messages to its AFTN component. Check the addressee indicators contained in the AFTN messages. Verify that no AFTN recipient is lost and the total number of AFTN addressee indicators contained in all three messages is 50. For example • the first AFTN message contains addressee indicators for the first 21 recipients, • the second AFTN message contains addressee indicators for the next 21 recipients, and • the third AFTN message contains addressee indicators for the remaining 8 recipients.
AMHS SARPs reference	3.1.2.3.5.2.1.8
Test class	Normal AMHS communications (N)

4.5.5 IT505 – Probe Conveyance Test

IT505	**Probe Conveyance Test**
Test criteria	This test is successful, if the receiving IUT generates a report (DR or NDR), when it receives a probe with AFTN users as intended recipients.
Scenario description	From the sending IUT, send AMHS probes to the receiving IUT: a) addressing two AFTN recipients and one AMHS recipient, b) addressing two AFTN recipients, one of which can be mapped and one of which cannot be mapped onto a valid AFTN address. Verify that the receiving IUT returns a. one DR with 2 AFTN recipients from the MTCU and one DR with one recipient from the MTA b. a combined DR and NDR or one DR and one NDR in response to the probe received. Verify in all cases that the DRs reporting about the AFTN addresses which could be translated contains the supplementary information "This report only indicates successful (potential) conversion to AFTN, not delivery to a recipient".
AMHS SARPs reference	3.1.2.3.5.5 (reception of AMHS probe), 3.1.2.3.5.6.2.27
Test class	Normal AMHS communications (N)

4.6 Stress traffic situations

4.6.1 IT601 – Stress load

IT601	Stress load
Test criteria	This test is successful, if both IUTs perform AMHS traffic interchange correctly for a number of messages queued in advance.
Scenario description	Defined numbers of messages (beginning with100, 200, till 400 messages) have to be selected from the data base or generated by the UA or the AFTN terminal. These messages need to be queued (in MTAs) in both IUTs, preferably by disabling the physical connector used to send information to the underlying network in one of the IUTs. When reconnecting, the messages queued in both IUTs will be sent simultaneously from the two sites, the rate being defined by the line speed of the interconnection, as well as the process followed by each system. No errors due to malfunction of the IUTs should be observed during the interchange period. The time from sending the first till receiving the last message has to be measured and analysed in both IUTs.
AMHS SARPs reference	None
Test class	Normal (forced) AMHS communications (N)

5 Trilateral Test procedures - optional

5.1 Submission/Transfer/Delivery and Relay operations

5.1.1 IT701 – Submission /Transfer/Delivery between the partner MTAs

IT701	**Submission / Transfer / Delivery between the partner MTAs**
Test criteria	This test is successful, if the messages from all UAs are received by the corresponding UAs of the other the IUTs.
Scenario description	Create “normal” X.400 routing: (see 3.3, AFTN and X.400 Routing Tables) From the UA send an ATS message (IPM) with ATS-message-priority FF addressed to the UA of the other IUTs. • Message 1 (IT701M01) from UA IUT-A to UAs of IUT-B and IUT-C • Message 2 (IT701M02) from UA IUT-B to UAs of IUT-A and IUT-C. • Message 3 (IT701M03) from UA IUT-C to UAs of IUT-A and IUT-B. Each message shall have different ATS-filing-time and ATS-message-text. The *optional-heading-information* element shall be empty. Verify the messages received by both remote UAs. In particular, verify: • ATS-message-priority, • ATS-message-filing-time, • ATS-message-text.
AMHS SARPs reference	None
Test class	Normal AMHS communications (N)

5.1.2 IT702 – Relay operations

IT702	**Relay operations**
Test criteria	This test is successful, if the message from the sending UA is routed by the IUT in between and received by the addressed UA.
Scenario description	Create a “transfer” X.400 routing: The X.400 routing table of IUT-A routes PRMD=IUTLAND-B and PRMD=IUTLAND-C to IUT-B. The X.400 routing table of IUT-B routes PRMD=IUTLAND-A and PRMD=IUTLAND-C to IUT-C. The X.400 routing table of IUT-C routes PRMD=IUTLAND-A and PRMD=IUTLAND-B to IUT-A. From the UA send an ATS message (IPM) with ATS-message-priority FF to one UA of another IUT. • Message 1 (IT702M01) from UA IUT-A to UA of IUT-C • Message 2 (IT702M02) from UA IUT-B to UA of IUT-A. • Message 3 (IT702M03) from UA IUT-C to UA of IUT-B. Each message shall have different ATS-filing-time and ATS-message-text. The *optional-heading-information* element shall be empty. Verify the messages received by the remote UA and passed the IUT in between. In particular, verify: • ATS-message-priority, • ATS-message-filing-time, • ATS-message-text.
AMHS SARPs reference	None
Test class	Normal AMHS communications (N)

5.2 Test of special situations

5.2.1 IT801 – Alternate MTA routing

IT801	**Alternate MTA routing**
Test criteria	This test is successful, if the message from the sending UA is received by the addressed UA
Scenario description	Create a “normal” X.400 routing: (see 3.3, AFTN and X.400 Routing Tables) Cut the direct connection to the IUT to which you intend to send a message. From the UA send an ATS message (IPM) with ATS-message-priority FF to the UA of the IUT concerned. • Message 1 (IT801M01) from UA IUT-A to UA of IUT-B • Message 2 (IT801M02) from UA IUT-B to UAs of IUT-C. • Message 3 (IT801M03) from UA IUT-C to UAs of IUT-A. Each message shall have different ATS-filing-time and ATS-message-text. The *optional-heading-information* element shall be empty. If alternate MTA routing functionality is implemented and configured the message will be forwarded automatically via the “other” connection;otherwise the queued message should be forced to follow the alternate routing by the adequate means (manually). Verify the messages received by the remote UA and passed the IUT in between. In particular, verify: • ATS-message-priority, • ATS-message-filing-time, • ATS-message-text.
AMHS SARPs reference	None
Test class	Normal AMHS communications (N)

5.2.2 IT802– Loop detection

IT802	**Loop detection**
Test criteria	This test is successful; if the one of the IUT detects that the message has traversed a loop.
Scenario description	Create a temporary routing loop. The X.400 routing table of IUT-A routes PRMD=IUTLAND-X to IUT-B.The X.400 routing table of IUT-B routes PRMD=IUTLAND-X to IUT-C.The X.400 routing table of IUT-C routes PRMD=IUTLAND-X to IUT-A. Send a message addressed to PRMD=IUTLAND-X which will be routed by the IUT to the other IUT so that finally the message is performing a loop. Verify that: • the one of the IUTs detects the loop, • this IUT discards the message and • generates a NDR Verify that the sending IUT receives the NDR Repeat the test with all IUTs, so that all sending IUTs have received the NDR.
AMHS SARPs reference	3.1.1, Note 2a (ISO/IEC 10021), 3.1.2.1.6 (AMHS routing), *See also ITU-T Rec. X.411 clause 14.3.1 and clause 12.3.1.*
Test class	MHS procedural errors (E2)

6 Bilateral Test Procedures – Test Scenarios

6.1 Introduction

The following tables contain the scenarios for the different Interoperability Tests (IT) described in the previous chapters.

The test scenarios consist of several test-cases. The test-case reference is as follows:

ITxxx/TCzz

Test scenario: Txxx where xxx is the scenario number

Test-case: Czz where zz is the number of test-case.

6.2 Submission, Transfer and Delivery Operation (AMHS to AMHS)

IT101	**Submit, transfer and deliver an IPM (UA IUT-A to UA IUT-B)**		
Test-case id: **IT101/TC01**	Tested functionality: Submission, transfer and delivery of messages with different ATS-message-priorities A KK priority message will be submitted from the UA of IUT-A and delivered to the UA of IUT-B.		
Test description:	From the User Agent IUTAMHSA send the following message to the UA IUTBMHSA: PRI: KK FT: <FT> OHI: TEST IT101/TC01 Get the message with IUTBMHSA (UA-terminal of IUT-B).		
Test control:	Check the correct reception of the message at the UA IUTBMHSA of the IUT-B system. Check - the ATS-message-priority: PRI: KK - the ATS-message-filing-time and - the ATS-message-text		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

<table>
<tr><td>IT101</td><td colspan="3">Submit, transfer and deliver an IPM (UA IUT-A to UA IUT-B)</td></tr>
<tr><td>Test-case id:
IT101/TC02</td><td colspan="3">Tested functionality: Submission, transfer and delivery of messages with different ATS-message-priorities
A GG priority message will be submitted from the UA of IUT-A and delivered to the UA of IUT-B.</td></tr>
<tr><td>Test description:</td><td colspan="3">From the User Agent IUTAMHSA send the following message to the UA IUTBMHSA:
PRI: GG
FT: <FT>
OHI:
TEST IT101/TC02

Get the message with IUTBMHSA (UA-terminal of IUT-B).</td></tr>
<tr><td>Test control:</td><td colspan="3">Check the correct reception of the message at the UA IUTBMHSA of the IUT-B system.
Check
- the ATS-message-priority: PRI: GG
- the ATS-message-filing-time and
- the ATS-message-text</td></tr>
<tr><td>Test result:</td><td>PASS</td><td>FAILED</td><td>INCONCLUSIVE</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>

IT101	**Submit, transfer and deliver an IPM (UA IUT-A to UA IUT-B)**		
Test-case id: **IT101/TC03**	Tested functionality: Submission, transfer and delivery of messages with different ATS-message-priorities An FF priority message will be submitted from the UA of IUT-A and delivered to the UA of IUT-B.		
Test description:	From the User Agent IUTAMHSA send the following message to the UA IUTBMHSA: PRI: FF FT: <FT> OHI: TEST IT101/TC03 Get the message with IUTBMHSA (UA-terminal of IUT-B).		
Test control:	Check the correct reception of the message at the UA IUTBMHSA of the IUT-B system. Check - the ATS-message-priority: PRI: FF - the ATS-message-filing-time and - the ATS-message-text		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

<table>
<tr><td>IT101</td><td colspan="3">Submit, transfer and deliver an IPM (UA IUT-A to UA IUT-B)</td></tr>
<tr><td>Test-case id:
IT101/TC04</td><td colspan="3">Tested functionality: Submission, transfer and delivery of messages with different ATS-message-priorities
A DD priority message will be submitted from the UA of IUT-A and delivered to the UA of IUT-B.</td></tr>
<tr><td>Test description:</td><td colspan="3">From the User Agent IUTAMHSA send the following message to the UA IUTBMHSA:
PRI: DD
FT: <FT>
OHI:
TEST IT101/TC04

Get the message with IUTBMHSA (UA-terminal of IUT-B).</td></tr>
<tr><td>Test control:</td><td colspan="3">Check the correct reception of the message at the UA IUTBMHSA of the IUT-B system.
Check
- the ATS-message-priority: PRI: DD
- the ATS-message-filing-time and
- the ATS-message-text</td></tr>
<tr><td>Test result:</td><td>PASS</td><td>FAILED</td><td>INCONCLUSIVE</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>

IT101	Submit, transfer and deliver an IPM (UA IUT-A to UA IUT-B)		
Test-case id: **IT101/TC05**	Tested functionality: Submission, transfer and delivery of messages with different ATS-message-priorities An SS priority message will be submitted from the UA of IUT-A and delivered to the UA of IUT-B.		
Test description:	From the User Agent IUTAMHSA send the following message to the UA IUTBMHSA: PRI: SS FT: <FT> OHI: TEST IT101/TC05 Get the message with IUTBMHSA (UA-terminal of IUT-B). A RN is submitted when the message is displayed. Note. – Depending on UA implementation the user might be requested to send the RN.		
Test control:	Check the correct reception of the message at the UA IUTBMHSA of the IUT-B system. Check - the ATS-message-priority: PRI: SS - the ATS-message-filing-time and - the ATS-message-text Check the reception of a RN on the UA IUTAMHSA of the IUT-A system.		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

IT102	**Submit, transfer and deliver an IPM (UA IUT-B to UA IUT-A)**		
Test-case id: **IT102/TC01**	Tested functionality: Submission, transfer and delivery of messages with different ATS-message-priorities A KK priority message will be submitted from the UA of IUT-B and delivered to the UA of IUT-A.		
Test description:	From the User Agent IUTBMHSA send the following message to the UA IUTAMHSA: PRI: KK FT: <FT> OHI: TEST IT102/TC01 Get the message with IUTAMHSA (UA-terminal of IUT-A).		
Test control:	Check the correct reception of the message at the UA IUTAMHSA of the IUT-A system. Check - the ATS-message-priority: PRI: KK - the ATS-message-filing-time and - the ATS-message-text		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

<table>
<tr><td>IT102</td><td colspan="3">Submit, transfer and deliver an IPM (UA IUT-B to UA IUT-A)</td></tr>
<tr><td>Test-case id:
IT102/TC02</td><td colspan="3">Tested functionality: Submission, transfer and delivery of messages with different ATS-message-priorities
A GG priority message will be submitted from the UA of IUT-B and delivered to the UA of IUT-A.</td></tr>
<tr><td>Test description:</td><td colspan="3">From the User Agent IUTBMHSA send the following message to the UA IUTAMHSA:
PRI: GG
FT: <FT>
OHI:
TEST IT102/TC02

Get the message with IUTAMHSA (UA-terminal of IUT-A).</td></tr>
<tr><td>Test control:</td><td colspan="3">Check the correct reception of the message at the UA IUTAMHSA of the IUT-A system.
Check
- the ATS-message-priority: PRI: GG
- the ATS-message-filing-time and
- the ATS-message-text</td></tr>
<tr><td>Test result:</td><td>PASS</td><td>FAILED</td><td>INCONCLUSIVE</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>

IT102	Submit, transfer and deliver an IPM (UA IUT-B to UA IUT-A)		
Test-case id: **IT102/TC03**	Tested functionality: Submission, transfer and delivery of messages with different ATS-message-priorities An FF priority message will be submitted from the UA of IUT-B and delivered to the UA of IUT-A.		
Test description:	From the User Agent IUTBMHSA send the following message to the UA IUTAMHSA: PRI: FF FT: <FT> OHI: TEST IT102/TC03 Get the message with IUTAMHSA (UA-terminal of IUT-A).		
Test control:	Check the correct reception of the message at the UA IUTAMHSA of the IUT-A system. Check - the ATS-message-priority: PRI: FF - the ATS-message-filing-time and - the ATS-message-text		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

IT102	**Submit, transfer and deliver an IPM (UA IUT-B to UA IUT-A)**		
Test-case id: **IT102/TC04**	Tested functionality: Submission, transfer and delivery of messages with different ATS-message-priorities A DD priority message will be submitted from the UA of IUT-B and delivered to the UA of IUT-A.		
Test description:	From the User Agent IUTBMHSA send the following message to the UA IUTAMHSA: PRI: DD FT: <FT> OHI: TEST IT102/TC04 Get the message with IUTAMHSA (UA-terminal of IUT-A)		
Test control:	Check the correct reception of the message at the UA IUTAMHSA of the IUT-A system. Check - the ATS-message-priority: PRI: DD - the ATS-message-filing-time and - the ATS-message-text		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

IT102	Submit, transfer and deliver an IPM (UA IUT-B to UA IUT-A)		
Test-case id: **IT102/TC05**	Tested functionality: Submission, transfer and delivery of messages with different ATS-message-priorities An SS priority message will be submitted from the UA of IUT-B and delivered to the UA of IUT-A.		
Test description:	From the User Agent IUTBMHSA send the following message to the UA IUTAMHSA: PRI: SS FT: <FT> OHI: TEST IT102/TC05 Get the message with IUTAMHSA (UA-terminal of IUT-A). A RN is submitted when the message is displayed. *Note. – Depending on UA implementation the user might be requested to send the RN.*		
Test control:	Check the correct reception of the message at the UA IUTAMHSA of the IUT-A system. Check - the ATS-message-priority: PRI: SS - the ATS-message-filing-time and - the ATS-message-text Check the reception of a RN on the UA IUTBMHSA of the IUT-B system.		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

6.3 Gateway Operations (AFTN to AMHS)

IT201	**Convert an AFTN message to AMHS format (IUT-A)**		
Test-case id: **IT201/TC01**	Tested functionality: Conversion of messages with different AFTN priorities A KK priority message will be sent from the AFTN terminal of IUT-A, converted to AMHS and received at the UA of IUT-B.		
Test description:	From the AFTN terminal IUTAFTNA of IUT-A send the following message to the User Agent (UA) of IUT-B: KK IUTBMHSA <FT> IUTAFTNA TEST IT201/TC01 The message is converted from AFTN into AMHS format in the MTCU of IUT-A.		
Test control:	Check the correct reception of the message at the UA IUTBMHSA of the IUT-B system. Check - the ATS-message-priority: PRI: KK - the message transfer priority: NON URGENT - the ATS-message-filing-time and - the ATS-message-text		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

IT201	Convert an AFTN message to AMHS format (IUT-A)		
Test-case id: **IT201/TC02**	Tested functionality: Conversion of messages with different AFTN priorities A GG priority message will be sent from the AFTN terminal of IUT-A, converted to AMHS and received at the UA of IUT-B.		
Test description:	From the AFTN terminal IUTAFTNA of IUT-A send the following message to the User Agent (UA) of IUT-B: GG IUTBMHSA <FT> IUTAFTNA TEST IT201/TC02 The message is converted from AFTN into AMHS format in the MTCU of IUT-A.		
Test control:	Check the correct reception of the message at the UA IUTBMHSA of the IUT-B system. Check - the ATS-message-priority: PRI: GG - the message transfer priority: NON URGENT - the ATS-message-filing-time and - the ATS-message-text		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

<table>
<tr><th>IT201</th><th colspan="3">Convert an AFTN message to AMHS format (IUT-A)</th></tr>
<tr><td>Test-case id:
IT201/TC03</td><td colspan="3">Tested functionality: Conversion of messages with different AFTN priorities
An FF priority message will be sent from the AFTN terminal of IUT-A, converted to AMHS and received at the UA of IUT-B.</td></tr>
<tr><td>Test description:</td><td colspan="3">From the AFTN terminal IUTAFTNA of IUT-A send the following message to the User Agent (UA) of IUT-B:
FF IUTBMHSA
<FT> IUTAFTNA
TEST IT201/TC03

The message is converted from AFTN into AMHS format in the MTCU of IUT-A.</td></tr>
<tr><td>Test control:</td><td colspan="3">Check the correct reception of the message at the UA IUTBMHSA of the IUT-B system.
Check
- the ATS-message-priority: PRI: FF
- the message transfer priority: NORMAL
- the ATS-message-filing-time and
- the ATS-message-text</td></tr>
<tr><td>Test result:</td><td>PASS</td><td>FAILED</td><td>INCONCLUSIVE</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>

IT201	Convert an AFTN message to AMHS format (IUT-A)		
Test-case id: **IT201/TC04**	Tested functionality: Conversion of messages with different AFTN priorities A DD priority message will be sent from the AFTN terminal of IUT-A, converted to AMHS and received at the UA of IUT-B.		
Test description:	From the AFTN terminal IUTAFTNA of IUT-A send the following message to the User Agent (UA) of IUT-B: DD IUTBMHSA <FT> IUTAFTNA TEST IT201/TC04 The message is converted from AFTN into AMHS format in the MTCU of IUT-A.		
Test control:	Check the correct reception of the message at the UA IUTBMHSA of the IUT-B system. Check - the ATS-message-priority: PRI: DD - the message transfer priority: NORMAL - the ATS-message-filing-time and - the ATS-message-text		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

<table>
<tr><td>IT201</td><td colspan="3">Convert an AFTN message to AMHS format (IUT-A)</td></tr>
<tr><td>Test-case id:
IT201/TC05</td><td colspan="3">Tested functionality: Conversion of messages with different AFTN priorities
An SS priority message will be sent from the AFTN terminal of IUT-A, converted to AMHS and received at the UA of IUT-B.</td></tr>
<tr><td>Test description:</td><td colspan="3">From the AFTN terminal IUTAFTNA of IUT-A send the following message to the User Agent (UA) of IUT-B:
SS IUTBMHSA
<FT> IUTAFTNA
TEST IT201/TC05

The message is converted from AFTN into AMHS format in the MTCU of IUT-A.

Optional:
Generate a RN at the receiving UA IUTBMHSA of ITU-B.</td></tr>
<tr><td>Test control:</td><td colspan="3">Check the correct reception of the message at the UA IUTBMHSA of the IUT-B system.
Check
- the ATS-message-priority: PRI: SS
- the message transfer priority: URGENT
- the ATS-message-filing-time and
- the ATS-message-text

Optional:
If a RN is replied from the UA IUTBMHSA of ITU-B, the MTCU of IUT-A converts it into an SS Ack message which is sent to the AFTN terminal of IUT-A.
Check the reception of the SS Ack message at the AFTN terminal IUTAFTNA of IUT-A. .Its originator indicator shall be the AFTN address IUTBMHSA, and its text shall be “R <FT> IUTAFTNA”, where <FT> denotes the filing time of the subject AFTN message.</td></tr>
<tr><td>Test result:</td><td>PASS</td><td>FAILED</td><td>INCONCLUSIVE</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>

<table>
<tr><td>IT202</td><td colspan="3">Convert an AFTN message to AMHS format (IUT-B)</td></tr>
<tr><td>Test-case id:
IT202/TC01</td><td colspan="3">Tested functionality: Conversion of messages with different AFTN priorities
A KK priority message will be sent from the AFTN terminal of IUT-B, converted to AMHS and received at the UA of IUT-A.</td></tr>
<tr><td>Test description:</td><td colspan="3">From the AFTN terminal IUTBFTNA of IUT-B send the following message to the User Agent (UA) of IUT-A:
KK IUTAMHSA
<FT> IUTBFTNA
TEST IT202/TC01

The message is converted from AFTN into AMHS format in the MTCU of IUT-B.</td></tr>
<tr><td>Test control:</td><td colspan="3">Check the correct reception of the message at the UA IUTAMHSA of the IUT-A system.
Check
- the ATS-message-priority: PRI: KK
- the message transfer priority: NON URGENT
- the ATS-message-filing-time and
- the ATS-message-text</td></tr>
<tr><td>Test result:</td><td>PASS</td><td>FAILED</td><td>INCONCLUSIVE</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>

<table>
<tr><td>IT202</td><td colspan="3">Convert an AFTN message to AMHS format (IUT-B)</td></tr>
<tr><td>Test-case id:
IT202/TC02</td><td colspan="3">Tested functionality: Conversion of messages with different AFTN priorities
A GG priority message will be sent from the AFTN terminal of IUT-B, converted to AMHS and received at the UA of IUT-A.</td></tr>
<tr><td>Test description:</td><td colspan="3">From the AFTN terminal IUTBFTNA of IUT-B send the following message to the User Agent (UA) of IUT-A:
GG IUTAMHSA
<FT> IUTBFTNA
TEST IT202/TC02

The message is converted from AFTN into AMHS format in the MTCU of IUT-B.</td></tr>
<tr><td>Test control:</td><td colspan="3">Check the correct reception of the message at the UA IUTAMHSA of the IUT-A system.
Check
- the ATS-message-priority: PRI: GG
- the message transfer priority: NON URGENT
- the ATS-message-filing-time and
- the ATS-message-text</td></tr>
<tr><td>Test result:</td><td>PASS</td><td>FAILED</td><td>INCONCLUSIVE</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>

IT202	Convert an AFTN message to AMHS format (IUT-B)		
Test-case id: **IT202/TC03**	Tested functionality: Conversion of messages with different AFTN priorities An FF priority message will be sent from the AFTN terminal of IUT-B, converted to AMHS and received at the UA of IUT-A.		
Test description:	From the AFTN terminal IUTBFTNA of IUT-B send the following message to the User Agent (UA) of IUT-A: FF IUTAMHSA <FT> IUTBFTNA TEST IT202/TC03 The message is converted from AFTN into AMHS format in the MTCU of IUT-B.		
Test control:	Check the correct reception of the message at the UA IUTAMHSA of the IUT-A system. Check - the ATS-message-priority: PRI: FF - the message transfer priority: NORMAL - the ATS-message-filing-time and - the ATS-message-text		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

IT202	**Convert an AFTN message to AMHS format (IUT-B)**		
Test-case id: **IT202/TC04**	Tested functionality: Conversion of messages with different AFTN priorities A DD priority message will be sent from the AFTN terminal of IUT-B, converted to AMHS and received at the UA of IUT-A.		
Test description:	From the AFTN terminal IUTBFTNA of IUT-B send the following message to the User Agent (UA) of IUT-A: DD IUTAMHSA Test message ID: IT202M04 <FT> IUTBFTNA DD IUTAMHSA TEST IT202/TC04 <FT> IUTBFTNA TEST IT202/TC04 The message is converted from AFTN into AMHS format in the MTCU of IUT-B. Test message ID: IT202M05		
Test control: <FT> IUTBFTNA TEST IT202/TC05	Check the correct reception of the message at the UA IUTAMHSA of the IUT-A system. Check - the ATS-message-priority: PRI: DD - the message transfer priority: NORMAL - the ATS-message-filing-time and - the ATS-message-text		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

<table>
<tr><td>Test-case id:
IT202/TC05</td><td colspan="3">Tested functionality: Conversion of messages with different AFTN priorities
An SS priority message will be sent from the AFTN terminal of IUT-B, converted to AMHS and received at the UA of IUT-A.</td></tr>
<tr><td>Test description:</td><td colspan="3">From the AFTN terminal IUTBFTNA of IUT-B send the following message to the User Agent (UA) of IUT-A:
SS IUTAMHSA
<FT> IUTBFTNA
TEST IT202/TC05

The message is converted from AFTN into AMHS format in the MTCU of IUT-B.

Optional:
Generate a RN at the receiving UA IUTAMHSA of ITU-A.</td></tr>
<tr><td>Test control:</td><td colspan="3">Check the correct reception of the message at the UA IUTAMHSA of the IUT-A system.
Check
- the ATS-message-priority: PRI: SS
- the message transfer priority: URGENT
- the ATS-message-filing-time and
- the ATS-message-text

Optional:
If a RN is replied from the UA IUTAMHSA of ITU-A, the MTCU of IUT-B converts it into an SS Ack message which is sent to the AFTN terminal of IUT-B.
Check the reception of the SS Ack message at the AFTN terminal IUTBFTNA of IUT-B. Its originator indicator shall be the AFTN address IUTAMHSA, and its text shall be “R <FT> IUTBFTNA”, where <FT> denotes the filing time of the subject AFTN message.</td></tr>
<tr><td>Test result:</td><td>PASS</td><td>FAILED</td><td>INCONCLUSIVE</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>

6.4 Gateway Operations (AMHS to AFTN)

<table>
<tr><td>IT301</td><td colspan="3">Convert an IPM to AFTN format (IUT-B)</td></tr>
<tr><td>Test-case id:
IT301/TC01</td><td colspan="3">Tested functionality: Conversion of messages with different ATS-message-priorities
A KK priority message will be submitted from the UA of IUT-A, converted to AFTN in IUT-B and received at the AFTN terminal of IUT-B.</td></tr>
<tr><td>Test description:</td><td colspan="3">From the User Agent IUTAMHSA send the following message to the AFTN terminal IUTBFTNA of IUT-B:
PRI: KK
FT: <FT>
OHI:
TEST IT301/TC01

The message is converted from AMHS into AFTN format in the MTCU of IUT-B.</td></tr>
<tr><td>Test control:</td><td colspan="3">Check the correct reception of the message at the AFTN terminal IUTBFTNA of the IUT-B system.
Check
- the AFTN priority: KK
- the AFTN filing time and
- the AFTN message text</td></tr>
<tr><td>Test result:</td><td>PASS</td><td>FAILED</td><td>INCONCLUSIVE</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>

IT301	Convert an IPM to AFTN format (IUT-B)		
Test-case id: **IT301/TC02**	Tested functionality: Conversion of messages with different ATS-message-priorities A GG priority message will be submitted from the UA of IUT-A, converted to AFTN in IUT-B and received at the AFTN terminal of IUT-B.		
Test description:	From the User Agent IUTAMHSA send the following message to the AFTN terminal IUTBFTNA of IUT-B: PRI: GG FT: <FT> OHI: TEST IT301/TC02 The message is converted from AMHS into AFTN format in the MTCU of IUT-B.		
Test control:	Check the correct reception of the message at the AFTN terminal IUTBFTNA of the IUT-B system. Check - the AFTN priority: GG - the AFTN filing time and - the AFTN message text		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

IT301	**Convert an IPM to AFTN format (IUT-B)**		
Test-case id: **IT301/TC03**	Tested functionality: Conversion of messages with different ATS-message-priorities An FF priority message will be submitted from the UA of IUT-A, converted to AFTN in IUT-B and received at the AFTN terminal of IUT-B.		
Test description:	From the User Agent IUTAMHSA send the following message to the AFTN terminal IUTBFTNA of IUT-B: PRI: FF FT: <FT> OHI: TEST IT301/TC03 The message is converted from AMHS into AFTN format in the MTCU of IUT-B.		
Test control:	Check the correct reception of the message on the AFTN terminal IUTBFTNA of the IUT-B system. Check - the AFTN priority: FF - the AFTN filing time and - the AFTN message text		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

IT301	**Convert an IPM to AFTN format (IUT-B)**		
Test-case id: **IT301/TC04**	Tested functionality: Conversion of messages with different ATS-message-priorities A DD priority message will be submitted from the UA of IUT-A, converted to AFTN in IUT-B and received at the AFTN terminal of IUT-B.		
Test description:	From the User Agent IUTAMHSA send the following message to the AFTN terminal IUTBFTNA of IUT-B: PRI: DD FT: <FT> OHI: TEST IT301/TC04 The message is converted from AMHS into AFTN format in the MTCU of IUT-B.		
Test control:	Check the correct reception of the message on the AFTN terminal IUTBFTNA of the IUT-B system. Check - the AFTN priority: DD - the AFTN filing time and - the AFTN message text		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

IT301	**Convert an IPM to AFTN format (IUT-B)**		
Test-case id: **IT301/TC05**	Tested functionality: Conversion of messages with different ATS-message-priorities An SS priority message will be submitted from the UA of IUT-A, converted to AFTN in IUT-B and received at the AFTN terminal of IUT-B		
Test description:	From the User Agent IUTAMHSA send the following message to the AFTN terminal IUTBFTNA of IUT-B: PRI: SS FT: <FT> OHI: TEST IT301/TC05 The message is converted from AMHS into AFTN format in the MTCU of IUT-B. *Optional:* *Send an SS Acknowledgement message from the receiving AFTN terminal.*		
Test control:	Check the correct reception of the message on the AFTN terminal IUTBFTNA of the IUT-B system. Check - the AFTN priority: SS - the AFTN filing time and - the AFTN message text *Optional:* *When the SS Ack message is replied, the MTCU of IUT-B converts it into a RN.* *Check the reception of the RN at the UA IUTAMHSA of ITU-A.*		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

IT302	Convert an IPM to AFTN format (IUT-A)		
Test-case id: **IT302/TC01**	Tested functionality: Conversion of messages with different ATS-message-priorities A KK priority message will be submitted from the UA of IUT-B, converted to AFTN in IUT-A and received at the AFTN terminal of IUT-A.		
Test description:	From the User Agent IUTBMHSA send the following message to the AFTN terminal IUTAFTNA of IUT-A: PRI: KK FT: <FT> OHI: TEST IT302/TC01 The message is converted from AMHS into AFTN format in the MTCU of IUT-A.		
Test control:	Check the correct reception of the message on the AFTN terminal IUTAFTNA of the IUT-A system. Check - the AFTN priority: KK - the AFTN filing time and - the AFTN message text		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

IT302	Convert an IPM to AFTN format (IUT-A)		
Test-case id: **IT302/TC02**	Tested functionality: Conversion of messages with different ATS-message-priorities A GG priority message will be submitted from the UA of IUT-B, converted to AFTN in IUT-A and received at the AFTN terminal of IUT-A.		
Test description:	From the User Agent IUTBMHSA send the following message to the AFTN terminal IUTAFTNA of IUT-A: PRI: GG FT: <FT> OHI: TEST IT302/TC02 The message is converted from AMHS into AFTN format in the MTCU of IUT-A.		
Test control:	Check the correct reception of the message on the AFTN terminal IUTAFTNA of the IUT-A system. Check - the AFTN priority: GG - the AFTN filing time and - the AFTN message text		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

<table>
<tr><td>IT302</td><td colspan="3">Convert an IPM to AFTN format (IUT-A)</td></tr>
<tr><td>Test-case id:
IT302/TC03</td><td colspan="3">Tested functionality: Conversion of messages with different ATS-message-priorities
An FF priority message will be submitted from the UA of IUT-B, converted to AFTN in IUT-A and received at the AFTN terminal of IUT-A.</td></tr>
<tr><td>Test description:</td><td colspan="3">From the User Agent IUTBMHSA send the following message to the AFTN terminal IUTAFTNA of IUT-A:
PRI: FF
FT: <FT>
OHI:
TEST IT302/TC03

The message is converted from AMHS into AFTN format in the MTCU of IUT-A.</td></tr>
<tr><td>Test control:</td><td colspan="3">Check the correct reception of the message on the AFTN terminal IUTAFTNA of the IUT-A system.
Check
- the AFTN priority: FF
- the AFTN filing time and
- the AFTN message text</td></tr>
<tr><td>Test result:</td><td>PASS</td><td>FAILED</td><td>INCONCLUSIVE</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>

<table>
<tr><td>IT302</td><td colspan="3">Convert an IPM to AFTN format (IUT-A)</td></tr>
<tr><td>Test-case id:
IT302/TC04</td><td colspan="3">Tested functionality: Conversion of messages with different ATS-message-priorities
A DD priority message will be submitted from the UA of IUT-B, converted to AFTN in IUT-A and received at the AFTN terminal of IUT-A.</td></tr>
<tr><td>Test description:</td><td colspan="3">From the User Agent IUTBMHSA send the following message to the AFTN terminal IUTAFTNA of IUT-A:
PRI: DD
FT: <FT>
OHI:
TEST IT302/TC04

The message is converted from AMHS into AFTN format in the MTCU of IUT-A.</td></tr>
<tr><td>Test control:</td><td colspan="3">Check the correct reception of the message on the AFTN terminal IUTAFTNA of the IUT-A system.
Check
- the AFTN priority: DD
- the AFTN filing time and
- the AFTN message text</td></tr>
<tr><td>Test result:</td><td>PASS</td><td>FAILED</td><td>INCONCLUSIVE</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>

IT302	**Convert an IPM to AFTN format (IUT-A)**		
Test-case id: **IT302/TC05**	Tested functionality: Conversion of messages with different ATS-message-priorities An SS priority message will be submitted from the UA of IUT-B, converted to AFTN in IUT-A and received at the AFTN terminal of IUT-A.		
Test description:	From the User Agent IUTBMHSA send the following message to the AFTN terminal IUTAFTNA of IUT-A: PRI: SS FT: <FT> OHI: TEST IT302/TC05 The message is converted from AMHS into AFTN format in the MTCU of IUT-A. *Optional:* *Send an SS Acknowledgement message from the receiving AFTN terminal.*		
Test control:	Check the correct reception of the message on the AFTN terminal IUTAFTNA of the IUT-A system. Check - the AFTN priority: SS - the AFTN filing time and - the AFTN message text *Optional:* *When the SS Ack message is replied, the MTCU of IUT-A converts it into a RN.* *Check the reception of the RN at the UA IUTBMHSA of ITU-B.*		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

6.5 Gateway Operations (AFTN to AMHS to AFTN)

IT401	**Convert an AFTN message to an IPM and back to AFTN format (IUT-A to IUT-B)**		
Test-case id: **IT401/TC01**	Tested functionality: Conversion of messages with different AFTN priorities An AFTN message with KK priority will be sent from the AFTN terminal of IUT-A to the AFTN terminal of IUT-B.		
Test description:	From the AFTN terminal IUTAFTNA send the following message to the AFTN terminal IUTBFTNA of IUT-B: KK IUTBFTNA <FT> IUTAFTNA TEST IT401/TC01 The message is - converted from AFTN into AMHS format in the MTCU of IUT-A, - transferred via the MTA of IUT A to the MTA of IUT-B, - routed to the MTCU of IUT-B and - converted from AMHS into AFTN format in the MTCU of IUT-B. .		
Test control:	Check the correct reception of the message on the AFTN terminal IUTBFTNA of the IUT-B system. Check - the AFTN priority: KK - the AFTN filing time and - the AFTN message text		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

IT401	**Convert an AFTN message to an IPM and back to AFTN format (IUT-A to IUT-B)**		
Test-case id: **IT401/TC02**	Tested functionality: Conversion of messages with different AFTN priorities An AFTN message with GG priority will be sent from the AFTN terminal of IUT-A to the AFTN terminal of IUT-B.		
Test description:	From the AFTN terminal IUTAFTNA send the following message to the AFTN terminal IUTBFTNA of IUT-B: GG IUTBFTNA <FT> IUTAFTNA TEST IT401/TC02 The message is - converted from AFTN into AMHS format in the MTCU of IUT-A, - transferred via the MTA of IUT A to the MTA of IUT-B, - routed to the MTCU of IUT-B and - converted from AMHS into AFTN format in the MTCU of IUT-B.		
Test control:	Check the correct reception of the message on the AFTN terminal IUTBFTNA of the IUT-B system. Check - the AFTN priority: GG - the AFTN filing time and - the AFTN message text		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

IT401	**Convert an AFTN message to an IPM and back to AFTN format (IUT-A to IUT-B)**		
Test-case id: **IT401/TC03**	Tested functionality: Conversion of messages with different AFTN priorities An AFTN message with FF priority will be sent from the AFTN terminal of IUT-A to the AFTN terminal of IUT-B.		
Test description:	From the AFTN terminal IUTAFTNA send the following message to the AFTN terminal IUTBFTNA of IUT-B: FF IUTBFTNA <FT> IUTAFTNA TEST IT401/TC03 The message is - converted from AFTN into AMHS format in the MTCU of IUT-A, - transferred via the MTA of IUT A to the MTA of IUT-B, - routed to the MTCU of IUT-B and - converted from AMHS into AFTN format in the MTCU of IUT-B. .		
Test control:	Check the correct reception of the message on the AFTN terminal IUTBFTNA of the IUT-B system. Check - the AFTN priority: FF - the AFTN filing time and - the AFTN message text		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

<table>
<tr><td>IT401</td><td colspan="3">Convert an AFTN message to an IPM and back to AFTN format (IUT-A to IUT-B)</td></tr>
<tr><td>Test-case id:
IT401/TC04</td><td colspan="3">Tested functionality: Conversion of messages with different AFTN priorities
An AFTN message with DD priority will be sent from the AFTN terminal of IUT-A to the AFTN terminal of IUT-B.</td></tr>
<tr><td>Test description:</td><td colspan="3">From the AFTN terminal IUTAFTNA send the following message to the AFTN terminal IUTBFTNA of IUT-B:
DD IUTBFTNA
<FT> IUTAFTNA
TEST IT401/TC04

The message is - converted from AFTN into AMHS format in the MTCU of IUT-A, - transferred via the MTA of IUT A to the MTA of IUT-B, - routed to the MTCU of IUT-B and - converted from AMHS into AFTN format in the MTCU of IUT-B.
.</td></tr>
<tr><td>Test control:</td><td colspan="3">Check the correct reception of the message on the AFTN terminal IUTBFTNA of the IUT-B system.
Check
- the AFTN priority: DD
- the AFTN filing time and
- the AFTN message text</td></tr>
<tr><td>Test result:</td><td>PASS</td><td>FAILED</td><td>INCONCLUSIVE</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>

IT401	**Convert an AFTN message to an IPM and back to AFTN format (IUT-A to IUT-B)**		
Test-case id: **IT401/TC05**	Tested functionality: Conversion of messages with different AFTN priorities An AFTN message with SS priority will be sent from the AFTN terminal of IUT-A to the AFTN terminal of IUT-B.		
Test description:	From the AFTN terminal IUTAFTNA send the following message to the AFTN terminal IUTBFTNA of IUT-B: SS IUTBFTNA <FT> IUTAFTNA TEST IT401/TC05 The message is - converted from AFTN into AMHS format in the MTCU of IUT-A, - transferred via the MTA of IUT A to the MTA of IUT-B, - routed to the MTCU of IUT-B and - converted from AMHS into AFTN format in the MTCU of IUT-B. *Optional:* *Send an SS Acknowledgement message from the receiving AFTN terminal.*		
Test control:	Check the correct reception of the message on the AFTN terminal IUTBFTNA of the IUT-B system. Check - the AFTN priority: SS - the AFTN filing time and - the AFTN message text *Optional:* *When the SS Ack message is replied, the MTCU of IUT-B converts it into a RN, the RN is re-converted to an SS Acknowledgement message in the MTCU of IUT-A.* *Check the reception of the SS Acknowledgement at the AFTN terminal IUTAFTNA of ITU-A.*		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

IT402	**Convert an AFTN message to an IPM and back to AFTN format (IUT-B to IUT-A)**		
Test-case id: **IT402/TC01**	Tested functionality: Conversion of messages with different AFTN priorities An AFTN message with KK priority will be sent from the AFTN terminal of IUT-B to the AFTN terminal of IUT-A.		
Test description:	From the AFTN terminal IUTBFTNA send the following message to the AFTN terminal IUTAFTNA of IUT-A: KK IUTAFTNA <FT> IUTBFTNA TEST IT402/TC01 The message is - converted from AFTN into AMHS format in the MTCU of IUT-B, - transferred via the MTA of IUT B to the MTA of IUT-A, - routed to the MTCU of IUT-A and - converted from AMHS into AFTN format in the MTCU of IUT-A.		
Test control:	Check the correct reception of the message on the AFTN terminal IUTAFTNA of the IUT-A system. Check - the AFTN priority: KK - the AFTN filing time and - the AFTN message text		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

IT402	**Convert an AFTN message to an IPM and back to AFTN format (IUT-B to IUT-A)**		
Test-case id: **IT402/TC02**	Tested functionality: Conversion of messages with different AFTN priorities An AFTN message with GG priority will be sent from IUT-B to the AFTN terminal of IUT-A.		
Test description:	From the AFTN terminal IUTBFTNA send the following message to the AFTN terminal IUTAFTNA of IUT-A: GG IUTAFTNA <FT> IUTBFTNA TEST IT402/TC02 The message is - converted from AFTN into AMHS format in the MTCU of IUT-B, - transferred via the MTA of IUT B to the MTA of IUT-A, - routed to the MTCU of IUT-A and - converted from AMHS into AFTN format in the MTCU of IUT-A.		
Test control:	Check the correct reception of the message on the AFTN terminal IUTAFTNA of the IUT-A system. Check - the AFTN priority: GG - the AFTN filing time and - the AFTN message text		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

<table>
<tr><td>IT402</td><td colspan="3">Convert an AFTN message to an IPM and back to AFTN format (IUT-B to IUT-A)</td></tr>
<tr><td>Test-case id:
IT402/TC03</td><td colspan="3">Tested functionality: Conversion of messages with different AFTN priorities
An AFTN message with FF priority will be sent from the AFTN terminal of IUT-B to the AFTN terminal of IUT-A.</td></tr>
<tr><td>Test description:</td><td colspan="3">From the AFTN terminal IUTBFTNA send the following message to the AFTN terminal IUTAFTNA of IUT-A:
FF IUTAFTNA
<FT> IUTBFTNA
TEST IT402/TC03

The message is - converted from AFTN into AMHS format in the MTCU of IUT-B, - transferred via the MTA of IUT B to the MTA of IUT-A, - routed to the MTCU of IUT-A and - converted from AMHS into AFTN format in the MTCU of IUT-A.</td></tr>
<tr><td>Test control:</td><td colspan="3">Check the correct reception of the message on the AFTN terminal IUTAFTNA of the IUT-A system.
Check
- the AFTN priority: FF
- the AFTN filing time and
- the AFTN message text</td></tr>
<tr><td>Test result:</td><td>PASS</td><td>FAILED</td><td>INCONCLUSIVE</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>

IT402	**Convert an AFTN message to an IPM and back to AFTN format (IUT-B to IUT-A)**		
Test-case id: **IT402/TC04**	Tested functionality: Conversion of messages with different AFTN priorities An AFTN message with DD priority will be sent from the AFTN terminal of IUT-B to the AFTN terminal of IUT-A.		
Test description:	From the AFTN terminal IUTBFTNA send the following message to the AFTN terminal IUTAFTNA of IUT-A: DD IUTAFTNA <FT> IUTBFTNA TEST IT402/TC04 The message is - converted from AFTN into AMHS format in the MTCU of IUT-B, - transferred via the MTA of IUT B to the MTA of IUT-A, - routed to the MTCU of IUT-A and - converted from AMHS into AFTN format in the MTCU of IUT-A.		
Test control:	Check the correct reception of the message on the AFTN terminal IUTAFTNA of the IUT-A system. Check - the AFTN priority: DD - the AFTN filing time and - the AFTN message text		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

IT402	Convert an AFTN message to an IPM and back to AFTN format (IUT-B to IUT-A)		
Test-case id: **IT402/TC05**	Tested functionality: Conversion of messages with different AFTN priorities An AFTN message with SS priority will be sent from the AFTN terminal of IUT-B to the AFTN terminal of IUT-A.		
Test description:	From the AFTN terminal of IUTBFTNA send the following message to the AFTN terminal IUTAFTNA of IUT-A: SS IUTAFTNA <FT> IUTBFTNA TEST IT402/TC05 The message is - converted from AFTN into AMHS format in the MTCU of IUT-B, - transferred via the MTA of IUT B to the MTA of IUT-A, - routed to the MTCU of IUT-A and - converted from AMHS into AFTN format in the MTCU of IUT-A. Optional: Send an SS Acknowledgement message from the receiving AFTN terminal.		
Test control:	Check the correct reception of the message on the AFTN terminal IUTAFTNA of the IUT-A system. Check - the AFTN priority: SS - the AFTN filing time and - the AFTN message text Optional: When the SS Ack message is replied, the MTCU of IUT-A converts it into a RN, the RN is re-converted to an SS Acknowledgement message in the MTCU of IUT-B. Check the reception of the SS Acknowledgement at the AFTN terminal IUTBFTNA of ITU-B.		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

6.6 Gateway Operations – special cases

IT501	**Distribute an IPM to AMHS and AFTN users**		
Test-case id: **IT501/TC01**	Tested functionality: Distribution of IPM A message will be sent from a UA on IUT-A to IUT-B with Primary Recipients addressing an AFTN terminal and a UA in IUT-B.		
Test description:	From IUTAMHSA send the following message to: Primary Recipients: IUTBMHSA and IUTBFTNA PRI: FF FT: <FT> TEST IT501/TC01 Get the message at the UA- and AFTN terminals of IUT-B.		
Test control:	Check the correct reception of the message by IUTBFTNA and IUTBMHSA in the IUT-B configuration.		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

IT501	**Distribute an IPM to AMHS and AFTN users**		
Test-case id: **IT501/TC02**	Tested functionality: Distribution of IPM A message will be sent from a UA on IUT-B to IUT-A with Primary Recipients addressing an AFTN terminal and a UA in IUT-A.		
Test description:	From IUTBMHSA send the following message to: Primary Recipients: IUTAMHSA and IUTAFTNA PRI: FF FT: <FT> TEST IT501/TC02 Get the message at the UA- and AFTN terminals of IUT-A.		
Test control:	Check the correct reception of the message by IUTAFTNA and IUTAMHSA in the IUT-A configuration.		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

<table>
<tr><th>IT501</th><th colspan="3">Distribute an IPM to AMHS and AFTN users</th></tr>
<tr><td>Test-case id:
IT501/TC03</td><td colspan="3">Tested functionality: Distribution of IPM
A message will be sent from a UA on IUT-A to IUT-B with Primary Recipients and Copy Recipients, addressing AFTN terminals and UAs in IUT-B.</td></tr>
<tr><td>Test description:</td><td colspan="3">From IUTAMHSA send the following message to:
<u>Primary Recipients</u>: IUTBMHSA and IUTBFTNA
<u>Copy Recipients</u>: IUTBMHSB and IUTBFTNB
PRI: FF
FT: <FT>
TEST IT501/TC03

Get the message at the UA- and AFTN terminals of IUT-B.</td></tr>
<tr><td>Test control:</td><td colspan="3">Check the correct reception of the message by
IUTBFTNA, IUTBFTNB and
IUTBMHSA, IUTBMHSB in the IUT-B configuration.</td></tr>
<tr><td>Test result:</td><td>PASS</td><td>FAILED</td><td>INCONCLUSIVE</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>

IT501	**Distribute an IPM to AMHS and AFTN users**		
Test-case id: **IT501/TC04**	Tested functionality: Distribution of IPM A message will be sent from a UA on IUT-B to IUT-A with Primary Recipients and Copy Recipients, addressing AFTN terminals and UAs in IUT-A.		
Test description:	From IUTBMHSA send the following message to: Primary Recipients: IUTAMHSA and IUTAFTNA Copy Recipients: IUTAMHSB and IUTAFTNB PRI: FF FT: <FT> TEST IT501/TC04 Get the message at the UA- and AFTN terminals of IUT-A.		
Test control:	Check the correct reception of the message by IUTAFTNA, IUTAFTNB and IUTAMHSA, IUTAMHSB in the IUT-A configuration.		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

<table>
<tr><td colspan="2">IT501</td><td colspan="3">Distribute an IPM to AMHS and AFTN users</td></tr>
<tr><td colspan="2">Test-case id:
IT501/TC05</td><td colspan="3">Tested functionality: Distribution of IPM
A message will be sent from a UA on IUT-A to IUT-B with Primary Recipients, Copy Recipients and Blind Copy Recipients, addressing AFTN terminals and UAs in IUT-B.</td></tr>
<tr><td colspan="2">Test description:</td><td colspan="3">From IUTAMHSA send the following message to:
<u>Primary Recipients</u>: IUTBMHSA and IUTBFTNA
<u>Copy Recipients</u>: IUTBMHSB and IUTBFTNB
<u>Blind Copy Recipients</u>: IUTBMHSC and IUTBFTNC
PRI: FF
FT: <FT>
TEST IT501/TC05

Get the message at the UA- and AFTN terminals of IUT-B.</td></tr>
<tr><td colspan="2">Test control:</td><td colspan="3">Check that at the AFTN Station of IUT-B one message with addresses IUTBFTNA, IUTBFTNB and another message with the address IUTBFTNC is received.
Check that at the UA IUTBMHSA one IPM is received which contains the Primary Recipients IUTBMHSA, IUTBFTNA and the Copy Recipients IUTBMHSB, IUTBFTNB, but no Blind Copy Recipients.
Check that at the UA IUTBMHSC one IPM is received which contains the Primary Recipients IUTBMHSA, IUTBFTNA, the Copy Recipients IUTBMHSB, IUTBFTNB and one Blind Copy Recipient IUTBMHSC.</td></tr>
<tr><td colspan="2">Test result:</td><td>PASS</td><td>FAILED</td><td>INCONCLUSIVE</td></tr>
<tr><td colspan="2"></td><td></td><td></td><td></td></tr>
</table>

<table>
<tr><td>IT501</td><td colspan="3">Distribute an IPM to AMHS and AFTN users</td></tr>
<tr><td>Test-case id:
IT501/TC06</td><td colspan="3">Tested functionality: Distribution of IPM
A message will be sent from a UA on IUT-B to IUT-A with Primary Recipients, Copy Recipients and Blind Copy Recipients, addressing AFTN terminals and UAs in IUT-A.</td></tr>
<tr><td>Test description:</td><td colspan="3">From IUTBMHSA send the following message to:
<u>Primary Recipients</u>: IUTAMHSA and IUTAFTNA
<u>Copy Recipients</u>: IUTAMHSB and IUTAFTNB
<u>Blind Copy Recipients</u>: IUTAMHSC and IUTAFTNC
PRI: FF
FT: <FT>
TEST IT501/TC06

Get the message at the UA- and AFTN terminals of IUT-A.</td></tr>
<tr><td>Test control:</td><td colspan="3">Check that at the AFTN Station of IUT-A one message with addresses IUTAFTNA, IUTAFTNB and another message with the address IUTAFTNC is received.
Check that at the UA IUTAMHSA one IPM is received which contains the Primary Recipients IUTAMHSA, IUTAFTNA and the Copy Recipients IUTAMHSB, IUTAFTNB, but no Blind Copy Recipients.
Check that at the UA IUTAMHSC one IPM is received which contains the Primary Recipients IUTAMHSA, IUTAFTNA, the Copy Recipients IUTAMHSB, IUTAFTNB and one Blind Copy Recipient IUTAMHSC.</td></tr>
<tr><td>Test result:</td><td>PASS</td><td>FAILED</td><td>INCONCLUSIVE</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>

IT502	**Expand a DL addressing both AMHS and AFTN users**		
Test-case id: **IT502/TC01**	Tested functionality: Expanding of Distribution list The message will be sent from a UA on IUT-A addressing a local DL which contains addresses of AFTN terminals and the UA in IUT-B.		
Test description:	IUTADLLO must be configured as a local DL entry in IUT-A containing the addresses IUTBFTNA IUTBFTNB and IUTBMHSA. From IUTAMHSA send the following message to IUTADLLO: PRI: FF FT: <FT> TEST IT502/TC01 Get the message at the UA and AFTN terminals of IUT-B.		
Test control:	Check the correct reception of the message by AFTN terminals IUTBFTNA, IUTBFTNB and UA IUTBMHSA in the IUT-B configuration.		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

<table>
<tr><td>IT502</td><td colspan="3">Expand a DL addressing both AMHS and AFTN users</td></tr>
<tr><td>Test-case id:
IT502/TC02</td><td colspan="3">Tested functionality: Expanding of Distribution list
The message will be sent from a UA on IUT-B addressing a local DL which contains addresses of AFTN terminals and the UA in IUT-A.</td></tr>
<tr><td>Test description:</td><td colspan="3">IUTBDLLO must be configured as a local DL entry in IUT-A containing the addresses IUTAFTNA, IUTAFTNB and IUTAMHSA.

From IUTBMHSA send the following message to IUTBDLLO:
PRI: FF
FT: <FT>
TEST IT502/TC02

Get the message at the UA and AFTN terminals of IUT-A.</td></tr>
<tr><td>Test control:</td><td colspan="3">Check the correct reception of the message by AFTN terminals IUTAFTNA, IUTAFTNB and UA IUTAMHSA in the IUT-A configuration.</td></tr>
<tr><td>Test result:</td><td>PASS</td><td>FAILED</td><td>INCONCLUSIVE</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>

<table>
<tr><td>IT502</td><td colspan="3">Expand a DL addressing both AMHS and AFTN users</td></tr>
<tr><td>Test-case id:
IT502/TC03</td><td colspan="3">Tested functionality: Expanding of Distribution list
The message will be sent from a UA on IUT-A addressing a remote DL in IUT-B which contains addresses of AFTN terminals and the UA in IUT-B</td></tr>
<tr><td>Test description:</td><td colspan="3">IUTBDLRE must be configured as a local DL entry in IUT-B containing the addresses IUTBFTNA, IUTBFTNB and IUTBMHSA.

From IUTAMHSA send the following message to IUTBDLRE:
PRI: FF
FT: <FT>
TEST IT502/TC03

Get the message at the UA and AFTN terminals of IUT-B.</td></tr>
<tr><td>Test control:</td><td colspan="3">Check the correct reception of the message by AFTN terminals IUTBFTNA, IUTBFTNB and UA IUTBMHSA in the IUT-B configuration.</td></tr>
<tr><td>Test result:</td><td>PASS</td><td>FAILED</td><td>INCONCLUSIVE</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>

IT502	Expand a DL addressing both AMHS and AFTN users		
Test-case id: **IT502/TC04**	Tested functionality: Expanding of Distribution list The message will be sent from a UA on IUT-B addressing a remote DL in IUT-A which contains addresses of AFTN terminals and the UA in IUT-A		
Test description:	IUTADLRE must be configured as a local DL entry in IUT-A containing the addresses IUTAFTNA, IUTAFTNB and IUTAMHSA. From IUTBMHSA send the following message to IUTADLRE: PRI: FF FT: <FT> TEST IT502/TC04 Get the message at the UA- and AFTN terminals of IUT-B.		
Test control:	Check the correct reception of the message by AFTN terminals IUTAFTNA, IUTAFTNB and UA IUTAMHSA in the IUT-A configuration.		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

<table>
<tr><td>IT503</td><td colspan="3">Convert or reject an IPM, if the ATS-message-text contains more than 1800 characters</td></tr>
<tr><td>Test-case id:
IT503/TC01</td><td colspan="3">Tested functionality: Conversion of “long” messages
A message with normal priority and length of about 4500 characters is sent from the IUT-A to the IUT-B</td></tr>
<tr><td>Test description:</td><td colspan="3">From UA IUTAMHSA of IUT-A send the following message to the AFTN terminal IUTBFTNA:
PRI: FF
FT: <FT>
OHI:
TEST IT503/TC01
TEXT 4500 CHARACTERS
123456789012345678901234567890123456789012345678901234567890123456789
123456789012345678901234567890123456789012345678901234567890123456789
123456789012345678901234567890123456789012345678901234567890123456789
…
123456789012345678901234567890123456789012345678901234567890123456789
END</td></tr>
<tr><td>Test control:</td><td colspan="3">The SARPs (3.1.2.3.5.2.1.7) specify that the message can be rejected (case a) or split into several messages (case b). If the system provides “long AFTN message” capability the message will be converted (case c).
<u>If case a is implemented:</u>
The message is not conveyed to the AFTN component.
Check the Report received at the User Agent position IUTAMHSA
Verify the following Per-Recipient-Report Non-Delivery information:
- Actual-recipient-name: MF-form address of IUTBFTNA
- reason code 1 signifies "unable-to-transfer"
- diagnostic code 7 signifies "content-too-long".
- supplementary information: "unable to convert to AFTN due to message text length".

<u>If case b is implemented:</u>
Check that IUTBFTNA receives several messages.

<u>If case c is implemented:</u>
Check that IUTBFTNA receives one message.</td></tr>
<tr><td>Test result:</td><td>PASS</td><td>FAILED</td><td>INCONCLUSIVE</td></tr>
<tr><td></td><td>a / b / c</td><td></td><td></td></tr>
</table>

<table>
<tr><td>IT503</td><td colspan="3">Convert or reject an IPM, if the ATS-message-text contains more than 1800 characters</td></tr>
<tr><td>Test-case id:
IT503/TC02</td><td colspan="3">Tested functionality: Conversion of “long” messages
A message with normal priority and length of about 4500 characters is sent from the IUT-B to the IUT-A</td></tr>
<tr><td>Test description:</td><td colspan="3">From UA IUTBMHSA of IUT-B send the following message to the AFTN terminal IUTAFTNA:
PRI: FF
FT: <FT>
OHI:
TEST IT503/TC02
TEXT 4500 CHARACTERS
123456789012345678901234567890123456789012345678901234567890123456789
123456789012345678901234567890123456789012345678901234567890123456789
123456789012345678901234567890123456789012345678901234567890123456789
…
123456789012345678901234567890123456789012345678901234567890123456789
END</td></tr>
<tr><td>Test control:</td><td colspan="3">The SARPs (3.1.2.3.5.2.1.7) specify that the message can be rejected (case a) or split into several messages (case b). If the system provides “long AFTN message” capability the message will be converted (case c).

<u>If case a is implemented:</u>
The message is not conveyed to the AFTN component.
Check the Report received at the User Agent position IUTBMHSA
Verify the following Per-Recipient-Report Non-Delivery information:
- Actual-recipient-name: MF-form address of IUTAFTNA
- reason code 1 signifies "unable-to-transfer"
- diagnostic code 7 signifies "content-too-long".
- supplementary information: "unable to convert to AFTN due to message text length".

<u>If case b is implemented:</u>
Check that IUTAFTNA receives several messages.
<u>If case c is implemented:</u>
Check that IUTAFTNA receives one message.</td></tr>
<tr><td>Test result:</td><td>PASS</td><td>FAILED</td><td>INCONCLUSIVE</td></tr>
<tr><td></td><td>a / b / c</td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>

IT504	**Split an incoming IPM addressing more than 21 AFTN users**		
Test-case id: **IT504/TC01**	Tested functionality: Conversion of messages with more than 21 addresses A message with normal priority containing 50 recipients is sent from the IUT-A to the IUT-B.		

Test description:	From IUTAMHSA send the following message to the following addressees (all recipients in the corresponding MF-Form):
	`IUTBFTNA,IUTBFTNB,IUTBFTNC,IUTBFTND,IUTBFTNE,IUTBFTNF, IUTBFTNG,IUTBFTNH,IUTBFTNI,IUTBFTNJ,IUTBFTNK,IUTBFTNL, IUTBFTNM,IUTBFTNN,IUTBFTNO,IUTBFTNP,IUTBFTNQ,IUTBFTNR, IUTBFTNS,IUTBFTNT,IUTBFTNU,IUTBFTNV,IUTBFTNW,IUTBFTNX, IUTBFTNY,`
	`IUTBFTAA,IUTBFTAB,IUTBFTAC,IUTBFTAD,IUTBFTAE,IUTBFTAF, IUTBFTAG,IUTBFTAH,IUTBFTAI,IUTBFTAJ,IUTBFTAK,IUTBFTAL, IUTBFTAM,IUTBFTAN,IUTBFTAO,IUTBFTAP,IUTBFTAQ,IUTBFTAR, IUTBFTAS,IUTBFTAT,IUTBFTAU,IUTBFTAV,IUTBFTAW,IUTBFTAX, IUTBFTAY`
	FT: <FT>
	OHI:
	TEST IT504/TC01		

Test control:	PDR M4050004 (Title: AMHS - Too Many Recipients) is resolved. Therefore the message shall be split into several messages. The message is split into 3 copies, each conveyed to the AFTN component. The first copy is addressed to 21 of the 50 addressee indicators. The second copy is addressed to further 21 addressee indicators. The third copy is addressed to the remaining 8 of the 50 addressee indicators. Check the correct reception of the messages on the AFTN terminal of IUT-B.		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

<table>
<tr><td>IT504</td><td colspan="3">Split an incoming IPM addressing more than 21 AFTN users</td></tr>
<tr><td>Test-case id:
IT504/TC02</td><td colspan="3">Tested functionality: Conversion of messages with more than 21 addresses
A message with normal priority containing 50 recipients is sent from the IUT-B to the IUT-A.</td></tr>
<tr><td>Test description:</td><td colspan="3">From IUTBMHSA send the following message to the following addressees (all recipients in the corresponding MF-Form):
IUTAFTNA,IUTAFTNB,IUTAFTNC,IUTAFTND,IUTAFTNE,IUTAFTNF,
IUTAFTNG,IUTAFTNH,IUTAFTNI,IUTAFTNJ,IUTAFTNK,IUTAFTNL,
IUTAFTNM,IUTAFTNN,IUTAFTNO,IUTAFTNP,IUTAFTNQ,IUTAFTNR,
IUTAFTNS,IUTAFTNT,IUTAFTNU,IUTAFTNV,IUTAFTNW,IUTAFTNX,
IUTAFTNY,
IUTAFTAA,IUTAFTAB,IUTAFTAC,IUTAFTAD,IUTAFTAE,IUTAFTAF,
IUTAFTAG,IUTAFTAH,IUTAFTAI,IUTAFTAJ,IUTAFTAK,IUTAFTAL,
IUTAFTAM,IUTAFTAN,IUTAFTAO,IUTAFTAP,IUTAFTAQ,IUTAFTAR,
IUTAFTAS,IUTAFTAT,IUTAFTAU,IUTAFTAV,IUTAFTAW,IUTAFTAX,
IUTAFTAY
PRI: FF
FT: <FT>
OHI:
TEST IT504/TC02</td></tr>
<tr><td>Test control:</td><td colspan="3">PDR M4050004 (Title: AMHS - Too Many Recipients) is resolved. Therefore the message shall be split into several messages.
The message is split into 3 copies, each conveyed to the AFTN component.
The first copy is addressed to 21 of the 50 addressee indicators.
The second copy is addressed to further 21 addressee indicators.
The third copy is addressed to the remaining 8 of the 50 addressee indicators.
Check the correct reception of the messages on the AFTN terminal of IUT-A.</td></tr>
<tr><td>Test result:</td><td>PASS</td><td>FAILED</td><td>INCONCLUSIVE</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>

IT505	Probe Conveyance Test		
Test-case id: **IT505/TC01**	Tested functionality: Processing of Probe Messages by UA and MTCU. The messages will be sent from a UA on IUT-A to IUT-B, addressing AFTN terminals and UAs in IUT-B.		
Test description:	From IUTAMHSA send a probe to IUTBFTNA, IUTBFTNB, IUTBMHSA.		
Test control:	On IUT-A UA IUTAMHSA: One Delivery Report (DR) with 2 AFTN recipients from the MTCU and one DR with one recipient from the MTA Verify that the DR reporting about the AFTN addresses contains the supplementary information “This report only indicates successful (potential) conversion to AFTN, not delivery to a recipient”.		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

IT505	**Probe Conveyance Test**		
Test-case id: **IT505/TC02**	Tested functionality: Processing of Probe Messages by UA and MTCU. The messages will be sent from a UA on IUT-B to IUT-A, addressing AFTN terminals and UAs in IUT-A.		
Test description:	From IUTBMHSA send a probe to IUTAFTNA, IUTAFTNB, IUTAMHSA.		
Test control:	On IUT-B UA IUTBMHSA: One Delivery Report (DR) with 2 AFTN recipients from the MTCU and one DR with one recipient from the MTA Verify that the DR reporting about the AFTN addresses contains the supplementary information “This report only indicates successful (potential) conversion to AFTN, not delivery to a recipient”.		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

IT505	**Probe Conveyance Test**		
Test-case id: **IT505/TC03**	Tested functionality: Processing of Probe Messages by UA and MTCU. The messages will be sent from a UA on IUT-A to IUT-B, containing the address of an AFTN terminal of IUT-B and an MF address which cannot be translated by the MTCU of IUT-B.		
Test description:	From IUTAMHSA send a probe to IUTBFTNA, IUTBFTUU (address is not provided in the look-up table of IUT-B).		
Test control:	Verify that at UA IUTAMHSA: A Delivery Report, containing the reported recipient IUTBFTNA and a NDR, containing the reported recipient IUTBFTUU, with: - non-delivery-reason-code set to “unable-to-transfer”, - non-delivery-diagnostic-code set to “unrecognized-OR-name” are received. Verify that the DR reporting about the address which could be translated contains the supplementary information “This report only indicates successful (potential) conversion to AFTN, not delivery to a recipient”.		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

IT505	**Probe Conveyance Test**		
Test-case id: **IT505/TC04**	Tested functionality: Processing of Probe Messages by UA and MTCU. The messages will be sent from a UA on IUT-B to IUT-A, containing the address of an AFTN terminal of IUT-A and an MF address which cannot be translated by the MTCU of IUT-A.		
Test description:	From IUTBMHSA send a probe to IUTAFTNA, IUTAFTUU (address is not provided in the look-up table of IUT-A)		
Test control:	Verify that at UA IUTBMHSA: A Delivery Report, containing the reported recipient IUTAFTNA and a NDR, containing the reported recipient IUTAFTUU, with: - non-delivery-reason-code set to “unable-to-transfer”, - non-delivery-diagnostic-code set to “unrecognized-OR-name” are received. Verify that the DR reporting about the address which could be translated contains the supplementary information “This report only indicates successful (potential) conversion to AFTN, not delivery to a recipient”.		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

6.7 Stress traffic situations

IT601	**Stress load**		
Test-case id: **IT601/TC01**	Tested functionality: AMHS traffic interchange after queuing of an amount of messages After queuing of an amount of messages both IUTs start sending a burst of messages		
Test description:	Interrupt the connection between IUT-A and IUT-B by disabling the physical connector used to send information to the underlying network in one of the IUTs. Select from the data base or generated by the UA and/or the AFTN terminal 100 messages in both IUTs. For example, from IUTAFTNA send 100 messages to IUTBFTNA, IUTBMHSA. and from IUTBFTNA send 100 messages to IUTAFTNA, IUTAMHSA, In the result on IUT-A and IUT-B there are 100 messages queued in direction to the peer IUT. Re-establish the connection between IUT-A and IUT-B. The queued messages will be sent simultaneously from both IUTs. Measure the time: from re-establishing the connection till sending the first message and from sending the first till sending the last message. Measure the time: from re-establishing the connection till receiving the first message and from receiving the first message till receiving the last message.		
Test control:	Check that all 100 messages are received at the addressed terminals. Check that no errors or malfunction are reported or observed at the IUTs during the interchange period. Analyse the measured time. Calculate at both sides the amount of time needed to flush the queues. Unacceptable delays shall be treated as “FAILED”.		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

The following table can be used to make notes of the Test Control Result.

Test Control	**Result IT601/TC01**	**Result IT601/TC02**	**Result IT601/TC03**
1. Notice the time of re-establishing the connection sending direction.			
2. Notice the time of sending the first message.			
3. Notice the time of sending the last message.			
4. Notice the time of re-establishing the connection receiving direction.			
5. Notice the time of receiving the first message.			
6. Notice the time of receiving the last message.			
7. Notice the number of messages received (shall be equal to the number of messages expected.)			
8. Check the event logging of the system for abnormalities in the area of AMHS / X.400 / AFTN/AMHS Gateway.			
9. Check the event logging / traffic traces for NDRs. (No NDRs are awaited.)			
10. Check for Control Position events. (No related events are awaited.)			
11. Check the X.400 / AMHS diagnostics, check the number of associations used (in particular possible hanging/unused associations).			
12. Monitor the underlying network infrastructure (network specialist).			
13. At both sides note the amount of time needed to flush the queues. (Unacceptable delays shall be treated as “FAILED”)			

<table>
<tr><td>IT601</td><td colspan="3">Stress load</td></tr>
<tr><td>Test-case id:
IT601/TC02</td><td colspan="3">Tested functionality: AMHS traffic interchange after queuing of an amount of messages
After queuing of an amount of messages both IUTs start sending a burst of messages</td></tr>
<tr><td>Test description:</td><td colspan="3">Interrupt the connection between IUT-A and IUT-B by disabling the physical connector used to send information to the underlying network in one of the IUTs.
Select from the data base or generated by the UA and/or the AFTN terminal 200 messages in both IUTs.
For example, from IUTAFTNA send 200 messages to IUTBFTNA, IUTBMHSA. and from IUTBFTNA send 200 messages to IUTAFTNA, IUTAMHSA,
In the result on IUT-A and IUT-B there are 200 messages queued in direction to the peer IUT.
Re-establish the connection between IUT-A and IUT-B.
The queued messages will be sent simultaneously from both IUTs.
Measure the time:
• from re-establishing the connection till sending the first message and
• from sending the first till sending the last message.
Measure the time:
• from re-establishing the connection till receiving the first message and
• from receiving the first message till receiving the last message.</td></tr>
<tr><td>Test control:</td><td colspan="3">Check that all 200 messages are received at the addressed terminals.
Check that no errors or malfunction are reported or observed at the IUTs during the interchange period.
Analyse the measured time. Calculate at both sides the amount of time needed to flush the queues. Unacceptable delays shall be treated as “FAILED”.</td></tr>
<tr><td>Test result:</td><td>PASS</td><td>FAILED</td><td>INCONCLUSIVE</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>

IT601	Stress load		
Test-case id: **IT601/TC03**	Tested functionality: AMHS traffic interchange after queuing of an amount of messages After queuing of an amount of messages both IUTs start sending a burst of messages		
Test description:	Interrupt the connection between IUT-A and IUT-B by disabling the physical connector used to send information to the underlying network in one of the IUTs. Select from the data base or generated by the UA and/or the AFTN terminal 400 messages in both IUTs. For example, from IUTAFTNA send 400 messages to IUTBFTNA, IUTBMHSA. and from IUTBFTNA send 400 messages to IUTAFTNA, IUTAMHSA, In the result on IUT-A and IUT-B there are 400 messages queued in direction to the peer IUT. Re-establish the connection between IUT-A and IUT-B. The queued messages will be sent simultaneously from both IUTs. Measure the time: • from re-establishing the connection till sending the first message and • from sending the first till sending the last message. Measure the time: • from re-establishing the connection till receiving the first message and • from receiving the first message till receiving the last message.		
Test control:	Check that all 400 messages are received at the addressed terminals. Check that no errors or malfunction are reported or observed at the IUTs during the interchange period. Analyse the measured time. Calculate at both sides the amount of time needed to flush the queues. Unacceptable delays shall be treated as “FAILED”.		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

7 Trilateral Test procedures - optional

7.1 Submission/Transfer/Delivery and Relay operations

IT701	**Submission / Transfer / Delivery**		
Test-case id: **IT701/TC01**	Tested functionality: Submission, transfer and delivery of messages to different IUTs An IPM submitted in IUT-A is transferred to IUT-B, IUT-C and delivered to the UAs of IUT-B, IUT-C.		
Test description:	Verify that the X.400 routing tables are configured according section 3.3, thus: The X.400 routing table of IUT-A routes PRMD=IUTLAND-B to IUT-B and PRMD=IUTLAND-C to IUT-C. From UA IUTAMHSA send an ATS message (IPM) to UA IUTBMHSA and IUTCMHSA: PRI: FF FT: <FT> OHI: TEST IT701/TC01		
Test control:	Verify that the message is received by both remote UAs in IUT-B and IUT-C. In particular, verify: • ATS-message-priority FF, • ATS-message-filing-time, • ATS-message-text.		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

IT701	**Submission / Transfer / Delivery**		
Test-case id: **IT701/TC02**	Tested functionality: Submission, transfer and delivery of messages to different IUTs An IPM submitted in IUT-B is transferred to IUT-C, IUT-A and delivered to the UAs of IUT-C, IUT-A.		
Test description:	Verify that the X.400 routing tables are configured according section 3.3, thus: The X.400 routing table of IUT-B routes PRMD=IUTLAND-C to IUT-C and PRMD=IUTLAND-A to IUT-A. From the UA IUTBMHSA send an ATS message (IPM) to UA IUTAMHSA and IUTCMHSA. PRI: FF FT: <FT> OHI: TEST IT701/TC02		
Test control:	Verify that the message is received by both remote UAs in IUT-A and IUT-C. In particular, verify: • ATS-message-priority, • ATS-message-filing-time, • ATS-message-text.		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

IT701	**Submission / Transfer / Delivery between the partner MTAs**		
Test-case id: **IT701/TC03**	Tested functionality: Submission, transfer and delivery of messages to different IUTs An IPM submitted in IUT-C is transferred to IUT-A, IUT-B and delivered to the UA of IUT-A, IUT-B.		
Test description:	Verify that the X.400 routing tables are configured according section 3.3, thus: The X.400 routing table of IUT-C routes PRMD=IUTLAND-A to IUT-A and PRMD=IUTLAND-B to IUT-B. From the UA IUTCMHSA send an ATS message (IPM) to UA IUTAMHSA and IUTBMHSA. PRI: FF FT: <FT> OHI: TEST IT701/TC03		
Test control:	Verify that the messages is received by both remote UAs in IUT-A and IUT-B. In particular, verify: • ATS-message-priority, • ATS-message-filing-time, • ATS-message-text.		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

<table>
<tr><td>IT702</td><td colspan="3">Relay operations</td></tr>
<tr><td>Test-case id:
IT702/TC01</td><td colspan="3">Tested functionality: Transfer of messages by an IUT in between
An IPM is routed via an intermediate MTA and transferred from one IUT to another IUT via a “relay” IUT.</td></tr>
<tr><td>Test description:</td><td colspan="3">Modify the X.400 routing as follows: The X.400 routing table of IUT-A routes PRMD=IUTLAND-B and PRMD=IUTLAND-C to IUT-B. The X.400 routing table of IUT-B routes PRMD=IUTLAND-C to IUT-C.
Hence, IUT-B is the “relay” IUT.

From the UA IUTAMHSA send an ATS message (IPM) to the UA IUTCMHSA.
PRI: FF
FT: <FT>
OHI:
TEST IT702/TC01</td></tr>
<tr><td>Test control:</td><td colspan="3">Verify that the message has passed the IUT-B in between (if possible).
Verify that the message is received by the UA IUTCMHSA.
In particular, verify:
• ATS-message-priority,
• ATS-message-filing-time,
• ATS-message-text.</td></tr>
<tr><td>Test result:</td><td>PASS</td><td>FAILED</td><td>INCONCLUSIVE</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>

IT702	Relay operations		
Test-case id: **IT702/TC02**	Tested functionality: Transfer of messages by an IUT in between An IPM is routed via an intermediate MTA and transferred from one IUT to another IUT via a “relay” IUT.		
Test description:	Modify the X.400 routing as follows: The X.400 routing table of IUT-B routes PRMD=IUTLAND-A and PRMD=IUTLAND-C to IUT-C. The X.400 routing table of IUT-C routes PRMD=IUTLAND-A to IUT-A. Hence, IUT-C is the “relay” IUT. From the UA IUTBMHSA send an ATS message (IPM) to the UA IUTAMHSA. PRI: FF FT: <FT> OHI: TEST IT702/TC02		
Test control:	Verify that the message has passed the IUT-C in between (if possible). Verify that the message is received by the UA IUTAMHSA. In particular, verify: • ATS-message-priority, • ATS-message-filing-time, • ATS-message-text.		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

<table>
<tr><td>IT702</td><td colspan="3">Relay operations</td></tr>
<tr><td>Test-case id:
IT702/TC03</td><td colspan="3">Tested functionality: Transfer of messages by an IUT in between
An IPM is routed via an intermediate MTA and transferred from one IUT to another IUT via a “relay” IUT.</td></tr>
<tr><td>Test description:</td><td colspan="3">Modify the X.400 routing as follows: The X.400 routing table of IUT-C routes PRMD=IUTLAND-A and PRMD=IUTLAND-B to IUT-A. The X.400 routing table of IUT-A routes PRMD=IUTLAND-B to IUT-B.
Hence, IUT-A is the “relay” IUT.

From the UA IUTCMHSA send an ATS message (IPM) to the UA IUTBMHSA.
PRI: FF
FT: <FT>
OHI:
TEST IT702/TC03</td></tr>
<tr><td>Test control:</td><td colspan="3">Verify that the message has passed the IUT-A in between (if possible).
Verify that the message is received by the UA IUTBMHSA.
In particular, verify:
• ATS-message-priority,
• ATS-message-filing-time,
• ATS-message-text.</td></tr>
<tr><td>Test result:</td><td>PASS</td><td>FAILED</td><td>INCONCLUSIVE</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>

7.2 Test of special situations

IT801	**Alternate MTA routing**		
Test-case id: **IT801/TC01**	Tested functionality: Alternate routing capability An ATS message (IPM) queued due to outage of the primary X.400 routing path is routed via an alternate MTA (IUT).		
Test description:	Verify that the X.400 routing tables are configured according section 3.3, thus: The X.400 routing table of IUT-A routes PRMD=IUTLAND-B to IUT-B and PRMD=IUTLAND-C to IUT-C. The X.400 routing table of IUT-C routes PRMD=IUTLAND-A to IUT-A and PRMD=IUTLAND-B to IUT-B. Cut the direct connection from IUT-A to IUT-B. From the UA IUTAMHSA send an ATS message (IPM) to the UA IUTBMHSA. If alternate MTA routing functionality is implemented and configured in IUT-A, the message will be transferred automatically via the “alternate” connection. Otherwise: Reroute the queued message manually (an operational procedure for should exist).		
Test control:	Verify that the messages had passed the IUT-C in between (if possible). Verify the message received by the UA IUTBMHSA. In particular, verify: • ATS-message-priority, • ATS-message-filing-time, • ATS-message-text.		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

IT801	Alternate MTA routing		
Test-case id: **IT801/TC02**	Tested functionality: Alternate routing capability An ATS message (IPM) queued due to outage of the primary X.400 routing path is routed via an alternate MTA (IUT).		
Test description:	Verify that the X.400 routing tables are configured according section 3.3, thus: The X.400 routing table of IUT-A routes PRMD=IUTLAND-B to IUT-B and PRMD=IUTLAND-C to IUT-C. The X.400 routing table of IUT-B routes PRMD=IUTLAND-A to IUT-A and PRMD=IUTLAND-C to IUT-C. Cut the direct connection from IUT-B to IUT-C. From the UA IUTBMHSA send an ATS message (IPM) to the UA IUTCMHSA. If alternate MTA routing functionality is implemented and configured in IUT-B, the message will be transferred automatically via the “alternate” connection. Otherwise: Reroute the queued message manually (an operational procedure for should exist).		
Test control:	Verify that the message had passed the IUT-A in between (if possible). Verify the message received by the UA of IUTCMHSA. In particular, verify: • ATS-message-priority, • ATS-message-filing-time, • ATS-message-text.		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

IT801	**Alternate MTA routing**		
Test-case id: **IT801/TC03**	Tested functionality: Alternate routing capability An ATS message (IPM) queued due to outage of the primary X.400 routing path is routed via an alternate MTA (IUT).		
Test description:	Verify that the X.400 routing tables are configured according section 3.3, thus: The X.400 routing table of IUT-B routes PRMD=IUTLAND-A to IUT-A and PRMD=IUTLAND-C to IUT-C. The X.400 routing table of IUT-C routes PRMD=IUTLAND-A to IUT-A and PRMD=IUTLAND-B to IUT-B. Cut the direct connection from IUT-C to IUT-A. From the UA IUTCMHSA send an ATS message (IPM) to the UA IUTAMHSA. If alternate MTA routing functionality is implemented and configured in IUT-C, the message will be transferred automatically via the “alternate” connection. Otherwise: Reroute the queued message manually (an operational procedure for should exist).		
Test control:	Verify that the message had passed the IUT-B in between (if possible). Verify the message received by the UA of IUTAMHSA. In particular, verify: • ATS-message-priority, • ATS-message-filing-time, • ATS-message-text.		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

<table>
<tr><td>IT802</td><td colspan="3">Loop detection</td></tr>
<tr><td>Test-case id:
IT802/TC01</td><td colspan="3">Tested functionality: A message traversing a loop is detected by an IUT.</td></tr>
<tr><td>Test description:</td><td colspan="3">Create a temporary routing loop. The X.400 routing table of IUT-A routes PRMD=IUTLAND-X to IUT-B.The X.400 routing table of IUT-B routes PRMD=IUTLAND-X to IUT-C.The X.400 routing table of IUT-C routes PRMD=IUTLAND-X to IUT-A.
From UA IUTAMHSA send a message (IT802/M01) addressed to IUTXLOOP. This message will be routed cyclically so that it is finally performing a loop.

One IUT detects the looping message, stops the further transfer and non-delivers the message.</td></tr>
<tr><td>Test control:</td><td colspan="3">Verify that:
• the message is discarded
• at UA IUTAMHSA a Non-Delivery-Report is received with non-delivery-reason “transfer-failure” and non-delivery-diagnostic-code “loop detected”.</td></tr>
<tr><td>Test result:</td><td>PASS</td><td>FAILED</td><td>INCONCLUSIVE</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>

<table>
<tr><td>IT802</td><td colspan="3">Loop detection</td></tr>
<tr><td>Test-case id:
IT802/TC02</td><td colspan="3">Tested functionality: A message traversing a loop is detected by an IUT.</td></tr>
<tr><td>Test description:</td><td colspan="3">Create a temporary routing loop. The X.400 routing table of IUT-A routes PRMD=IUTLAND-X to IUT-B.The X.400 routing table of IUT-B routes PRMD=IUTLAND-X to IUT-C.The X.400 routing table of IUT-C routes PRMD=IUTLAND-X to IUT-A.
From UA IUTBMHSA send a message (IT802/M02) addressed to IUTXLOOP. This message will be routed cyclically so that it is finally performing a loop.

One IUT detects the looping message, stops the further transfer and non-delivers the message.</td></tr>
<tr><td>Test control:</td><td colspan="3">Verify that:
• the message is discarded
• at UA IUTBMHSA a Non-Delivery-Report is received with non-delivery-reason “transfer-failure” and non-delivery-diagnostic-code “loop detected”.</td></tr>
<tr><td>Test result:</td><td>PASS</td><td>FAILED</td><td>INCONCLUSIVE</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>

IT802	Loop detection		
Test-case id: IT802/TC03	Tested functionality: A message traversing a loop is detected by an IUT.		
Test description:	Create a temporary routing loop. The X.400 routing table of IUT-A routes PRMD=IUTLAND-X to IUT-B.The X.400 routing table of IUT-B routes PRMD=IUTLAND-X to IUT-C.The X.400 routing table of IUT-C routes PRMD=IUTLAND-X to IUT-A. From UA IUTCMHSA send a message (IT802/M03) addressed to IUTXLOOP. The message will be routed cyclically so that it is finally performing a loop. One IUT detects the looping message, stops the further transfer and non-delivers the message.		
Test control:	Verify that: • the message is discarded • at UA IUTCMHSA a Non-Delivery-Report is received with non-delivery-reason “transfer-failure” and non-delivery-diagnostic-code “loop detected”.		
Test result:	**PASS**	**FAILED**	**INCONCLUSIVE**

8 Test message templates

8.1 Test message templates for IUT-A

8.1.1 Input device User Agent (UA): IUTAMHSA

From UA IUTAMHSA	**to UA IUTBMHSA**
Test message ID: IT101M01	PRI: KK FT: <FT> OHI: TEST IT101/TC01
Test message ID: IT101M02	PRI: GG FT: <FT> OHI: TEST IT101/TC02
Test message ID: IT101M03	PRI: FF FT: <FT> OHI: TEST IT101/TC03
Test message ID: IT101M04	PRI: DD FT: <FT> OHI: TEST IT101/TC04
Test message ID: IT101M05	PRI: SS FT: <FT> OHI: TEST IT101/TC05

From UA IUTAMHSA	**to UA IUTBFTNA**
Test message ID: IT301M01	PRI: KK FT: <FT> OHI: TEST IT301/TC01
Test message ID: IT301M02	PRI: GG FT: <FT> OHI: TEST IT301/TC02
Test message ID: IT301M03	PRI: FF FT: <FT> OHI: TEST IT301/TC03
Test message ID: IT301M04	PRI: DD FT: <FT> OHI: TEST IT301/TC04
Test message ID: IT301M05	PRI: SS FT: <FT> OHI: TEST IT301/TC05

From UA IUTAMHSA Test message ID: IT501M01	To Primary Recipients: IUTBMHSA and IUTBFTNA PRI: FF FT: <FT> OHI: TEST IT501/TC01
Test message ID: IT501M03	To Primary Recipients: IUTBMHSA and IUTBFTNA To Copy Recipients: IUTBMHSB and IUTBFTNB PRI: FF FT: <FT> OHI: TEST IT501/TC03
Test message ID: IT501M05	To Primary Recipients: IUTBMHSA and IUTBFTNA To Copy Recipients: IUTBMHSB and IUTBFTNB To Blind Copy Recipients: IUTBMHSC and IUTBFTNC PRI: FF FT: <FT> OHI: TEST IT501/TC05

From UA IUTAMHSA Test message ID: IT502M01	To: IUTADLLO PRI: FF FT: <FT> OHI: TEST IT502/TC01
Test message ID: IT502M03	To: IUTBDLRE PRI: FF FT: <FT> OHI: TEST IT502/TC03
From UA IUTAMHSA Test message ID: IT503M01	To: AFTN terminal IUTBFTNA PRI: FF FT: <FT> OHI: TEST IT503/TC01 TEXT 4500 CHARACTERS 123456789012345678901234567890123456789012345678901234567890123456789 123456789012345678901234567890123456789012345678901234567890123456789 123456789012345678901234567890123456789012345678901234567890123456789 … <63 figure lines 1234567890 … 123456789> 123456789012345678901234567890123456789012345678901234567890123456789 END
From UA IUTAMHSA Test message ID: IT504M01	To IUTBFTNA, IUTBFTNB, IUTBFTNC, IUTBFTND, IUTBFTNE, IUTBFTNF, IUTBFTNG, IUTBFTNH, IUTBFTNI, IUTBFTNJ, IUTBFTNK, IUTBFTNL, IUTBFTNM, IUTBFTNN, IUTBFTNO, IUTBFTNP, IUTBFTNQ, IUTBFTNR, IUTBFTNS, IUTBFTNT, IUTBFTNU, IUTBFTNV, IUTBFTNW, IUTBFTNX, IUTBFTNY, IUTBFTAA, IUTBFTAB, IUTBFTAC, IUTBFTAD, IUTBFTAE, IUTBFTAF, IUTBFTAG, IUTBFTAH, IUTBFTAI, IUTBFTAJ, IUTBFTAK, IUTBFTAL, IUTBFTAM, IUTBFTAN, IUTBFTAO, IUTBFTAP, IUTBFTAQ, IUTBFTAR, IUTBFTAS, IUTBFTAT, IUTBFTAU, IUTBFTAV, IUTBFTAW, IUTBFTAX, IUTBFTAY PRI: FF FT: <FT> OHI: TEST IT504/TC01

8.1.2 Input device AFTN Terminal: IUTAFTNA

From AFTN Terminal IUTAFTNA	**To UA IUTBMHSA**
Test message ID: IT201M01	KK IUTBMHSA <FT> IUTAFTNA TEST IT201/TC01
Test message ID: IT201M02	GG IUTBMHSA <FT> IUTAFTNA TEST IT201/TC02
Test message ID: IT201M03	FF IUTBMHSA <FT> IUTAFTNA TEST IT201/TC03
Test message ID: IT201M04	DD IUTBMHSA <FT> IUTAFTNA TEST IT201/TC04
Test message ID: IT201M05	SS IUTBMHSA <FT> IUTAFTNA TEST IT201/TC05

From AFTN Terminal IUTAFTNA	**to AFTN Terminal IUTBFTNA**
Test message ID: IT401M01	KK IUTBFTNA <FT> IUTAFTNA TEST IT401/TC01
Test message ID: IT401M02	GG IUTBFTNA <FT> IUTAFTNA TEST IT401/TC02
Test message ID: IT401M03	FF IUTBFTNA <FT> IUTAFTNA TEST IT401/TC03
Test message ID: IT401M04	DD IUTBFTNA <FT> IUTAFTNA TEST IT401/TC04
Test message ID: IT401M05	SS IUTBFTNA <FT> IUTAFTNA TEST IT401/TC05

8.2 Test message templates for IUT-B

8.2.1 Input device User Agent (UA): IUTBMHSA

From UA IUTBMHSA	**to UA IUTAMHSA**
Test message ID: IT102M01	PRI: KK FT: <FT> OHI: TEST IT102/TC01
Test message ID: IT102M02	PRI: GG FT: <FT> OHI: TEST IT102/TC02
Test message ID: IT102M03	PRI: FF FT: <FT> OHI: TEST IT102/TC03
Test message ID: IT102M04	PRI: DD FT: <FT> OHI: TEST IT102/TC04
Test message ID: IT102M05	PRI: SS FT: <FT> OHI: TEST IT102/TC05

From UA IUTBMHSA	**to AFTN Terminal IUTAFTNA**
Test message ID: IT302M01	PRI: KK FT: <FT> OHI: TEST IT302/TC01
Test message ID: IT302M02	PRI: GG FT: <FT> OHI: TEST IT302/TC02
Test message ID: IT302M03	PRI: FF FT: <FT> OHI: TEST IT302/TC03
Test message ID: IT302M04	PRI: DD FT: <FT> OHI: TEST IT302/TC04
Test message ID: IT302M05	PRI: SS FT: <FT> OHI: TEST IT302/TC05

From UA IUTBMHSA Test message ID: IT501M02	To Primary Recipients: IUTAMHSA and IUTAFTNA PRI: FF FT: <FT> OHI: TEST IT501/TC02
Test message ID: IT501M04	To Primary Recipients: IUTAMHSA and IUTAFTNA To Copy Recipients: IUTAMHSB and IUTAFTNB PRI: FF FT: <FT> OHI: TEST IT501/TC04
Test message ID: IT501M06	To Primary Recipients: IUTAMHSA and IUTAFTNA To Copy Recipients: IUTAMHSB and IUTAFTNB To Blind Copy Recipients: IUTAMHSC and IUTAFTNC PRI: FF FT: <FT> OHI: TEST IT501/TC06
From UA IUTBMHSA Test message ID: IT502M02	To: IUTBDLLO PRI: FF FT: <FT> OHI: TEST IT502/TC02
Test message ID: IT502M04	To: IUTADLRE PRI: FF FT: <FT> OHI: TEST IT502/TC04
From UA IUTBMHSA Test message ID: IT503M02	To: AFTN Terminal IUTAFTNA PRI: FF FT: <FT> OHI: TEST IT503/TC02 TEXT 4500 CHARACTERS 1234567890123456789012345678901234567890123456789012345678901234567890123456789 1234567890123456789012345678901234567890123456789012345678901234567890123456789 1234567890123456789012345678901234567890123456789012345678901234567890123456789 … <63 figure lines 1234567890 … 123456789> 1234567890123456789012345678901234567890123456789012345678901234567890123456789 END

From UA IUTBMHSA Test message ID: IT504M02	To: IUTAFTNA,IUTAFTNB,IUTAFTNC,IUTAFTND,IUTAFTNE,IUTAFTNF, IUTAFTNG,IUTAFTNH,IUTAFTNI,IUTAFTNJ,IUTAFTNK,IUTAFTNL, IUTAFTNM,IUTAFTNN,IUTAFTNO,IUTAFTNP,IUTAFTNQ,IUTAFTNR, IUTAFTNS,IUTAFTNT,IUTAFTNU,IUTAFTNV,IUTAFTNW,IUTAFTNX, IUTAFTNY,IUTAFTAA,IUTAFTAB,IUTAFTAC,IUTAFTAD,IUTAFTAE, IUTAFTAF,IUTAFTAG,IUTAFTAH,IUTAFTAI,IUTAFTAJ,IUTAFTAK, IUTAFTAL,IUTAFTAM,IUTAFTAN,IUTAFTAO,IUTAFTAP,IUTAFTAQ, IUTAFTAR,IUTAFTAS,IUTAFTAT,IUTAFTAU,IUTAFTAV,IUTAFTAW, IUTAFTAX,IUTAFTAY PRI: FF FT: <FT> OHI: TEST IT504/TC02

8.3 Input device AFTN Terminal: IUTBFTNA

From AFTN Terminal IUTBFTNA	**to UA IUTAMHSA**
Test message ID: IT202M01	KK IUTAMHSA <FT> IUTBFTNA TEST IT202/TC01
Test message ID: IT202M02	GG IUTAMHSA <FT> IUTBFTNA TEST IT202/TC02
Test message ID: IT202M03	FF IUTAMHSA <FT> IUTBFTNA TEST IT202/TC03
Test message ID: IT202M04	DD IUTAMHSA <FT> IUTBFTNA TEST IT202/TC04
Test message ID: IT202M05	SS IUTAMHSA <FT> IUTBFTNA TEST IT202/TC05

From AFTN Terminal IUTBFTNA	**to UA IUTAMHSA**
Test message ID: IT402M01	KK IUTAFTNA <FT> IUTBFTNA TEST IT402/TC01
Test message ID: IT402M02	GG IUTAFTNA <FT> IUTBFTNA TEST IT402/TC02
Test message ID: IT402M03	FF IUTAFTNA <FT> IUTBFTNA TEST IT402/TC03
Test message ID: IT402M04	DD IUTAFTNA <FT> IUTBFTNA TEST IT402/TC04
Test message ID: IT402M05	SS IUTAFTNA <FT> IUTBFTNA TEST IT402/TC05

8.4 Test message templates for multilateral tests

From UA IUTAMHSA Test message ID: IT701M01	To: IUTBMHSA and IUTCMHSA PRI: FF FT: <FT> OHI: TEST IT701/TC01
From UA IUTBMHSA Test message ID: IT701M02	To: IUTAMHSA and IUTCMHSA PRI: FF FT: <FT> OHI: TEST IT701/TC02
From UA IUTCMHSA Test message ID: IT701M03	To: IUTAMHSA and IUTBMHSA PRI: FF FT: <FT> OHI: TEST IT701/TC03

From UA IUTAMHSA Test message ID: IT702M01	To: IUTCMHSA PRI: FF FT: <FT> OHI: TEST IT702/TC01
From UA IUTBMHSA Test message ID: IT702M02	To: IUTAMHSA PRI: FF FT: <FT> OHI: TEST IT702/TC02
From UA IUTCMHSA Test message ID: IT702M03	To: IUTBMHSA PRI: FF FT: <FT> OHI: TEST IT702/TC03

From UA IUTAMHSA Test message ID: IT801M01	To: IUTBMHSA PRI: FF FT: <FT> OHI: TEST IT801/TC01
From UA IUTBMHSA Test message ID: IT801M02	To: IUTCMHSA PRI: FF FT: <FT> OHI: TEST IT801/TC02
From UA IUTCMHSA Test message ID: IT801M03	To: IUTAMHSA PRI: FF FT: <FT> OHI: TEST IT801/TC03

From UA IUTAMHSA Test message ID: IT802M01	To: IUTXMHSA PRI: FF FT: <FT> OHI: TEST IT802/TC01
From UA IUTBMHSA Test message ID: IT802M02	To: IUTXMHSA PRI: FF FT: <FT> OHI: TEST IT802/TC02
From UA IUTCMHSA Test message ID: IT802M03	To: IUTXMHSA PRI: FF FT: <FT> OHI: TEST IT802/TC03

- END -

ANNEX F

AMHS Pre-Operational Tests

ANNEX F

of

AMHS Manual

Document Control Log

Edition	Date	Comments	Section/pages affected
1.0	15/06/2007	Creation of the document.	all

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References

[1] ICAO Annex 10 – Aeronautical Telecommunications, Volume II: Communication Procedures
[2] ICAO DOC 9705-AN/956: The Manual of technical provisions for the ATN, Sub-volume III, Section 3.1 –Edition 3 (2002) – Referred to as AMHS SARPs
[3] ASIAPAC Doc 020 – ASIAPAC AMHS Manual, Main Part
[4] ASIAPAC Doc 020 – ASIAPAC AMHS Manual, Appendix C, AMHS Testing Requirements
[5] ASIAPAC Doc 020 – ASIAPAC AMHS Manual, Appendix D, AMHS Conformance Tests

[6] ASIAPAC Doc 020 – ASIAPAC AMHS Manual, Appendix E, AMHS Interoperability Tests

1 Introduction

1.1 Purpose of the Document

The purpose of the document is to define AMHS Pre-operational Tests in order to ensure the interoperability between AMHS systems prepared for going into operation. The document defines the objectives and prerequisites as well as the tests themselves.

The AMHS Pre-operational Tests are interoperability type tests. They are the last tests between Operational Systems and should be performed within the operational network environment before the “AMHS cut-over”.

After "AMHS cut-over" the AMHS relation between the two systems is operational. That means: the exchange of the complete operational traffic (or a part of that) is performed by means of AMHS only. For this traffic no other means (AFTN or X.25) are used.

1.2 Objectives of the Pre-operational Tests

The objectives of the AMHS Pre-operational Tests are:

1. To test the interoperability between the AMHS systems in an operational environment.

2. To test the integrity of the messages exchanged.

3. To test the message exchange after a disturbance (e.g. queued messages).

The prerequisites of the AMHS Pre-operational Tests are:

- Successful performance of AMHS Conformance Tests as specified in [5], through which the compliance of all systems under test to the [2] has been demonstrated, and
- Successful performance of AMHS Interoperability Tests as specified in [6], through which the interoperability of these AMHS systems in a test (bed) environment has been demonstrated, and
- Successful performance of Underlying Network Tests, through which is demonstrated that the underlying (IP) network is available and stable, and
- System configuration on both systems (The agreed set is loaded and established.)

The messages used in the AMHS Pre-operational Tests are generated either:

- manually, or
- using parallel duplicated traffic;

1.3 Test Overview

The following tests have to be performed:

1. Go-NoGo Test: A simple test which checks that the configuration and underlying network functions are operating correctly. It is a prerequisite for the subsequent tests.

2. Traffic duplication and verification: For selected AFTN addressee indicators all traffic[1] will be duplicated to corresponding AMHS recipient addresses on the remote system. On the remote system the AFTN message received will be compared with the copy received by the AMHS user.

3. Stress test: The outgoing AMHS traffic recorded in one day within the previous test is repeated from one to the other system and vice versa. To simulate an outage between the involved systems the LAN connection can be disabled; in consequence the messages are queued. If enough messages are queued the LAN connection will be enabled.

4. (Optional) Selected test cases from the AMHS Interoperability Tests: Due to the fact that in the pre-operational test phase the operational system with the complete operational setup is used, a selection of interoperability tests may be repeated.

The estimated duration of the AMHS Pre-operational Tests is 4 days and calculated as follows:

Test ID	Duration	Remark
PRE001 and PRE002	1 hour	inclusive set-up / co-ordination
PRE003	3 days	
PRE003	0.5 day	
optional (selected Interoperability Tests)	1 hour	

Table F- 1: Estimated duration of the AMHS Pre-operational Tests

[1] Traffic consisting of the locally originated AFTN flow and the incoming AFTN flow; *Locally originated AFTN flow*: national AFTN traffic received by the COM Centre addressed to international (or national) communication partners; *Incoming AFTN flow*: international AFTN traffic received by the COM Centre addressed to international (or national) communication partners.

[2] Where aaaa = the location indicator of the MTA location of the Test partner 1.

[3] Where dddd = the location indicator of the MTA location of the Test partner 2.

1.4 Document Structure

Chapter 1 presents the purpose, objectives and test overview.
Chapter 2 presents the test environment used for AMHS Pre-operational Testing.
Chapter 3 defines the set-up and configuration of the AMHS systems.
Chapter 4 defines the addressing plan for AMHS Pre-operational Testing.
Chapter 5 contains the description of the Pre-operational Tests.

2 AMHS Pre-operational Test Environment

2.1 Application infrastructure

The AMHS systems prepared for going into operation are interconnected by means of the operational infrastructure (cf. Figure F-1).

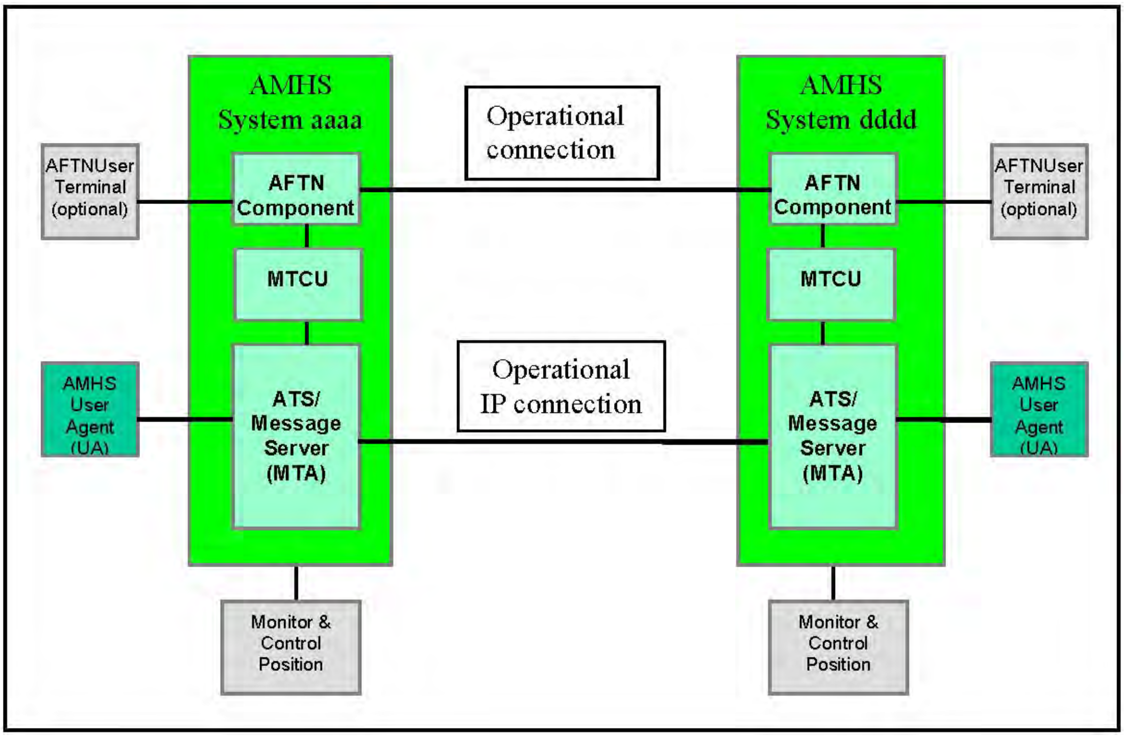

Figure F- 1: AMHS Pre-operational Test Environment

2.2 Transport infrastructure

One of the recommended infrastructures was TCP/IP protocol (IPv4/IPv6). In line with existing recommendations, the operational IP connection should utilize IPv6 at the international level and should provide a redundant connectivity. The redundancy concept of the network ensures the reach ability in any case between the MTAs, while the MTA uses single IP addresses only.

3 Operational system setup - Configuration

The AMHS Systems involved in the pre-operational tests are expected to be configured "as close" to the Operational Systems as possible (with respect to routing tables and look-up tables).

Special addresses needed for testing are listed in this document.

MTA names etc. shall follow the recommendations laid down in [3]. For completeness they are listed hereafter.

3.1 Configuration Lower Layers

Item	Test partner 1	Test partner 2	Recommended values
TSAP	TBD	TBD	e.g. '544350' ("TCP") or '4D4853' ("MHS")
IPv6 Address	TBD	TBD	
IP Port	TBD	TBD	102

Table F- 2: Configuration Lower Layers

3.2 Configuration Upper Layers

Item Item	Test partner 1	Test partner 2	Recommended values
MTA Name	MTA-aaaa2-1	MTA-dddd3-1	cf. [3] section 8.2
Password	ICAO-aaaa-1	ICAO-dddd-1	cf. [3] section 8.2
PSAP	not used	not used	not used
SSAP	not used	not used	not used
Number of incoming associations	TBD	TBD	5, should be equal to the outgoing number
Number of outgoing associations	TBD	TBD	5, should be equal to the incoming number
Protocol type	X.400/1988	X.400/1988	cf. PDR M6080001 Phasing out of IPM 1984
Dialogue mode	Monologue	Monologue	

Table F- 3: Configuration Upper Layers

4 Addressing Plan for AMHS Pre-operational Testing

4.1 User addresses

To meet the scope of testing, the test-address space used by AMHS Pre-operational Testing should include for each test partner as minimum one AMHS user.

4.1.1 AMHS Users for Test partner 1

User Name	MF-address	Remarks
aaaaAMHA	/C=XX/A=ICAO/P=bbbb/O=cccc/OU1=aaaa /CN=aaaaAMHA	or other than AMHA

Table F- 4: Registered AMHS Users (Test partner 1)

Example:

User Name	MF-address	Remarks
LEEEAMHA	/C=XX/A=ICAO/P=AENA/O=LECM/OU1=LEEE /CN=LEEEAMHA	

4.1.2 AMHS Users for Test partner 2

User Name	MF-address	Remarks
ddddAMHA	/C=XX/A=ICAO/P=eeee/O=ffff/OU1=dddd /CN=ddddAMHA	or other than AMHA

Table F- 5: Registered AMHS Users (Test partner 2)

Example:

User Name	MF-address	Remarks
EDDDYFYA	/C=XX/A=ICAO/P=GERMANY/O=EDDD/OU1= EDDD /CN=EDDDYFYA	

4.2 Addresses for Traffic Duplication

Due to the fact that the Pre-operational tests will be performed in an operational environment the addresses selected for duplication cannot be pre-determined in this document. The following tables show two different possibilities how to define these addresses. The test partners have all freedom in definition and selection.

It is recommended to select those addresses for duplication to which a moderate number of messages are usually transmitted.

4.2.1 AFTN Addresses selected for Traffic Duplication -Test partner 1 to Test partner 2

AF Address	O/R address	Remarks
ddaaCOPY	/C=XX/A=ICAO/P=eeee/O=ffff/OU1=ddaa /CN=ddaaCOPY	Copy of a real ddaa address
ddbbCOPY	/C=XX/A=ICAO/P=eeee/O=ffff /OU1=ddbb /CN=ddbbCOPY	Copy of a real ddbb address
ddccCOPY	/C=XX/A=ICAO/P=eeee/O=ffff /OU1=ddcc /CN=ddccCOPY	Copy of a real ddcc address

Table F- 6: AFTN addresses -Test partner 1 to Test partner 2

Example:

AF Address	O/R address	Remarks
LEEECOPY	/C=XX/A=ICAO/P=AENA/O=LECM/OU1=LEEE /CN=LEEECOPY	real address: LEEEYNYX
LEEACOPY	/C=XX/A=ICAO/P=AENA/O=LECM/OU1=LEEA /CN=LEEACOPY	real address: LEMMYMYX
LECMCOPY	/C=XX/A=ICAO/P=AENA/O=LECM/OU1=LECM /CN=LECMCOPY	real address: LECMZAZX

4.2.2 AFTN Addresses selected for Traffic Duplication -Test partner 2 to Test partner 1

AF Address	O/R address	Remarks
aaaaAMHA	/C=XX/A=ICAO/P=bbbb/O=cccc/OU1=aaaa /CN=aaaaAMHA	Copy of a real aaaa address
aaaaAMHB	/C=XX/A=ICAO/P=bbbb/O=cccc/OU1=aaaa /CN=aaaaAMHB	Copy of another real aaaa address
aaccAMHC	/C=XX/A=ICAO/P=bbbb/O=cccc/OU1=aacc /CN=aaccAMHC	Copy of a real aacc address

Table F- 7: AFTN addresses -Test partner 2 to Test partner 1

Example:

AF Address	O/R address	Remarks
EDDDAMHA	/C=XX/A=ICAO/P=GERMANY/O=EDDD/OU1=EDDD /CN=EDDDAMHA	real address: EDDDYNYX
EDDDAMHB	/C=XX/A=ICAO/P=GERMANY/O=EDDD/OU1=EDDD /CN=EDDDAMHB	real address: EDZOYMYX
EDZZAMHC	/C=XX/A=ICAO/P=GERMANY/O=EDDD/OU1=EDZZ /CN=EDZZAMHC	real address: EDZZNAXX

4.3 DL addresses

It is recommended to use for DLs specific Common Names (CN) to make it transparent for the users that this special O/R address is related to a Distribution list. The CN of a DL O/R address should in line with the definition for PDAI in [1].

4.4 AFTN and X.400 Routing Tables

It is recommended that the systems involved in the Pre-operational Tests are configured with the latest valid **AFTN Routing Table** available in the AMC system including the minor changes needed for the Pre-operational Tests themselves.

Only for the selected traffic (bilaterally agreed addresses) shall AFTN routing paths through the MTCU be set up.

Furthermore it is recommended that the systems are configured with the **complete X.400**.

Routing Table covering all existing PRMD names. For all PRMD names which are not involved in the Pre-operational Tests, a default routing to a "Dummy MTA direction" shall be defined in order to handle exceptional situations within the Pre-operational Tests as well as for future operations.

Only for the selected traffic (bilaterally agreed addresses) shall respective X.400 routing paths through the MTCU or to the adjacent MTA be set up.

The recommended complete setup of the X.400 Routing table allows the responsible international COM Centre to ensure that each message entered into an international Network (AFTN, X.25 as well as AMHS) is correct in format and addressing. When using a reduced X.400 routing table, (use of general default routing entries), such checking of addressing cannot be performed, especially if domestic UAs are connected. Only with the full set of PRMD routing entries, is a minimum checking of address validity possible.

4.5 Look-up Tables

4.5.1 Generic look-up Tables

It is recommended that the systems are configured with the complete set of information required for the address translation.

The tables needed are reflected in [8] or in the Intra MD Addressing function of the ATS Messaging Management Centre (AMC). From the AMC the complete **MD Look-up Table** (AMHS MD Register Export. csv) and the complete **CAAS Look-up Tables** (CAAS Table .csv) can be downloaded.

Loading of the complete tables is recommended to ensure that the AMHS application is able to handle the extensive content of the tables covering the address translation of all existing AFTN addresses into AMHS O/R addresses (XF as well as CAAS) and vice versa.

4.5.2 User address look-up Table

It is recommended to start Pre-operational tests and operations with empty **User address look-up tables**.

This kind of functionality should be foreseen for exceptional users and situations. Each entry in this table shall be coordinated with the AMC for the Regional and world-wide use.

5 Test Description

5.1 Test Scenarios

The tests are described in the following test scenarios:

PRExxx where xxx is the scenario number.

The following table contains an overview of the test scenarios:

Test-case id	Test function
PRE001	Go-NoGo test Test partner 1 to Test partner 2
PRE002	Go-NoGo test Test partner 2 to Test partner 1
PRE003	Exchange of duplicated Operational messages, check of integrity.
PRE004	Stress / Load Test (queued data)

Table F- 8: Test Scenario overview

5.2 Pre-operational AMHS Tests

This section contains the test-cases. Each test-case is written on a test sheet, which should be completed during testing.

The top of test-sheet contains the **test-case id** and a description of the **tested functionality**.

The **Test description** contains the instructions for the tester, the addresses used and the test message used.

The **Test control** contains the expected reaction/observation of the Systems under Test (SUTs).

The section **Test result** is used to log the test results.

5.2.1 Go-NoGo test (Partner 1 to Test Partner 2)

Test Reference	Tested Functionality
PRE001	This is a simple test with the purpose to check that the configuration and underlying network work correctly. It is a prerequisite for subsequent tests. An FF priority message is sent from Test partner 1 to Test partner2.

Test description:

From aaaaAMHA send the following FF priority message to ddddAMHA:

```
PRE001
1234567890123456789012345678901234567890123456789012345678901234567890123456789
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
BBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBB
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC

(and so on till)

ZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZ
```

Check the correct reception at ddddAMHA and send the following acknowledgement if the message is received correctly.

From ddddAMHA send the following message to aaaaAMHA:

ACK001 PLS CONTINUE WITH PRE002

Test control:

Check the correct reception of the message at ddddAMHA. No difference must exist between the message as defined above and the received message.

Test result:

PASS	FAILED	INCONCLUSIVE

5.2.2 Go-NoGo test Test partner 2 to Test partner 1

Test Reference	Tested Functionality
PRE002	This is a simple test with the purpose to check that the configuration and underlying network work correctly. It is a prerequisite for subsequent tests. An FF priority message is sent from Test partner 2 to Test partner1.

Test description:

From ddddAMHA send the following message to aaaaAMHA:

```
PRE002
123456789012345678901234567890123456789012345678901234567890123456789
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
BBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBB
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC

(and so on till)

ZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZ
```

Check the correct reception at aaaaAMHA and send the following acknowledgement if the message is received correctly.

From aaaaAMHA send the following message to ddddAMHA:

```
ACK002 PLS CONTINUE WITH PRE003
```

Test control:

Check the correct reception of the message at aaaaAMHA. No difference must exist between the message as defined above and the received message.

Test result:

PASS	FAILED	INCONCLUSIVE

5.2.3 Duplicated message exchange

Test Reference	Tested Functionality
PRE003	For selected AFTN destination addresses all traffic will be duplicated to corresponding AMHS recipient addresses at the remote system. At the remote system the AFTN messages received will be compared with the copies transmitted via AMHS.

Test description:

- On the system of Test partner 1 enable the duplication of Operational traffic for the agreed AFTN addressee indicators:

  The duplication shall remain active for 3 days.

- On the system of Test partner 2 enable the duplication of Operational traffic for agreed AFTN addressee indicators:

  The duplication shall remain active for 3 days.

Test control:

Note: Not all details of test control can be defined since two different systems are involved. Therefore the control is done in a general form. The main purpose of this test is to prove the integrity of the message exchange. At the same time, it is possible to detect problems which have not been spotted during previous tests.

1. Compare the number of messages received at the AFTN addresses with the number of messages received as copies at the corresponding AMHS addresses (check if all duplicated messages are received).

2. Compare the contents of the messages received for one randomly selected hour of traffic per day. The method of comparison is a local matter. Some options are:

   a) the messages can be displayed on two screens and compared one by one,

   b) the traffic log can be exported and compared (partly) electronically/in an automated way.

3. Check the event logging of the system for abnormalities in the area of AMHS/X.400/AFTN/AMHS Gateway.

4. Check the event logging / traffic traces for NDRs.

5. Check for Control Position events.
6. Check the X.400/AMHS Diagnostics; check the number of associations used (in particular possible hanging/unused associations).
7. Monitor the underlying network infrastructure (network specialist).

The following table can be used to make notes of the Test Control result:

Test Control	Result
1. Compare the number of messages received as AFTN copy with the number of messages received as AMHS copy.	
2. Compare the contents of the messages.	
3. The messages can be displayed on two screens and compared one by one.	
4. The traffic log can be exported and compared (partly) electronically/in an automated way.	
5. Check the event logging of the system for abnormalities in the area of AMHS / X.400 / AFTN/AMHS Gateway.	
6. Check whether NDRs have been received or transmitted.	
7. Check for events at the Control Position.	
8. X.400 / AMHS diagnostics, check the number of associations used (in particular possible hanging/unused associations).	
9. Monitor the underlying network infrastructure (network specialist).	

The test is failed if messages are lost, duplicated or corrupted. The other observations have to be forwarded to each other in the form of a test log and discussed in a test review.

Test result:

PASS	FAILED	INCONCLUSIVE

5.2.4 Stress / Load Test

Test Reference	Tested Functionality
PRE004	This test is performed to observe the behaviour of both systems during a load/stress situation. The traffic exchanged in test PRE003 is repeated in a burst fashion.

Test description:

1. Disable the duplication of traffic on both sides.
2. Three tests should be run. The amount of messages shall be:
   - 100 for the first test
   - 200 for the second test
   - 400 for the third test
3. Both sides shall retrieve the outgoing AMHS traffic exchanged in PRE003 for an agreed day.
4. Both sides shall inform each other about the amount of messages to be expected.
5. At **Test partner 2** (or 1) interrupt the LAN connection to **Test partner 1** (or 2) by an adequate command (should be agreed between the Test partners).
6. At **Test partner 1** and **Test partner 2** "repeat" the messages retrieved in step 2 and observe a queue with a length as communicated in step 3.
7. The moment to re-connect the LAN is co-ordinated by telephone. Note down the time it takes from re-connecting the LAN till the moment the queues are empty.
8. At **Test partner 2** (or 1) re-establish the LAN connection by adequate means (commands).
9. Observe and notice the incoming and outgoing message flow.

Test control:

1. The number of messages received shall be equal to the number of messages expected.
2. Check the event logging of the system for abnormalities in the area of AMHS / X.400 / AFTN/AMHS Gateway.
3. Check the event logging / traffic traces for NDRs.

4. Check for Control Position events.
5. Check the X.400 / AMHS diagnostics, check the number of associations used (in particular possible hanging/unused associations).
6. Monitor the underlying network infrastructure (network specialist).
7. At both sides note the amount of time needed to flush the queues.

The following table can be used to make notes of the Test Control result.

Test Control	**Result**		
	100	**200**	**400**
1. The number of messages received shall be equal to the number of messages expected.			
2. Check the event logging of the system for abnormalities in the area of AMHS / X.400 / AFTN/AMHS Gateway.			
3. Check the event logging / traffic traces for NDRs.			
4. Check for events at the Control Position.			
5. Check the X.400 / AMHS diagnostics, check the number of associations used (in particular possible hanging/unused associations).			
6. Monitor the underlying network infrastructure (network specialist).			
7. At both sides note the amount of time needed to flush the queues.			

Note: The test is failed if messages are lost, duplicated or corrupted. The other observations have to be forwarded to each other in the form of a test log and discussed in a test review.

Test result:

PASS	**FAILED**	**INCONCLUSIVE**

5.2.5 Additional selected and agreed Interoperability Tests

Here the selected and bilaterally agreed Test cases should be listed.

- END -

INTERNATIONAL CIVIL AVIATION ORGANIZATION
ASIA AND PACIFIC OFFICE

ASIA/PACIFIC PERFORMANCE-BASED NAVIGATION IMPLEMENTATION PLAN

Interim Edition

September 2008

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ASIA/PACIFIC PERFORMANCE-BASED NAVIGATION IMPLEMENTATION PLAN

1. Executive Summary

1.1 This Asia/Pacific PBN Implementation Plan has been produced in line with Resolution A 36/23 adopted by ICAO Assembly in its 36th Session held in September 2007 and Conclusion 18/53 adopted by APANPIRG/18. The Regional Plan addresses the strategic objectives of PBN implementation based on clearly established operational requirements, avoiding equipage of multiple on-board or ground based equipment, avoidance of multiple airworthiness and operational approvals and explains in detail contents relating to potential navigation applications. The Plan envisages pre- and post-implementation safety assessments and continued availability of conventional air navigation procedures during transition. The Plan discusses issues related to implementation which include traffic forecasts, aircraft fleet readiness, adequacy of ground-based CNS infrastructure etc. Implementation targets for various categories of airspace for the short term (2008 – 2012) and for the medium term (2013 – 2016) have been projected in tabular forms to facilitate easy reference. For the long term (2016 and beyond) it has been envisaged that GNSS will be the primary navigation infrastructure. It is also envisaged that precision approach capability using GNSS and its augmentation system will become available in the long term.

2. Explanation of Terms

2.1 The drafting and explanation of this document is based on the understanding of some particular terms and expressions that are described below:

2.1.1 **Asia/Pacific PBN Implementation Plan.** A document offering appropriate guidance for air navigation service providers, airspace operators and users, regulating agencies, and international organizations, on the evolution of navigation, as one of the key systems supporting air traffic management, and which describes the RNAV and RNP navigation applications that should be implemented in the short, medium and long term in the ASIA/PAC Region.

2.1.2 **Performance Based Navigation** Performance based navigation specifies RNAV and RNP system performance requirements for aircraft operating along an ATS route, on an instrument approach procedure or in an airspace.

2.1.3 **Performance requirements.** Performance requirements are defined in terms of accuracy, integrity, continuity, availability and functionality needed for the proposed operation in the context of a particular airspace concept. Performance requirements are identified in navigation specifications which also identify which navigation sensors and equipment may be used to meet the performance requirement.

3. Acronyms

3.1 The acronyms used in this document along with their expansions are given in the following list

ABAS	Aircraft-Based Augmentation System
AIS	Aeronautical Information System
APAC	Asia and Pacific Regions
APANPIRG	Asia/Pacific Air Navigation Planning and Implementation Regional Group
APCH	Approach
APV	Approach Procedures with Vertical Guidance
ATC	Air Traffic Control
Baro VNAV	Barometric Vertical Navigation
CNS/ATM	Communication Navigation Surveillance/Air Traffic Management

CPDLC	Controller Pilot Data Link Communications
DME	Distance Measuring Equipment
FASID	Facilities and Services Implementation Document
FIR	Flight Information Region
FMS	Flight Management System
GBAS	Ground-Based Augmentation System
GNSS	Global Navigation Satellite System
GRAS	Ground-based Regional Augmentation System
IATA	International Air Transport Association
IFALPA	International Federation of Air Line Pilots' Associations
INS	Inertial Navigation System
IRU	Inertial Reference Unit
PANS	Procedures for Air Navigation Services
PBN	Performance Based Navigation
PIRG	Planning and Implementation Regional Group
RASMAG	Regional Airspace Safety Monitoring Advisory Group
RCP	Required Communication Performance
RNAV	Area Navigation
RNP	Required Navigation Performance
SARP	Standards and Recommended Practices
SBAS	Satellite-Based Augmentation System
SID	Standard Instrument Departure
STAR	Standard Instrument Arrival
TMA	Terminal Control Area
VOR	VHF Omni-directional Radio-range
WGS	World Geodetic System

4. Introduction

Need for the regional PBN Implementation Plan

4.1 The Thirty-sixth Session of the ICAO Assembly held in Montreal in September 2007 adopted a Resolution to resolve that States and planning and implementation regional groups (PIRGs) complete a PBN implementation plan by 2009.

4.2 Recognizing that the PBN concept is now established, States should ensure that all RNAV and RNP operations and procedures are in accordance with the PBN concept as detailed in State letter AN 11/45-07/22 and the ICAO Doc 9613: PBN Manual for ensuring a globally harmonized and coordinated transition of PBN.

4.3 In view of the need for detailed navigation planning, it is advisable to develop a PBN Regional Plan to provide proper guidance to air navigation service providers, airspace operators and users, regulating agencies, and international organizations, on the evolution of navigation, as one of the key systems supporting air traffic management, which describes the RNAV and RNP navigation applications that should be implemented in the short and medium term in the ASIA/PAC Region.

4.4 Furthermore, the Asia/Pacific PBN Implementation Plan will be the basic material serving as guidance for regional projects for the implementation of air navigation infrastructure, such as ABAS, SBAS, GBAS, GRAS, etc., as well as for the development of national implementation plans.

Roles of Navigation in supporting ATM operations

4.5 An Airspace Concept may be viewed as a general vision or master plan for a particular airspace. Based on particular principles, an Airspace Concept is geared towards specific objectives. Strategic objectives drive the general vision of the Airspace Concept. These objectives are usually identified by airspace users, air traffic management (ATM), airports as well as environmental and government policy. It is the function of the Airspace Concept and the concept of operations to respond to these requirements. The strategic objectives which most commonly drive Airspace Concepts are Safety, Capacity, Efficiency, Access, and the Environment.

4.6 Navigation is one of several enablers of an Airspace Concept. Communications, ATS Surveillance and ATM are also essential elements of an Airspace Concept.

4.7 The Performance Based Navigation (PBN) concept specifies RNAV and RNP system performance requirements in terms of accuracy, integrity, availability, continuity and functionality needed for the proposed operations in the context of a particular Airspace Concept, when supported by the appropriate navigation infrastructure. In that context, the PBN concept represents a shift from sensor-based to performance-based navigation. Performance requirements are identified in navigation specifications which also identify the choice of navigation sensors and equipment that may be used to meet the performance requirements. These navigation specifications are defined at a sufficient level of detail to facilitate global harmonization by providing specific implementation guidance for States and operators.

4.8 Under the PBN concept, the generic navigation requirements are defined based on operational requirements. Thus, users may evaluate the available options. To ensure synchronization of investment and interoperability of the airborne and ground systems, the selection of the solution should be in consultation with aviation stakeholders, including international and domestic airline operators, air navigation service providers, and regulators. The solution selected should also be the most cost-effective one.

4.9 The development of the Performance Based Navigation concept recognized that advanced aircraft RNAV systems are achieving a predictable level of navigation performance accuracy which, together with an appropriate level of functionality, allows a more efficient use of available airspace to be realized. It also takes account of the fact that RNAV systems have developed over a 40-year period and as a result there were a large variety of implementations. Identifying navigation requirements rather than on the means of meeting the requirements will allow use of all RNAV systems meeting these requirements irrespective of the means by which these are met.

Benefits of Performance-Based Navigation

4.10 The main benefits derived from the implementation of PBN are:

a) Increased airspace safety through the implementation of continuous and stabilized descent procedures using vertical guidance;
b) Reduced aircraft flight time due to the implementation of optimal flight paths, with the resulting savings in fuel, noise reduction, and environmental protection;
c) Use of the RNAV and/or RNP capabilities that already exist in a significant percentage of the aircraft fleet flying in APAC airspace;
d) Improved airport and airspace arrival paths in all weather conditions, and the possibility of meeting critical obstacle clearance and environmental requirements through the application of optimized RNAV or RNP paths;
e) Implementation of more precise approach, departure, and arrival paths that will reduce dispersion and will foster smoother traffic flows;
f) Reduced delays in high-density airspaces and airports through the implementation of additional parallel routes and additional arrival and departure points in terminal areas;
g) Reduction of lateral and longitudinal separation between aircraft to accommodate more traffic;
h) Decrease ATC and pilot workload by utilizing RNAV/RNP procedures and airborne capability and reduce the needs for ATC-Pilot communications and radar vectoring;

i) Increase of predictability of the flight path.

Goals & Objectives of PBN Implementation

4.11 APANPIRG, in its Eighteenth meeting, discussed various issues related to an early implementation of PBN in the region. To facilitate coordination between States, a PBN Task Force was formed to develop a harmonized regional PBN Implementation plan.

4.12 The Asia/Pacific PBN Implementation Plan has the following strategic objectives:

a) To ensure that the implementation of the navigation item of the CNS/ATM system is based on clearly established operational requirements.
b) To avoid undue equipage of multiple on board equipment and/or ground-based systems.
c) To avoid the need for multiple airworthiness and operational approvals for intra- and inter-regional operations.
d) To explain in detail the contents of the Regional Air Navigation Plan, relating to potential navigation applications.

4.13 Furthermore, the Asia/Pacific PBN Implementation Plan will provide a high-level strategy for the evolution of the navigation applications to be implemented in the ASIA/PAC Region in the short term (2008-2012) and medium term (2013-2016). This strategy is based on the concepts of Area Navigation (RNAV) and Required Navigation Performance (RNP) in accordance with ICAO Doc. 9613: Performance Based Navigation Manual, and will be applied to aircraft operations involving instrument approaches, standard departure (SID) routes, standard arrival (STAR) routes, and ATS routes in oceanic and continental areas.

4.14 The Asia/Pacific PBN Implementation Plan was developed by the APAC States together with the international organizations concerned (IATA, IFALPA), and is intended to assist the main stakeholders of the aviation community plan a gradual transition to the RNAV and RNP concepts. The main stakeholders of the aviation community that benefit from this Regional Plan are:

- Airspace operators and users.
- Air navigation service providers.
- Regulating agencies.
- International organizations.

4.15 This Regional Plan is intended to assist the main stakeholders of the aviation community plan the future transition and their investment strategies. For example, airlines and operators can use this Regional Plan to plan future equipage and additional navigation capability investments; air navigation service providers can plan a gradual transition for the evolving ground infrastructure. Regulating agencies will be able to anticipate and plan for the criteria that will be needed in the future.

4.16 Recognizing the safety benefits of PBN, the thirty-sixth session of the ICAO Assembly held in Montreal, September 2007 adopted a Resolution to resolve that States and planning and implementation regional groups (PIRGs) complete a PBN implementation plan by 2009 to achieve:

a) Implementation of RNAV and RNP operations (where required) for en route and terminal areas according to established timelines and intermediate milestones; and
b) Implementation of approach procedures with vertical guidance (APV) (Baro-VNAV and/or augmented GNSS) for all instrument runway ends, either as the primary approach

or as a back-up for precision approaches by 2016 with intermediate milestones as follows: 30 per cent by 2010, 70 per cent by 2014.

Planning Principles

4.17 Planning for the implementation of PBN in the ASIA/PAC Region shall be based on the following principles:

a) Pre- and post-implementation safety assessments will be conducted to ensure the application and maintenance of the established target levels of safety.
b) Continued application of conventional air navigation procedures during the transition period, to guarantee the operations by users that are not RNAV- and/or RNP-equipped.
c) The first regional PBN implementation plan should address the short term (2008-2012) and medium term (2013-2016) and take into account long term global planning issues.
d) Target date for completion of the first regional PBN implementation plan is APANPIRG/19.

5. PBN Operational Requirements & Implementation Strategy

5.1 Introduction of PBN should be consistent with the Global Air Navigation Plan. Moreover, PBN implementation shall be in full compliance with ICAO SARPs and PANS and support ICAO Global Plan Initiatives.

5.2 The ICAO Council accepted the second amendment to the Global Air Navigation Plan for the CNS/ATM System in November 2006. The approved plan has been renamed as Global Air Navigation Plan (Doc 9750). The relevant Global Plan Initiatives including implementation of performance based navigation (PBN) and navigation system have been included in the Global Plan. The introduction of PBN must be supported by an appropriate navigation infrastructure consisting of an appropriate combination of Global Navigation Satellite System (GNSS), self-contained navigation system (inertial navigation system) and conventional ground-based navigation aids.

5.3 The Strategy for the Provision of Precision Approach, Landing & Departure Guidance Systems and the Strategy for Implementation of GNSS Navigation Capability were reviewed and updated by the Eleventh meeting of CNS/MET Sub Group of APANPIRG in July 2007. The updated strategies were reviewed and adopted by APANPIRG as Strategies for the Provision of Navigation Services in its Eighteenth meeting held in September, 2007 under its Conclusion 18/30.

Route Operations

5.4 As the routes structure and en-route operation are complicated in Asia-Pacific region, it is difficult to restructure and include the whole airspace in a single implementation plan for en-route operations.

5.5 Considering the traffic characteristics and CNS/ATM capability, en-route operations can be classified as Oceanic, Remote continental, and Continental en-route.

5.6 In principle for each classification of en-route operation (5.5 above) should adopt, but not be limited to single RNAV or RNP navigation specification. This implementation strategy will be applied by the state/territories/international organizations themselves, and the RNAV and RNP navigation applications should be coordinated between these states to ensure harmonization.

5.7 In areas where operational benefits can be achieved and appropriate CNS/ATM capability exists or can be provided for a more accurate navigation specification, States are encouraged to introduce the more accurate navigation specification on the basis of coordination with stakeholders and affected neighboring States/Territories.

TMA Operations

5.8 TMA operations have their own characteristics, taking into account the applicable separation minima between aircraft and between aircraft and obstacles. It also involves the diversity of aircraft, including low-performance aircraft flying in the lower airspace and conducting arrival and departure procedures on the same path or close to the paths of high-performance aircraft.

5.9 In this sense, the States/Territories shall develop their own national plans for the implementation of PBN in TMAs, based on the Asia/Pacific PBN Implementation Plan, seeking the harmonization of the application of PBN and avoiding the need for multiple operational approvals for intra- and inter-regional operations, and the applicable aircraft separation criteria.

Instrument Approaches

5.10 States are encouraged to introduce PBN approaches that provide Vertical Guidance to enhance safety. Conventional approach procedures and conventional navigation aids should be maintained to support non-equipped aircraft during the transitional period.

5.11 During early implementation of PBN, IFR Approaches based on PBN should be designed to accommodate mixed-equipage (PBN and non-PBN) environment. ATC workload should be taken into account while developing approach procedures. One possible way to accomplish this is to co-locate the Initial Approach Waypoint for both PBN and conventional approaches

6. Current Status & Forecast

APAC traffic forecast

6.1 The GEN part of FASID (Doc9673 Vol. II) provides the information and data of the following traffic forecasts:

- **Forecasts of air traffic demand for air navigation systems planning**
- **Passenger forecasts**
- **Aircraft movement forecast**
- **Major city-pairs forecasts**

6.2 The forecast data as well as the figures contained in the FASID document are the results of the regular meetings of Asia/Pacific Area Traffic Forecasting Group (APA TFG). These forecasts are updated periodically in conjunction with APA TFG meetings and are not subject to the amendment procedure related to the FASID. The APA TFG is tasked to update the long-range forecasts of passenger traffic produced for the Asia and Pacific (ASIA/PAC) regions, encompassing the intra-Asia/Pacific and trans-Pacific markets, along with preliminary city-pair forecasts to include the 40 busiest routes in terms of passengers carried within these regions. In addition, aircraft movements are forecast for a five-year horizon initially for the aggregate trans-Pacific market and city-pairs of three selected flight information regions (FIRs) of the intra-Asia/Pacific traffic. States are encouraged to consider the up to date forecast data contained in the FASID document while developing or updating the regional and national implementation plan.

6.3 The forecast conducted by IATA on 27 February 2008 for Asia and Pacific traffic in respect of passenger, cargo, aircraft movements and new aircraft deliveries in all the Regions is also provided in the

Appendix B to this plan as reference.

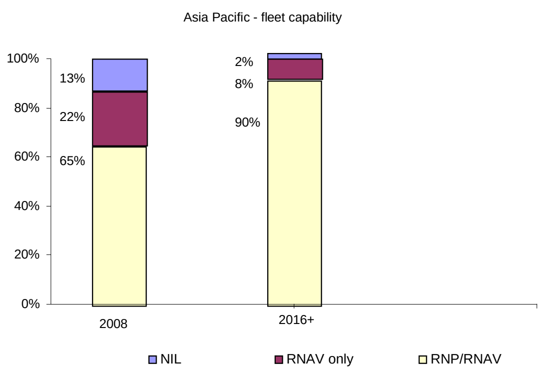
Aircraft fleet readiness status

6.4 2007 was a record year for Asia/Pacific airlines with 418 new aircraft deliveries and more than 1,000 new orders. The overall number of deliveries to Asia/Pacific based airlines in 2008 is expected to total 430 aircraft.

6.5 All major commercial aircraft manufacturers since the 1980's have included RNAV capabilities. The commercial aircraft currently produced incorporate an RNP capability.

6.6 One significant issue for PBN implementation today is directly related to the multitude of FMS installations and varying degrees of capabilities associated with the current fleet of RNAV aircraft. Specifically, there are numerous FMS systems installed in today's fleets, all with varying capabilities.

6.7 The diagram below displays a high level analysis based on fleet numbers from Ascend Online Fleets database March 2008 and RNAV/RNP classification by IATA.



CNS Infrastructure

Navigation infrastructure

Global Navigation Satellite System (GNSS)

6.8 Global Navigation Satellite System (GNSS) is a satellite-based navigation system utilizing satellite signals, such as Global Positioning System (GPS), for providing accurate and reliable position, navigation, and time services to airspace users. In 1996, the International Civil Aviation Organization (ICAO) endorsed the development and use of GNSS as a primary source of future navigation for civil aviation. ICAO noted the increased flight safety, route flexibility and operational efficiencies that could be realized from the move to space-based navigation.

6.9 GNSS supports both RNAV and RNP operations. Through the use of appropriate GNSS augmentations, GNSS navigation provides sufficient accuracy, integrity, availability and continuity to support en-route, terminal area, and approach operations. Approval of RNP operations with appropriate certified avionics provides on-board performance monitoring and alerting capability enhancing the integrity of aircraft navigation.

6.10 GNSS augmentations include Aircraft-Based Augmentation System (ABAS), Satellite-Based Augmentation System (SBAS), Ground-Based Augmentation System (GBAS), and Ground-based Regional Augmentation System (GRAS).

Other PBN navigation infrastructure

6.11 Other navigation infrastructure includes INS, VOR/DME, DME/DME, and DME/DME/IRU. These navigation infrastructures may satisfy the requirements pf RNAV navigation specifications, but not those of RNP.

6.12 INS may be used to support PBN en-route operations with RNAV-10 and RNAV-5 navigation specifications.

6.13 VOR/DME may be used to support PBN en-route and STAR operations based on the RNAV-5 navigation specification.

6.14 Uses of DME/DME and DME/DME/IRU may support PBN en-route and terminal area operations based on RNAV-5, RNAV-2 or RNAV-1 navigation specifications. Validation of DME/DME coverage area and appropriate DME/DME geometry should be conducted to identify possible DME/DME gaps, including identification of critical DMEs, and to ensure proper DME/DME service coverage.

Surveillance infrastructure

6.15 For RNAV operations, States should ensure that sufficient surveillance coverage is provided to assure the safety of the operations. For RNP operations, surveillance coverage may not be required. Details on the surveillance requirements for PBN implementation can be found in the ICAO PBN Manual and ICAO PANS-ATM (Doc 4444), and information on the current existing surveillance infrastructure in the Asia-Pacific can be found in ICAO FASID table.

Communication infrastructure

6.16 Implementation of RNAV/RNP routes includes communication requirements. Details on the communication requirements for PBN implementation can be found in ICAO PANS-ATM (Doc 4444), ICAO RCP Manual (Doc 9869), and ICAO Annex 10. Information on the current existing communication infrastructure in the Asia-Pacific can also be found in ICAO FASID table.

7. Implementation Road Map of Performance Based Navigation

ATM Operational Requirements

7.1 The Global ATM Operational Concept (Doc 9854) makes it necessary to adopt an airspace concept able to provide an operational scenario that includes Route networks, Minimum separation standards, assessment of obstacle clearance, and a CNS infrastructure that satisfies specific strategic objectives, including safety, access, capacity, efficiency, and environment.

7.2 In this regard, the following programmes will be developed:

a) traffic and cost benefit analyses
b) necessary updates on automation
c) operational simulations in different scenarios
d) ATC personnel training
e) Flight plan processing
f) Flight procedure design training to include PBN concepts and ARINC-424 coding standard
g) Enhanced electronic data and processes to ensure appropriate level of AIS data accuracy, integrity and timeliness
h) WGS-84 implementation in accordance with ICAO Annex 15

i) uniform classification of adjacent and regional airspaces, where practicable
j) RNAV/RNP applications for SIDs and STARs
k) Coordinated RNAV/RNP routes implementation
l) RNP approach with vertical guidance

Short Term Implementation Road Map

Route Operations

7.3 During the planning phase of any implementation of PBN routes, States should gather inputs from all aviation stakeholders to obtain operational needs and requirements. These needs and requirements should then be used to derive airspace concepts and to select appropriate PBN navigation specification.

7.4 In this phase, the application of RNAV-10 and RNP-4 navigation specifications is expected for Oceanic and Remote continental routes. Prior to implementation of RNP-4, States should consider air traffic demands, ATC workload, and fleet readiness statistics and consult all stakeholders.

7.5 For Continental routes, the application of RNAV-5 and RNAV-2 navigation specifications is expected. In the continental en-route areas of operation, States may choose to implement RNAV-2 routes to enhance efficiency of airspace usage and support closer route spacing, noting that appropriate communication and surveillance coverage must be provided. The RNAV-2 navigation specification can also be used in certain airspace, where sufficient CNS capability is provided and there are operational benefits.

TMA Operations

7.6 In selected TMAs, the application of RNAV-1 in a radar environment can be supported though the use of GNSS or ground navigation infrastructure, such as DME/DME and DME/DME/IRU. In this phase, mixed operations (equipped and non-equipped) will be permitted.

7.7 In a non-radar environment and/or in an environment without adequate ground navigation infrastructure, the SID/STAR application of Basic-RNP1 is expected in selected TMAs with exclusive application of GNSS. In this phase, mixed operations (equipped and non-equipped) will be permitted.

Instrument Approaches

7.8 The application of RNP APCH with Baro-VNAV procedures is expected to be implemented in the maximum possible number of airports, primarily international airports. To facilitate transitional period, conventional approach procedures and conventional navigation aids should be maintained for non-equipped aircraft.

7.9 States should promote the use of APV operations (Baro-VNAV or augmented GNSS) to enhance safety and accessibility of RNP approaches.

7.10 The application of RNP AR APCH procedures should be considered in selected airports, where obvious operational benefits can be obtained due to the existence of significant obstacles.

Summary table & Implementation targets

Short Term (2008-2012)		
Airspace	**Preferred Nav. Specifications**	**Acceptable Nav. Specifications**
Route – Oceanic	RNP-4	RNAV-10
Route – Remote continental	RNP-4	RNAV-10
Route – Continental en-route	RNAV-2, RNAV-5	
TMA – Arrival	RNAV-1 in radar environment and with adequate navigation infrastructure. Basic-RNP 1 in non-radar environment	
TMA – Departure	RNAV-1 in radar environment and with adequate navigation infrastructure. Basic-RNP 1 in non-radar environment	
Approach	RNP APCH with Baro-VNAV in most possible airports RNP AR APCH in airport where there are obvious operational benefits.	

Implementation Targets

- RNP APCH (with Baro-VNAV) in 30% of instrument runways by 2010 and 50% by 2012 and priority should be given to airports with operational benefits
- RNAV-1 SID/STAR for 50% of international airports by 2010 and 75% by 2012 and priority should be given to airports with RNP Approach
- Re-defining existing RNAV/RNP routes into PBN navigation specification by 2012
- Implementation of additional RNAV/RNP routes

Medium Term Implementation Road Map

Route Operations

7.11 Noting the current development of route spacing standards for RNAV-1, RNAV-2, RNP-2, in this phase, it is expected that the implementations of all existing RNAV/RNP routes are consistent with PBN standards. States are encouraged, as much as possible, to harmonize their RNAV/RNP routes based on consistent PBN navigation specifications and separation standards. Implementations of additional RNAV/RNP routes are also encouraged.

7.12 With the utilization of ADS and CPDLC, the application of RNP routes in the Oceanic and Remote continental airspace in the ASIA/PAC Region is expected. This will permit the use of smaller lateral and longitudinal separation, such as 30 NM. States should also consider the fleet readiness status during their planning.

7.13 Noting the current development of RNP-2 navigation specification, in this phase, the application of RNP-2 is expected for the continental en-route airspace with high air traffic density. Depending on the sufficiency of DME/DME coverage or GNSS availability, States may consider the use of RNAV-2 navigation specification.

7.14 In this phase, the establishment of a backup system in case of GNSS failure or the development of contingency procedures will be necessary.

TMA Operations

7.15 Noting the current development of Advanced RNP-1 navigation specification, in this phase, it is expected that the application of RNAV-1 or RNP-1 will be expanded in selected TMAs. The application of RNAV-1/RNP-1 will also depend on DME/DME infrastructure, GNSS availability and aircraft navigation capability. In TMAs of high air traffic complexity and movement (excluding airspaces), the use of RNAV-1 or RNP-1 equipments will be mandatory. In TMAs of less air traffic complexity, mixed operations will be permitted (equipped or non-equipped).

Instrument Approaches

7.16 In this phase, the extended application of RNP APCH with Baro-VNAV or APV in most airports is expected. These applications may also serve as a back-up to precision approaches and provide vertical guided approaches for the runways without precision approach capability.

7.17 The extended application of RNP AR Approaches is expected for airports where there are operational benefits.

7.18 The introduction of application of landing capability using GNSS and its augmentations is expected to guarantee a smooth transition toward high-performance approach and landing capability.

Summary table & Implementation targets

Medium Term (2013-2016)		
Airspace	**Preferred Nav. Specification**	**Acceptable Nav. Specification**
Route – Oceanic	RNP-2	RNP-4, RNAV-10
Route – Remote continental	RNP-2	RNAV-2, RNP-4, RNAV-10
Route – Continental en-route	RNAV-1, RNP-2	RNAV-2, RNAV-5
TMA – Arrival	Expand RNAV-1 or RNP-1 application Mandate RNAV-1 or RNP-1 approval for aircraft operating in higher air traffic density TMAs	
TMA – Departure	Expand RNAV-1 or RNP-1 application Mandate RNAV-1 or RNP-1 approval for aircraft operating in higher air traffic density TMAs	
Approach	Expansion of RNP APCH (with Baro-VNAV) and APV Expansion of RNP AR APCH where there are operational benefits Introduction of landing capability using GNSS and its augmentations	
Implementation Targets • RNP APCH with Baro-VNAV or APV in 100% of instrument runways by 2016 • RNAV-1 or RNP-1 SID/STAR for 100% of international airports by 2016 • RNAV-1 or RNP-1 SID/STAR for 70% of busy domestic airports where there are operational benefits • Implementation of additional RNAV/RNP routes		

Long Term Implementation Strategies (2016 and beyond)

7.19 In this phase, GNSS is expected to be a primary navigation infrastructure for PBN implementation. States should work co-operatively on a multinational basis to implement GNSS in order to facilitate seamless and inter-operable systems and undertake coordinated R&D programs on GNSS implementation and operation.

7.20 Moreover, during this phase, States are encouraged to consider segregating traffic according to navigation capability and granting preferred routes to aircraft with better navigation performance.

7.21 With the expectation that precision approach capability using GNSS and its augmentation systems will become available, States are encouraged to explore the use of such capability where there are operational and financial benefits.

8. Transitional Strategies

8.1 During transition to PBN, sufficient ground infrastructure for conventional navigation systems must remain available. Before existing ground infrastructure is considered for removal, users should be given reasonable transition time to allow them to equip appropriately to attain equivalent PBN-based navigation performance. States should approach removal of existing ground infrastructure with caution to ensure that safety is not compromised, such as by performance of safety assessment, consultation with users through regional air navigation planning process.

8.2 States should coordinate to ensure that harmonized separation standards and procedures are developed and introduced concurrently in all flight information regions along major traffic flows to allow for a seamless transition towards PBN.

8.3 States should cooperate on a multinational basis to implement PBN in order to facilitate seamless and inter-operable systems and undertake coordinated R&D programs on PBN implementation and operation.

8.4 States are encouraged to consider segregating traffic according to navigation capability and granting preferred routes to aircraft with better navigation performance**,** taking due consideration of the needs of State/Military aircraft.

8.5 States should encourage operators and other airspace users to equip with PBN-capable avionics. This can be achieved through early introductions of RNP approaches, preferably those with vertical guidance.

8.6 ICAO Asia-Pacific Regional Office should provide leadership supporting implementation and transition towards PBN.

9. **Safety Assessment & Monitoring Requirements**

Need for a safety assessment

9.1 To ensure that the introduction of PBN en-route applications within the Asia/Pacific Region is undertaken in a safe manner, in accordance with relevant ICAO provisions, implementation shall only take place following conduct of a safety assessment that has demonstrated that an acceptable level of safety will be met. This assessment may also need to demonstrate that levels of risk associated with specific PBN en-route implementations are acceptable. Additionally, ongoing periodic safety reviews shall be undertaken where required in order to establish that operations continue to meet the target levels of safety.

Undertaking a safety assessment

9.2 To demonstrate that the system is safe it will be necessary that the implementing agent – a State or group of States - ensures that a safety assessment and, where required, ongoing monitoring of the PBN en-route implementation are undertaken. The implementing agent may have the capability to undertake such activities or may seek assistance from a competent Asia/Pacific regional Safety Monitoring Agency (SMA). The latter course of action is preferred as an SMA can establish the necessary monitoring and data collection activity in an effective manner if the implementing agent is in the area for which the SMA holds responsibility.

9.3 In undertaking a safety assessment to enable en-route implementation of PBN, a State authority or SMA shall:

1) Establish and maintain a database of PBN approvals;

2) Monitor aircraft horizontal-plane navigation performance and the occurrence of large navigation errors and report results appropriately to the RASMAG;

3) Conduct safety and readiness assessments and report results appropriately to the RASMAG;

4) Monitor operator compliance with State approval requirements after PBN implementation;

5) Initiate necessary remedial actions if PBN requirements are not met.

9.4 Detailed information relating to the roles and responsibilities of Asia/Pacific SMAs is contained in the *Asia/Pacific Safety Monitoring Agency Handbook*, which is available from the ICAO Asia/Pacific Regional Office.

Appendix A – CHANGES TO THE PBN REGIONAL PLAN

Whenever a need is identified for a change to this document, the Request for Change (RFC) Form (see Section 1.6 below) should be completed and submitted to the ICAO Asia and Pacific Regional Office. The Regional Office will collate RFCs for consideration by the Performance Based Navigation Task Force (CNS/MET Sub-group of APANPIRG).

When an amendment has been agreed by a meeting of the Performance Based Navigation Task Force then a new version of the PBN Regional Plan will be prepared, with the changes marked by an "|" in the margin, and an endnote indicating the relevant RFC, so a reader can see the origin of the change. If the change is in a table cell, the outside edges of the table will be highlighted; e.g.:

Final approval for publication of an amendment to the PBN Regional Plan will be the responsibility of APANPIRG.

1.5 EDITING CONVENTIONS

(Intentionally blank)

1.6 PBN Regional Plan REQUEST FOR CHANGE FORM

RFC Nr:	

Please use this form when requesting a change to any part of this PBN Regional Plan. This form may be photocopied as required, emailed, faxed or e-mailed to ICAO Asia and Pacific Regional Office +66 (2) 537-8199 or icao_apac@bangkok.icao.int

1. SUBJECT:
2. REASON FOR CHANGE:
3. DESCRIPTION OF PROPOSAL: [expand / attach additional pages if necessary]

4. REFERENCE(S):				
5. PERSON INITIATING:		**DATE:**		
ORGANISATION:				
TEL/FA/X/E-MAIL:				
6. CONSULTATION	**RESPONSE DUE BY DATE:**			
	Organization	**Name**	**Agree/Disagree**	**Date**
7. ACTION REQUIRE :				
8. PBN REGIONAL PLAN EDITOR			**DATE REC'D :**	
9. FEEDBACK PASSED			**DATE :**	

1.7 AMENDMENT RECORD

Amendment Number	Date	Amended by	Comments

Appendix B – IATA Traffic Forecast

By 2010 Asia will be the largest single market for aviation - IATA 27th Feb 2008. Globally predicted passenger traffic will rise by 4.9 per cent per year between 2007 and 2026, almost trebling in two decades as jet planes got bigger and more people flew on them. Meanwhile airfreight will rise by 5.8 per cent annually in the same period.The greatest demand will come from the Asia-Pacific region, where airlines will take delivery of 31 per cent of new planes in the next 20 years, compared with 24 per cent for Europe and 27 per cent for North America.

Passenger
Asia Pacific airlines saw a marginal drop in demand growth from 6.2 per cent in December 2007 to 5.7 per cent in January 2008. Currently, airlines in the region benefited from increased competitiveness due to the strong Euro and the booming economies of both India and China.

Cargo
Steady year-on-year airfreight growth of 4.5 per cent was recorded in January 2008. In the larger freight markets there is continued strength. Asia Pacific airlines saw demand increase 6.5 per cent, up from 6 per cent in December 2007, boosted by the booming economies in China and India.

For the period 2002-2020 aircraft movements are expected to increase at an annual growth rate of 5.4 per cent, to reach almost 294 thousand aircraft movements by the year 2020. Average annual growth rates of 6.5, 5.7 and 5.2 per cent are forecast for the periods 2005 - 2010, 2010-2015 and 2015 - 2020, respectively.

TRANSPACIFIC PASSENGER FORECAST			
Average Annual Percentage Growth Rates			
Low	Medium	High	
2005-2010	5.3	6.5	7.8
2010-2015	4.5	5.7	7.0
2015-2020	4.0	5.2	6.5
2002-2020	4.1	5.4	6.7

The Intra-Asia/Pacific passenger aircraft movements are expected to increase at an average annual growth rate of 4.6 per cent to the year 2020. The growth rates for the intermediate periods of 2005-2010, 2010-2015 and 2015-2020 are 5.0, 4.3 and 4.2 per cent, respectively.

INTRA ASIA /PACIFIC AIRCRAFT MOVEMENT FORECAST			
Average Annual Percentage Growth Rates			
Low	Medium	High	
2005-2010	3.6	5.0	5.5
2010-2015	3.1	4.3	5.2
2015-2020	3.1	4.2	5.2
2002-2020	3.3	4.6	5.6

New Aircraft Deliveries by Region
Record new aircraft orders were placed by the airline industry in 2005 – 2007. The large numbers of

new orders represent strong confidence in the future prospects of the global airline industry. In its latest forecast of aviation growth, European aircraft maker Airbus said the world's fleet of large passenger jets (of more than 100 seats) would double in the next 20 years to nearly 33,000. The greatest demand will come from the Asia-Pacific region, where airlines will take delivery of 31 per cent of new planes in the next 20 years, compared with 24 per cent for Europe and 27 per cent for North America.

New Aircraft Deliveries by Region	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012+**
	Existing						
Africa	**665**	**26**	**15**	**20**	**16**	**13**	**28**
Asia Pacific	**3,578**	**329**	**428**	**407**	**344**	**267**	**440**
Europe	**5,301**	**292**	**348**	**364**	**251**	**153**	**297**
Latin America/Caribbean	**1,031**	**93**	**91**	**45**	**66**	**43**	**65**
Middle East	**626**	**41**	**57**	**44**	**36**	**27**	**164**
North America	**6,987**	**240**	**293**	**309**	**222**	**163**	**412**
Total	**18,188**	**1,026**	**1,237**	**1,208**	**944**	**679**	**1,551**
Increase in Global aircraft fleet (%)	**4.2**	**4.9**	**4.6**	**4.9**	**3.4**	**2.4**	**2.4**

Appendix C - Reference documentation for developing operational and airworthiness approval

TO BE DEVELOPED.

Appendix D – Practical Example of tangible benefits

TO BE DEVELOPED.

PERFORMANCE FRAMEWORK FORM

REGIONAL PERFORMANCE OBJECTIVES /NATIONAL PERFORMANCE OBJECTIVES FOR PBN

<table>
<tr><th colspan="6">REGIONAL PERFORMANCE OBJECTIVES /NATIONAL PERFORMANCE OBJECTIVES
OPTIMIZATION OF THE ATS ROUTE
STRUCTURE IN EN-ROUTE AIRSPACE</th></tr>
<tr><th colspan="6">Benefits</th></tr>
<tr><td>Environment
Efficiency</td><td colspan="5">• reductions in gas emissions;
• ability of aircraft to conduct flight more closely to preferred trajectories;
• increase in airspace capacity;
• facilitate utilization of advanced technologies (e.g., FMS based arrivals) and ATC decision support tools (e.g., metering and sequencing), thereby increasing efficiency.</td></tr>
<tr><th colspan="6">Strategy</th></tr>
<tr><th rowspan="2">ATM OC COMPONENTS</th><th rowspan="2">TASKS</th><th colspan="2">TIMEFRAME</th><th rowspan="2">RESPONSIBILITY</th><th rowspan="2">STATUS</th></tr>
<tr><th>START</th><th>END</th></tr>
<tr><td rowspan="12">AOM</td><td>Develop regional Implementation plan</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Develop regional action plan</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Develop Airspace Concept based on PBN regional implementation plan, in order to design and implement a trunk route network, connecting major city pairs in the upper airspace and for transit to/from aerodromes, on the basis of PBN, e.g. RNAV 10, RNP 4, RNAV-5 and RNAV 2 and taking into account interregional harmonization</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Develop State PBN implementation plans</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Develop performance measurement plan</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Formulate safety plan</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Establish collaborative decision making (CDM) process</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Publish national regulations for aircraft and operators approval using PBN manual as guidance material</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Identify training needs and develop corresponding guidelines</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Formulate system performance monitoring plan</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Implementation of ATS routes enroute</td><td></td><td></td><td></td><td></td></tr>
<tr><td>monitor implementation progress in accordance with PBN implementation plan and State implementation plan</td><td></td><td></td><td></td><td></td></tr>
<tr><td>linkage to GPIs</td><td>GPI/5: performance-based navigation, GPI/7: dynamic and flexible ATS route management, GPI/8: collaborative airspace design and management</td><td></td><td></td><td></td><td></td></tr>
</table>

**REGIONAL PERFORMANCE OBJECTIVES /NATIONAL PERFORMANCE OBJECTIVES
OPTIMIZATION OF THE ATS ROUTE STRUCTURE IN
TERMINAL AIRSPACE**

Benefits

Environment **Efficiency**	• reductions in gas emissions; • ability of aircraft to conduct flight more closely to preferred trajectories; • increase in airspace capacity; • improved availability of procedures • facilitate utilization of advanced technologies (e.g., FMS based arrivals) and ATC decision support tools (e.g., metering and sequencing), thereby increasing efficiency.

Strategy

ATM OC COMPONENTS	TASKS	TIMEFRAME START-END	RESPONSIBILITY	STATUS
AOM	Develop regional Implementation plan			
	Develop regional action plan			
	Develop State PBN implementation plan			
	Develop Airspace Concept based on PBN regional implementation plan, in order to design and implement optimized standard instrument departures (SIDs), standard instrument arrivals (STARs), holding and associated instrument flight procedures, , on the basis of PBN and, in particular RNAV 1 and Basic-RNP 1			
	Develop performance measurement plan			
	Formulate safety plan			
	Establish collaborative decision making (CDM) process			
	Publish national regulations for aircraft and operators approval using PBN manual as guidance material			
	Identify training needs and develop corresponding guidelines			
	Formulate system performance monitoring plan			
	-develop a regional strategy and work programme for implementation of; and			
	Implementation of SIDs and STARs		State	
	monitor implementation progress in accordance with PBN implementation roadmap and State implementation plan			
linkage to GPIs	GPI/5: performance-based navigation, GPI/7: dynamic and flexible ATS route management, GPI/8: collaborative airspace design and management, GPI/10: terminal area design and management, GPI/11: RNP and RNAV SIDs and STARs and GPI/12: FMS-based arrival procedures.			

<table>
<tr><td colspan="5">REGIONAL PERFORMANCE OBJECTIVES /NATIONAL PERFORMANCE OBJECTIVES
IMPLEMENTATION OF VERTICALLY GUIDED RNP APPROACHES</td></tr>
<tr><td colspan="5">Benefits</td></tr>
<tr><td colspan="5">Environment • reductions in gas emissions;
Efficiency • increased accessibility to aerodromes, including continuity of access
• increased runway capacity
Safety • Reduced pilot workload
• Availability of reliable lateral and vertical navigation capability</td></tr>
<tr><td colspan="5">Strategy</td></tr>
<tr><td>ATM OC COMPONENTS</td><td>TASKS</td><td>TIMEFRAME START-END</td><td>RESPONSIBILITY</td><td>STATUS</td></tr>
<tr><td rowspan="13">AOM</td><td>Approach</td><td rowspan="13">present - 2016</td><td></td><td></td></tr>
<tr><td>Develop regional Implementation plan</td><td></td><td></td></tr>
<tr><td>Develop regional action plan</td><td></td><td></td></tr>
<tr><td>Develop State PBN implementation plan</td><td></td><td></td></tr>
<tr><td>Develop Airspace Concept based on PBN regional implementation plan, in order to design and implement RNP APCH with Baro-VNAV in accordance with assembly resolution A36-23, and RNP AR APCH where beneficial</td><td></td><td></td></tr>
<tr><td>Develop performance measurement plan</td><td></td><td></td></tr>
<tr><td>Formulate safety plan</td><td></td><td></td></tr>
<tr><td>Establish collaborative decision making (CDM) process</td><td></td><td></td></tr>
<tr><td>Publish national regulations for aircraft and operators approval using PBN manual as guidance material</td><td></td><td></td></tr>
<tr><td>Identify training needs and develop corresponding guidelines</td><td></td><td></td></tr>
<tr><td>Implementation of APV procedures</td><td>State</td><td></td></tr>
<tr><td>Formulate system performance monitoring plan</td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>linkage to GPIs</td><td colspan="4">GPI/5: performance-based navigation, GPI/7: dynamic and flexible ATS route management, GPI/8: collaborative airspace design and management, GPI/10: terminal area design and management, GPI/11: RNP and RNAV SIDs and STARs and GPI/12: FMS-based arrival procedures.</td></tr>
</table>

AIR PACIFIC AIR NAVIGATION PLANNING AND IMPLEMENTATION REGIONAL GROUP PERFORMANCE BASED NAVIGATION (PBN) TASK FORCE

REVISED TERMS OF REFERENCE

1) Continue the refinement and ongoing review of the Asia Pacific Regional PBN implementation plan and monitor and report on its application in the region.

2) Carry out specific studies, develop guidance material and facilities training to assist States with RNAV/RNP implementation in the en-route, terminal, and approach flight phases, taking into account the performance based navigation (PBN) concept, according to the ICAO Strategic Objectives and Global Plan Initiatives (GPI) on this matter (GPI 5, 7, 10, 11, 12, 20, 21)

3) Identify other issues/action items arising from the work of ICAO or for consideration by ICAO in order to facilitate regional and global harmonization of existing applications as well as future, and where appropriate, provide responses and support to the ICAO RNPSORSG.

4) Assist States in the preparation and review of their PBN implementation documentation to ensure regional harmonization and for possible inclusion in ICAO-developed model documentation.

5) Develop and review material needed to meet the ICAO initiative on the introduction of APV approaches including Baro-VNAV and RNP-AR as part of the PBN initiative.

6) Address other regional PBN implementation issues, including the development of staff resources and skills, as needed by safety management.

7) Develop, in coordination with RASMAG, the necessary airspace safety and monitoring requirements for the introduction and continued application of PBN based procedures.

8) Continue the review of the PBN Manual and its practical application in the implementation of PBN in the region.

9) Review activities of PBN Task Force from other regions including their action plans for PBN implementation to ensure harmonization and avoid duplication of work.

10) The Task Force should report to the APANPIRG, through the CNS/MET Sub-group in coordination with the ATM/AIS/SAR Sub-group and RASMAG.

Membership

Proposed membership of the Task Force should include, but is not limited to, the following:
Australia, China, Hong Kong-China, India, Japan, New Zealand, Singapore, Thailand, United States and IATA and IFALPA.

NAVIGATION STRATEGY FOR THE ASIA/PACIFIC REGION

Considering:

a) the material contained in the Performance Based Navigation Manual (Doc 9613) for enroute, approach, landing and departures operations;

b) operators will equip aircraft to support PBN operations;

c) GNSS will be the predominant navigation sensor;

d) APV operations may be conducted with BARO-VNAV or augmented GNSS;

e) Augmented GNSS will support Category I operations by end 2009 and Category II and III operations by 2015;

f) in the Asia/Pacific Region, ILS is capable of meeting the majority of requirements for precision approach and landing;

g) MLS CAT III is operational;

h) the need to maintain aircraft interoperability both within the Region and between the Asia/Pacific Region and other ICAO regions and to provide flexibility for future aircraft equipage.

Strategy

a) transit to PBN operations as follows :-

   i) RNP10/RNP4 for Oceanic and Remote Continental routes;
   ii) RNAV5/RNAV2 for Continental En-route;
   iii) RNAV1, RNAV2 and Basic RNP1 based arrivals and departure;
   iv) APV (including Baro-VNAV);
   v) Precision approaches at selected runways.

   with respective end states as follows:

   i) RNP4 for Oceanic and Remote Continental routes;
   ii) RNP1 for Continental En-route;
   iii) RNP1 and RNP0.3 based arrivals and departure;
   iv) APV (including Baro-VNAV);
   v) Precision approaches at selected runways.

b) retain ILS as an ICAO standard system for as long as it is operationally acceptable and economically beneficial;

c) implement GNSS with augmentation as required for APV and precision approach operations where operationally required and economically beneficial;

d) implement the use of APV operation in accordance with ICAO's requirement;

e) protect all the Aeronautical Radio Navigation Service (ARNS) frequencies;

f) ensure civil-military interoperability.

INITIAL RESULT OF STUDY ON RVSM MONITORING USING ADS-B

Currently the RVSM Height Monitoring Measurements is using HMU or GMU

The purpose of RVSM height monitoring is to determine the following parameters for each aircraft:

- Assigned Altitude Deviation (AAD) – the difference between the Cleared Flight Level and the current Flight Level of the aircraft;
- Altimeter System Error (ASE) – this is the error in the altitude determined by the altimeter;
- Total Vertical Error (TVE) – this is the combination of AAD and ASE. This represents the difference between the Cleared Flight Level (CFL) and the actual measured height.

Providing that the TVE for each aircraft meets the Global Height-keeping Specification, outlined in ICAO Document 9574, the Target Level of Safety for RVSM operations can be assumed to be met.

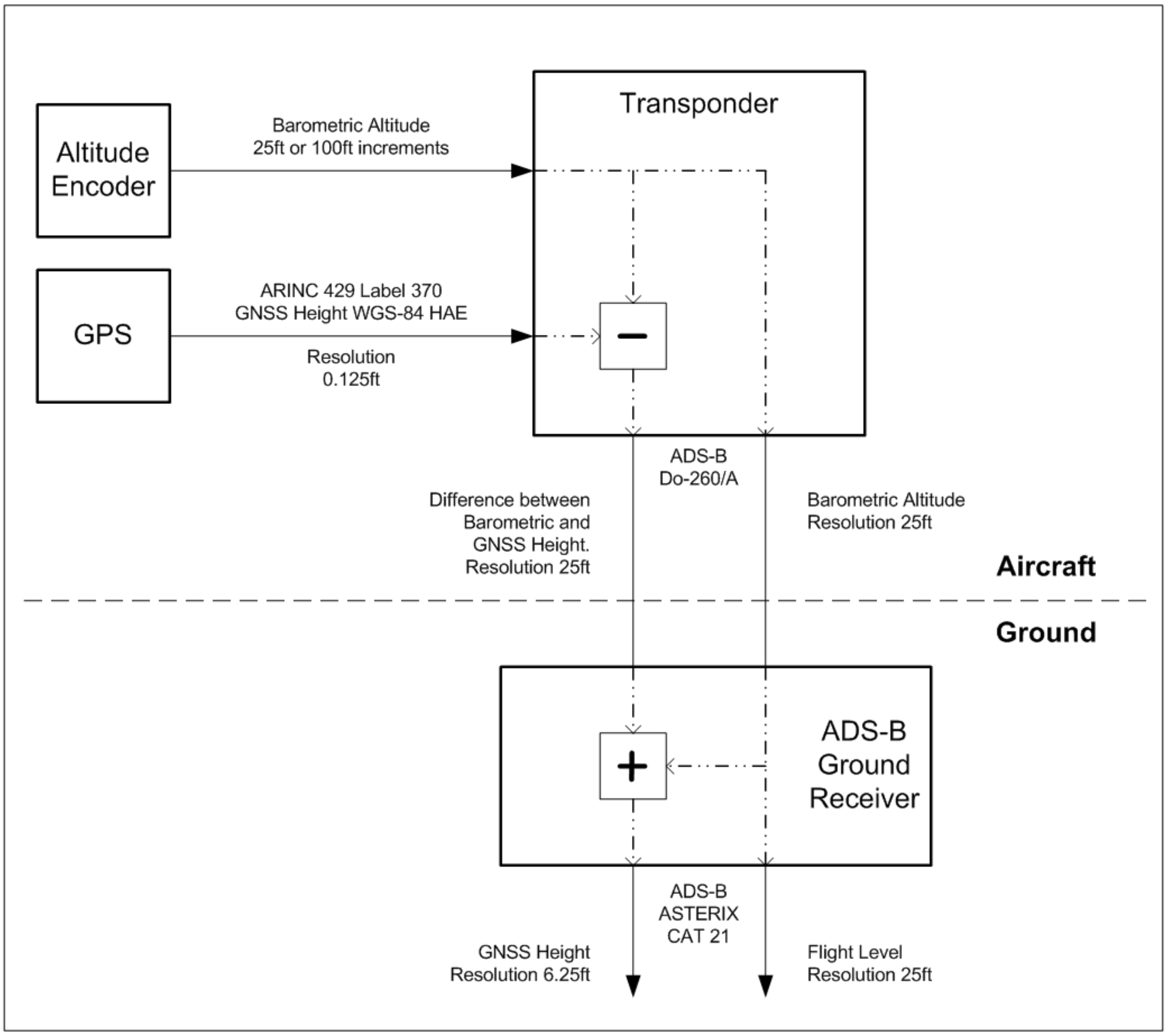
To determine the TVE for each aircraft, the monitoring unit must measure the height of the aircraft and compare this to the barometric altitude of the CFL. The CFL must be converted to a height above ground (or a common reference height) using the known atmospheric conditions at the time.

The ASE performance of the aircraft can also be monitored by comparing the reported barometric altitude to the CFL and taking this difference away from the overall TVE. Analysis of ASE monitoring in Europe has suggested that altimeter errors exist and can increase over time.

ADS-B for RVSM Height Monitoring

ADS-B reports both Mode C barometric altitude and GNSS Geometric height and **so is a suitable candidate for providing data for RVSM height monitoring**.

The following diagram shows the way in which the required height and altitude measurements are made available to the ADS-B system.



As can be seen above a number of limitations on the quality and accuracy of the available data exist. Further investigation into the use of ADS-B for RVSM monitoring has found the following:

- Not all aircraft approved for RVSM are ADS-B equipped, although this will change as ADS-B equipage rates continue to increase;

- The barometric altitude is encoded in either 100ft or 25ft increments by the altitude encoder. The transponder then transmits this value via SSR Mode C or Mode S (radar or ADS-B). Mode C can only transmit values quantised to 100ft increments. Mode S uses 25ft increments. Accuracy is reduced during this quantisation;

- GNSS Height provided by the GPS is quantised by the GPS to provide the value to the transponder. The difference between this value and the barometric altitude is calculated by the transponder and encoded in the ADS-B messages. This process further quantises the value. The accuracy of the GNSS height value recovered by the ground processing equipment is reduced due to this quantisation;

- As per RTCA DO-260 and DO-260A, the GNSS height value is reported by ADS-B as a difference from the barometric altitude. The preferred value for this calculation is GNSS Height Above Ellipsoid (HAE). However GNSS altitude above Mean Sea

Level (MSL) may be used if the airborne position is reported using Format Type Codes 11 through 18. This corresponds to a DO-260 NUC of 0 to 7. In this case there is no indication of which value is used, although it will be consistent for the particular aircraft; and

- ADS-B does not provide any information on the current atmospheric pressure/temperature conditions at the time the GNSS height measurement was taken. Atmospheric data is required to convert the CFL into a corresponding height for comparison to the GNSS height.

The Mode C altitude reported by the aircraft can be used to determine the likely CFL based on proximity to available Flight Levels.

Previous Work

A number of papers have been presented to the Separation and Airspace Safety Panel (SASP) describing algorithms for using ADS-B like data for monitoring of ASE. Without deployed ground infrastructure many of the algorithms presented have had little validation in the field.

Current Work on ADS-B RVSM Monitoring in Australia

Australia has a large ADS-B ground infrastructure from which to collect data. Initial samples of this data have been analysed using the algorithms previously presented to SASP. One such technique is the comparison of GNSS heights between closely spaced aircraft to cancel the affects of atmospheric pressure variations with time on pressure altitude conversions. By comparing a single aircraft to a number of others an indication of the ASE can be determined. A paper was presented to SASP in November 2007 describing this work.

Initial use of ADS-B data applying these techniques has produced large error values and a large spread in the errors observed. It is suspected that the limitations previously mentioned, particularly the quantisation introduced by the aircraft avionics, is contributing to the spread of errors observed. Alternative techniques for describing the aircraft trajectory are currently being explored.

Conclusion

Although ADS-B does provide a measurement of aircraft pressure altitude and GNSS height, a number of limitations have been identified with this data. Further work is required to determine whether ADS-B can be used successfully for RVSM Monitoring.

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UPDATED ADS-B SUBJECT/TASKS LIST

No.	Subject/Tasks List	Associated with Strategic Objective	Associated GPI	Deliverables	Target Date	Action to be taken and led by
1	Conduct study and present a paper on a study for the use of ADS-B technology in airspace in the North Asia.	D. Efficiency	GPI01/02/05/06/07/09/ 14/16/17/21/22	Report of study for the use of ADS-B in North Asia area	Completed (04/2008)	IATA
2	Report Organizational Policy on ADS-B data sharing with neighbors.	A. Safety D. Efficiency	GPI01/02/05/06/07/09/ 10/11/14/16/17/21/22	Status report	Completed (04/2008)	All Members
3	Each State report on the number of airframes fitted and transmitting with good NUC/NIC.	D. Efficiency	GPI01/05/06/09/14/16/ 17/21/22	Report on statistics conducted	10/2008	All Members with Ground Stations
4	Develop draft comparison of surveillance technologies document including required site and network architecture, expected surveillance coverage, cost of system.	D. Efficiency	GPI01/02/05/06/07/09/ 14/16/17/21/22	A regional guidance material for implemetation	Completed (4/2007)	Greg Dunstone
5	Develop draft update to AIGD to incorporate multilateration.	D. Efficiency	GPI01/05/06/09/ 14/16/17/21/22	The second amendment to the AIGD	Completed (4/2007)	Nick King, Chainan Chaisompong & Howard Anderson Anderson)
6	Provide a paper with an update on available equipment standards: (ARINC, Eurocae, RTCA, ICAO, TSO)	D. Efficiency	GPI01/05/06/09/ 14/16/17/21/22	An information document for implementation	10/2008	USA- seek updates from Home
7	Develop a table detailing readiness of Airspace users & ATS providers	D. Efficiency	GPI01/05/06/09/ 14/16/17/21/22	Report of a survey conducted	Completed (4/2007)	Singapore

No.	Subject/Tasks List	Associated with Strategic Objective	Associated GPI	Deliverables	Target Date	Action to be taken and led by
8	Provide details of potential areas (FIRs) that where there is a positive cost/benefit for near term implementation of ADS-B Out	D. Efficiency	GPI01/05/06/09/ 14/16/17/21/22	Report of result of studies	Completed (4/2008)	All -Corner meetings
9	Develop a paper on how Probability of detection should be reported for ADS-B so that it can be compared to radar probability of detection	D. Efficiency	GPI01/05/06/09/ 14/16/17/21/22	Guidance material for implementation	Completed (4/2008)	
10	Develop guidelines on how ADS-B equipage should be reported in future, especially the definition of "equipped".	D. Efficiency	GPI01/05/06/09/ 14/16/17/21/22	Guidelines for implementation	Completed (4/2008)	Greg Dunstone
11	Develope outline of the performance criteria and identify issues to be considered when introducing ADS-B into an Air Traffic Control multi-sensor fusion process	D. Efficiency	GPI01/05/06/09/ 14/16/17/21/22	Guidance material for implementation	Completed (4/2008)	Rick Castaldo, Greg Dunstone Michel G. Procoudine
12	Deveop brief guidance paper on security issues associated with ADS-B	D. Efficiency	GPI01/05/06/09/ 14/16/17/21/22	Guidance material for implementation	Completed (4/2008)	Patrick Souchu, Greg Dunstone, Mike Gahan
13	Exam the feasibiity of the use of ADS-B for height monitoring	A. Safety	GPI01/05/06/09/ 14/16/17/21/22	Result of feasibility study - Advice on ADS-B capability to RVSM Groups.	Completed the advice material 4/2008	TBD
14	Guidance material on how to build safety case for delivery of separation services	Safety	GPI01/05/06/09/ 14/16/17/21/22	Guidance material for implementation	Apr-09	Australia
15	Guidance material on display of ADS_B tracks on displays	D. Efficiency	GPI01/05/06/09/ 14/16/17/21/22	Guidelines for implementation	Apr-09	Australia
16	Sample mandate material defining ADS-B avionics including the positional data source	A. Safety	GPI01/05/06/09/ 14/16/17/21/22	Guidance material for implementation	Apr-09	Australia
17	Guidance on legal liability issues for ADS-B data sharing	A.Safety	GPI01/05/06/09/ 14/16/17/21/22	Guidance material for implementation	Apr-09	U.S.A.

No.	Subject/Tasks List	Associated with Strategic Objective	Associated GPI	Deliverables	Target Date	Action to be taken and led by
18	Develop and implement regional collaboration project for ADS-B Out operational use including data sharing in SEA and report on implementation progress	D. Efficiency	GPI01/05/06/09/ 14/16/17/21/22	Develop and implement sub-regional ADS-B collaboration project.	Jul-08/ Dec-10	SEA WG
19	Develop and implement regional collaboration project for ADS-B out operational use including data sharing in South Pacific and report on implementation progress	D. Efficiency	GPI01/05/06/09/ 14/16/17/21/22	Develop and implement sub-regional ADS-B collaboration project.	Apr-09/ Dec-11	South Pacific States
20	Develop common compliance procedures for regulatory surveillance of ADS-B avionics installations and operation.	D. Efficiency	GPI01/05/06/09/ 14/16/17/21/22	Sample document	Apr-09	Australia
21	Study application of ADS-B and multilat for precision runway monitoring	D. Efficiency	GPI01/05/06/09/ 14/16/17/21/22	Guidance material for implementation	Apr-10	All Members
22	Perform data collection and data analyis of ADS-B messages to examine GPS performance in different geographic areas	D. Efficiency	GPI01/05/06/09/ 14/16/17/21/22	Report of data collected and analyzied	Apr-09	All Members

GUIDANCE MATERIAL ON REPORTING ADS-B PROBABILITY OF UPDATE

1. Background

1.1 Radars rotate at a fixed rate. Typically the air traffic controller is presented with new surveillance data at a rate identical or similar to the rotation rate of the radar, e.g. in the terminal area the screen refresh rate is usually about 5 seconds.

1.2 Probability of detection (Pd) is often used as a performance measure of a radar. It is a measure of the likelihood that a target will be detected. There is an underlying assumption in this definition that this probability applies to a single antenna rotation or controller screen update. This could be called probability of update.

1.3 ADS-B does not have a rotating antenna and typically a message is presented to the ATC centre every 1 second. It is then usually presented to the controller at the same rate as radar so that the controller perception of speed for radar and ADS-B tracks is the same. Normally this implies that multiple ADS-B “detections” are received during the display update cycle.

1.4 To compare the detection probability of radar and an ADS-B receiver system one must consider the operational use of the facility. For ADS-B to have the equivalent (or better) performance as radar, it must have equivalent probability of providing an update to the controller as radar over the same period.

1.5 If a radar system provides an update every 5 seconds, then to compare the radar probability of detection, one must consider the probability of ADS-B detecting and displaying the aircraft in the 5 second period. If one wishes to compare to an en-route radar rotating at 5 RPM, then one must consider the probability of ADS-B detecting and displaying the aircraft in the 12 second period.

2. Radar PD calculation

2.1 The achieved radar Pd is calculated by examining, for a particular coverage area, the achieved detections and dividing by the number of attempts at detection : ie the number of antenna revolutions or number of screen updates, e.g. in 100 antenna rotations 90 detections are presented to the controller and hence the Pd = 90%

3. ADS-B Probability of update calculation

3.1 An equivalent Probability of Update for ADS-B would be calculated by examining, for a particular coverage area, the detections presented to the controller and dividing by the number of possible screen updates Eg: in 100 screen updates, ADS-B positional data is presented to the controller 90 times and hence the Probability of update = 90%

3.2 If there is a desire to measure Probability of Update of ADS-B to be used for a terminal area function, without consideration of a display system, it is recommended that a period of 5 seconds is used. Divide the observation period into 5 second intervals and measure the probability as

$$\frac{\text{the number of 5 second intervals that contain valid useable positional data}}{\text{the number of 5 second intervals}}$$

3.3 If the ADS-B is to be used for an en-route only function, the selected period could be 5, 10 or 12 seconds.

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GUIDANCE MATERIAL ON REPORTING ADS-B AVIONICS FITMENT

1 Purpose

1.1 States often discuss the percentage of flights or percentage of a fleet that is equipped with ADS-B. Whilst safety benefits can be delivered in environments with low equipage rates, the delivery of efficiency benefits to airspace users requires a high percentage of fitment.

1.2 A common method of reporting equipage rate is desirable. It has been noted that States currently use different criteria for reporting.

2 Acceptable Avionics

2.1 For ADS-B to be useful it is necessary that the avionics are transmitting “good” positional data integrity values. Therefore before an aircraft can be considered equipped it must be able to generate appropriate NUC (or NIC) values.

2.2 It may not be possible for all States reporting ADS-B detections to know definitively whether the transmitted integrity value from each detected airframe is generated correctly. In some cases this determination can only be made in consultation with the aircraft operator and avionics and/or airframe manufacturer. It is not proposed that all States undertake this determination.

2.3 Therefore, it is proposed that States report on the number of airframes reporting NUC or NIC acceptable for delivery of separation services, i.e. NUC>4. They may also report on the number of aircraft transmitting NIC or NUC indicating that ADS-B data cannot by used for separation services. No determination about the source or acceptability of NUC or NIC needs to be made in the reporting.

3 Reporting by Flight or Airframe

It is useful to report the number of ADS-B airframes detected as well as the number of ADS-B equipped flights.

3.1 By airframe reporting

Each ADS-B capable airframe is identified by its 24 bit address. Therefore it is relatively easy to maintain tables of individual airframes that have been detected transmitting acceptable ADS-B position and integrity data.

This report will include all aircraft that have been detected, regardless of whether they operated with and without a flight plan.

It is useful to understand the equipage rate for both foreign aircraft and local registered aircraft. Hence it is proposed that these are reported separately.

- Local [aircraft] – registered in the reporting State.
- Foreign [aircraft] – registered in any State other than the reporting State.

Splitting local aircraft into above and below 5700Kg also gives some indication of the type of aircraft equipped.

It would also be useful to indicate in the report the number of aircraft on the local aircraft register so that a percentage of equipage can be reported as well as the raw number of airframes detected.

This report may not be indicative of the impact of ADS-B because some equipped aircraft may operate very infrequently, others may operate many sectors a day and some may be either rare or frequent users of the State's airspace.

3.2 By Flight reporting

It may be possible for States to determine which individual flights are ADS-B equipped by using:

- Flight plan indicators
- Registration numbers of equipped aircraft matched to flight plans
- Date/ time and ADS-B transmitted flight ID matched to flight plans

From an air traffic management perspective, reporting by flight is more useful than reporting by airframe, because it gives an indication of the potential to provide services to airspace users. This report is more indicative of the impact of ADS-B because some equipped aircraft may operate very infrequently and others may operate many sectors a day.

This report will only include flights that have been operated with a flight plan.

If reporting by flight, assuming that flight plan data is available, it would be useful to categorise the flights into a number of categories. The following are proposed:

- International Scheduled flights
- Domestic Scheduled flights
- Domestic flights

where

- Domestic means a flight departing from and arriving in the reporting State (operation entirely within the reporting State).
- International means a flight departing from OR arriving in the reporting State (operation only partly within the reporting State).

4 Reporting forms and charts are shown in the Appendices

APPENDIX A

Report for year: …………

Percentage of flight planned **FLIGHTS** (per segment of operation) made by airframes with good integrity data for ADS-B service

	Scheduled International flights	**Unscheduled International flights**	**Scheduled Domestic flights**	**Unscheduled Domestic flights**
January				
February				
March				
April				
May				
June				
July				
August				
Sept				
October				
November				
December				

Number of ADS-B Equipped **AIRFRAMES** detected

	Foreign registered airframes	**Local registered airframes**
January		
February		
March		
April		
May		
June		
July		
August		
Sept		
October		
November		
December		

Percentage of ADS-B Equipped Local Airframes detected (based on local aircraft register for each month)

	Percentage of local registrations (>5700 MTOW)	**Percentage of local registrations (< 5700 MTOW)**
January		
February		
March		
April		
May		
June		
July		
August		
Sept		
October		
November		
December		

APPENDIX B: SAMPLE REPORTING GRAPHS

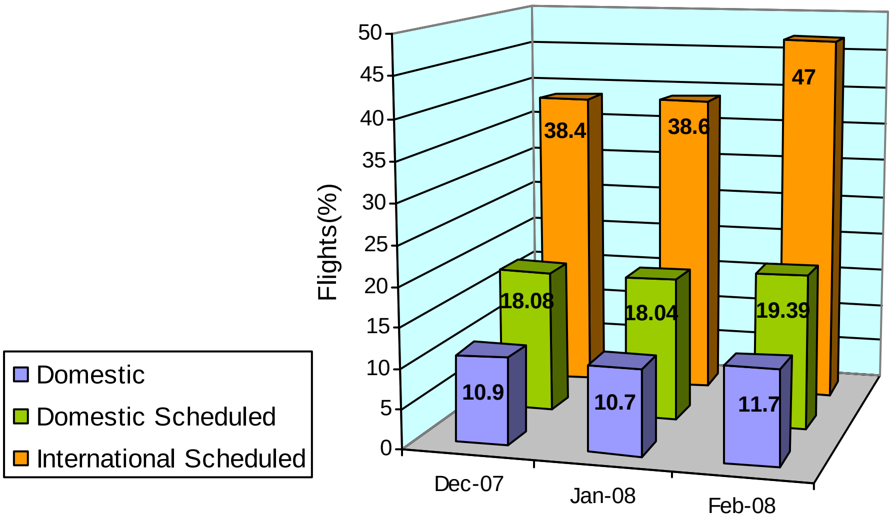

Figure 1 ADS-B **Flights** Detected since December 2007

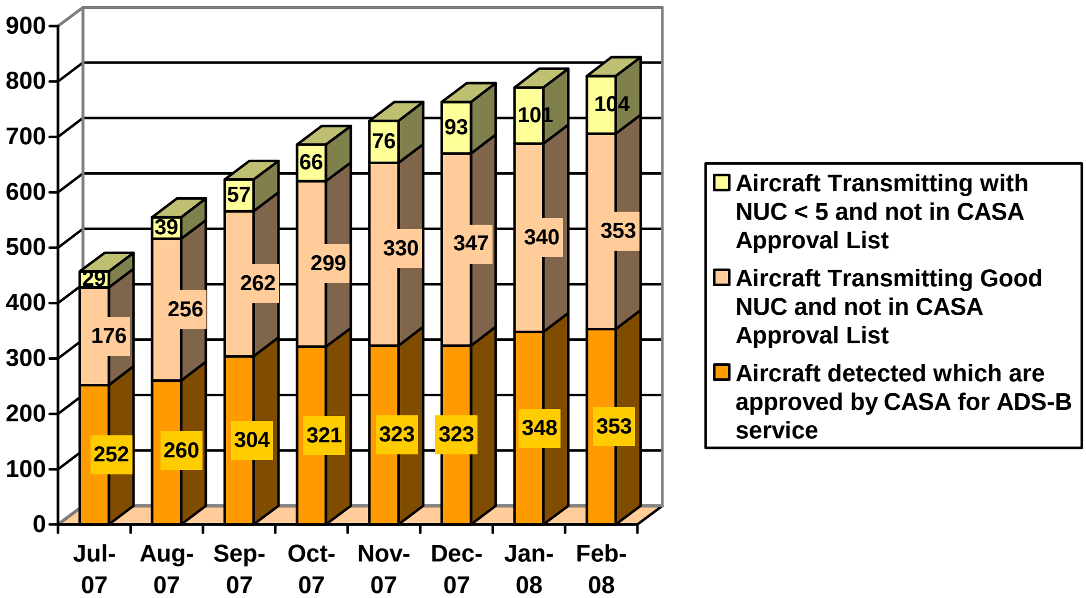

Figure 2 ADS-B **Airframes** Detected since July 2007

GUIDANCE MATERIAL ON ISSUES TO BE CONSIDERED IN ATC MULTI-SENSOR FUSION PROCESSING INCLUDING THE INTEGRATION OF ADS-B DATA

1 Introduction

Modern air traffic control systems use multi-sensor fusion processes to improve the quality of surveillance track data provided to air traffic controllers. This is the latest step in a series of evolutionary improvements to ATC surveillance systems, each offering performance benefits over previous systems.

The original surveillance systems presentations were limited to only displaying a single radar per controller's screen.

Radar mosaic displays provided the first advance on single radar displays. The coverage presented to a controller was divided into "sort boxes", and data from one radar could be displayed in some areas ("boxes"), and data from other radars displayed in other areas, each radar selected for best detection in a given area. Mosaic display systems are generally limited to displaying data from a single "preferred" radar per "sort box".

Multi-radar fusion processing provides an advance on mosaic processing by fusing the detections of multiple radars in areas of overlapping coverage, improving the probability of detection and the tracking of manoeuvring aircraft. Multi-radar fusion processing is a well established process, but is usually limited to integrating the outputs from similar radars that have overlapping coverage.

Multi-sensor fusion provides a further advance on multi-radar fusion by integrating data from a multiplicity of sensors to form a single track for each aircraft. A multi-sensor fusion processor may form a surveillance track using inputs from any or all of the following sensors:

- Primary radars
- Mode A/C SSRs using sliding window processing
- Mode A/C SSRs using monopulse processing
- Mode S SSRs
- Mode S SSRs with DAPS (downlinks of aircraft parameters)
- Wide Area Multilateration systems
- ADS-B receivers

Each of these sensors has different attributes, and a well designed multi-sensor fusion processor will take advantage of the strengths of each sensor, and use these to compensate where possible for the weaknesses of other sensors. It is important to note that some of the measures taken to mitigate the weaknesses of traditional radar sensors should not be applied to data from newer data sources (such as ADS-B) if those weaknesses are no longer a characteristic of the new data. Rather, the processing of each type of data in a multi-sensor fusion algorithm should be adapted to make best use of the actual performance of each of the data sources. Factors to be considered include accuracy, update rates, integrity (probability of false data), and amount of data provided (ie in addition to position, other aircraft information such as aircraft address, flight ID, vertical and horizontal velocities, bank angle, on ground or not, cleared flight level entered into the aircraft FMS, etc may be provided by some sensors, and these items should be used where they can improve performance).

2. Characteristics of Different Sensors

A high level summary of some of the key characteristics of the different sensor types listed above is provided at Attachment 1. The following figures provide examples of accuracy and update characteristics from different sources, and the impact they can have on multi-sensor fusion tracking.

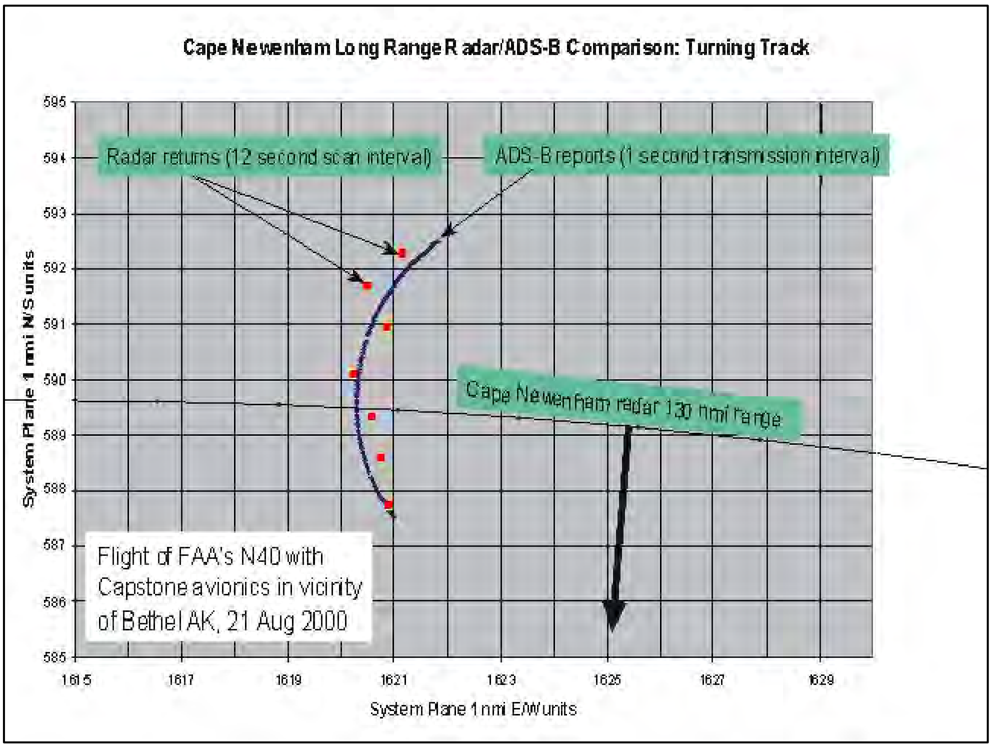

Figure 1 – Alaska: ADS-B and Radar position reports *(FAA)*

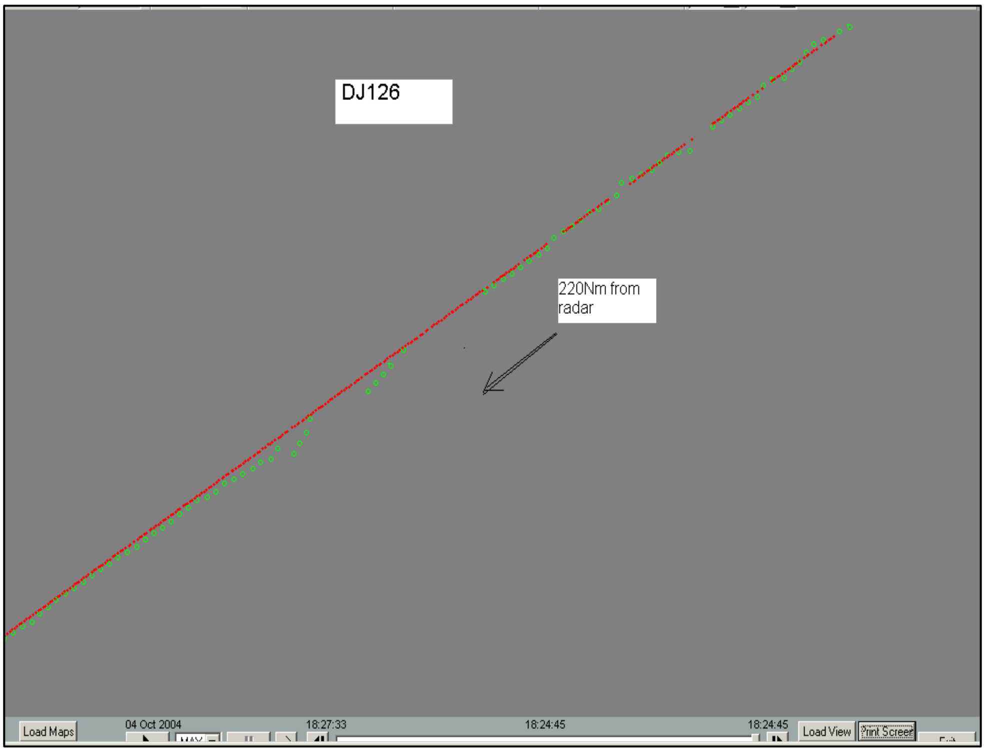

Figure 2 – Australia: ADS-B (red) and Monopulse SSR (green) *(Airservices Australia)*

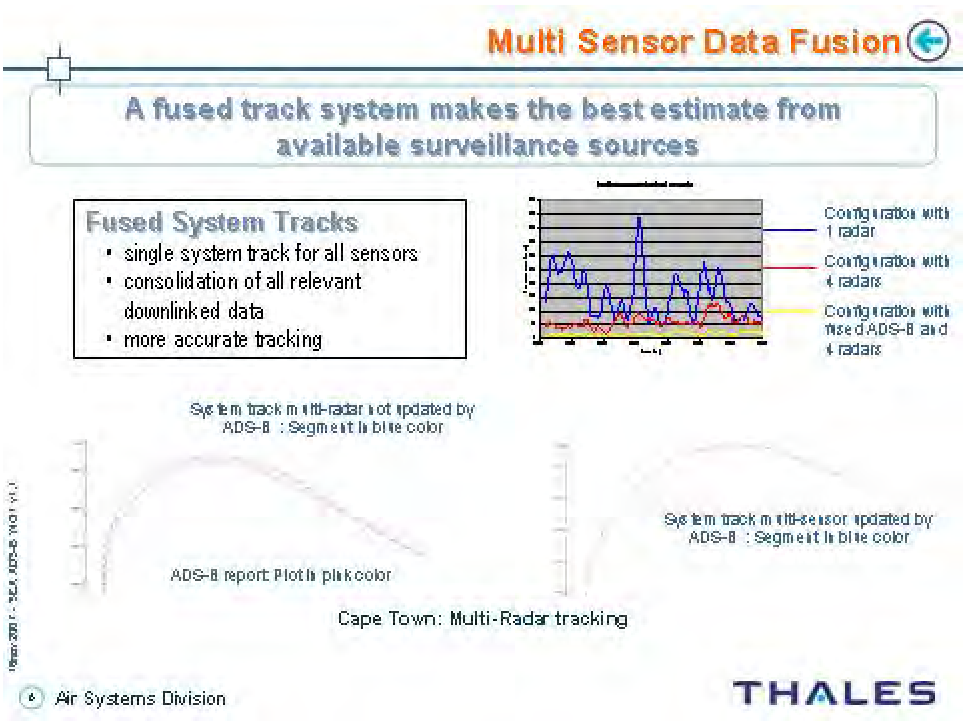

Figure 3 – Analysis of Multisensor Data Fusion with ADS-B *(Thales ATM)*

Figures 1 and 2 provide examples where the position accuracy of ADS-B is clearly much better than that of the radars at the radar ranges indicated. In addition, the update rate of the ADS-B data is much higher (once per second compared to once every 5 or 12 seconds). Both of these factors contribute to improved performance. Radar measurements that exhibit high position noise must be damped to mitigate against false couplings with position reports from other aircraft, and to achieve moderate stability of velocity vectors. While this damping improves tracking for straight line flights, the penalty of damping is overshoot position errors during manoeuvres. The improved accuracy of ADS-B data means there is little if any need for damping. Furthermore, for a given level of damping the overshoot errors tend to increase as the square of the time between updates, and so the higher update rate of ADS-B data significantly reduces the impact of any small amounts of damping that may be applied to this data. In Figure 3 the red line on the graph also shows the improvement from fusion of data from four overlapping radars, which the effect of increasing the average update rate for radar data, but the yellow line shows that the integration of ADS-B data further reduces position errors by a significant amount.

3 Issues to be considered in ATC multi-sensor fusion processing

Many different approaches are possible in the design of multi-sensor fusion surveillance systems suitable for air traffic control. The following paragraphs describe some of the issues to be considered when designing such a system, and the performance that can be expected from ADS-B in these areas.

3.1 Filtering of anomalous data

All of the sensor types listed above have the potential to generate anomalous reports, and the processing system needs to have the capability to filter out this data. Often this is undertaken in a two step process, with a first pre-processing filter at the sensor processing level, and a second filtering at the multi-sensor processing level.

Primary radars detect many objects which are not aircraft, such as road vehicles, weather cells, ground clutter and birds. If the radar is a combined primary and SSR system, then those primary radar detections that correlate in position with an SSR report can be given added credence in a sensor pre-processing filtering process. At this level some form of scan to scan surveillance processing or track formation is carried out, to filter out reports that do not show a scan to scan position movement consistent with aircraft performance parameters. However, even after pre-processing at the sensor, primary radars will output reports that are not from aircraft.

SSR systems require a transponder on each aircraft, and therefore do not generate the sort of anomalous reports that can occur with primary radars. However, SSR systems generate other forms of anomalous reports, such as those caused by reflections, mutual interference (garbling) and poor signal to noise ratios. SSR signals may be reflected off structures such as hangars and terminal buildings to create erroneous reports with incorrect azimuth and range. Some form of surveillance processing at the sensor is normally applied to try to filter out SSR reflection plots, but this is not always totally successful. Garbling occurs when the signals from two or more aircraft interfere with each other in the receiver. Garbling can cause loss of detection, corrupted Mode A (identity) and Mode C (pressure altitude) data, and azimuth shifts. SSR Mode A/C systems that use monopulse signal processing are less prone to losses of detection and azimuth shifts when replies from two aircraft partially overlap in azimuth. Weak signals (usually at longer ranges) can also lead to corrupted Mode A and C data, where receiver noise can corrupt the data detection process. Data from a Mode A/C SSR system does not have any form of error checking, making corrupted data difficult to detect.

SSR Mode S was developed to overcome the SSR garbling problem. Each aircraft is allocated a unique 24 bit address, which is used to selectively interrogate that aircraft. Only the aircraft with the specified address reply, eliminating garbling. False plots due to reflections are largely eliminated also, because on acquisition the Mode S ground station has to work out which replies are the correct ones, and thereafter it will only schedule selective interrogations on that azimuth, and not on the false reflective path azimuths. Incorrect decoding of data by a receiver is still possible when signal to noise ratios are poor, but SSR Mode S data includes a rigorous error detection and correction check sum generated in the aircraft that not detects virtually all errors, but also allows many to be corrected. In general the amount of anomalous data from SSR Mode S sensors is much reduced compared to previous SSR systems. SSR Mode S also allows an aircraft to downlink a number of aircraft parameters (referred to as DAPS), and this data can be used to improve the multi-sensor processing.

A Wide Area Multilateration (WAM) system requires transmissions from an aircraft to be received at a number of geographically dispersed receiving sites. The position accuracy of WAM reports is highly dependent on the geometry of the receiving sites relative to the position of the aircraft (meaning that accuracy for an aircraft in one position may be quite different to that for an aircraft in another position). It is important that the accuracy of WAM data is known to any multi-sensor fusion process. Wide Area Multilateration can operate by processing squitter signals from SSR Mode transponders (including Mode S Extended Squitter ADS-B signals), or by processing reply signals generated from any transponders in response to interrogations from other sources (TCAS on other aircraft, or ground based interrogators). In general, when processing signals from Mode A/C transponders a WAM system can suffer from garbling similar to SSR, but when processing signals from Mode S transponders the improvements in data integrity of SSR Mode S are obtained.

ADS-B data uses the SSR Mode S error detecting and correcting communication protocols to ensure that the data received from an aircraft has not been corrupted. Occasional garbling of ADS-B signals can occur if signals from two aircraft arrive at a receiver at the same time, but this is infrequent due to the pseudo random timing of ADS-B transmissions. It may result in the loss of one report, but is extremely unlikely to create an erroneous report. Given the high rate of transmissions, a new report is likely within a second, making the occasional loss of a report much less significant to the multi-sensor fusion process than the loss of a report from any of the radar sensors. Position determination is carried out by the aircraft avionics system, and the accuracy and integrity of this position determination is included in the data transmitted by the aircraft (parameters such as NUC for equipment certified to DO260, and NIC, NAC and SIL for equipment certified to DO260A). **It is critically important that this aircraft generated position accuracy and integrity information is taken into account when integrating ADS-B data into an ATC multi-sensor processing system.** For example, reports with low NUC values (such as 0,1,2 or 3) will often be discarded as inadequate to support an ATC application. For an airport surface surveillance separation application the threshold is likely to be set much higher whereas for an airport surface surveillance advisory service it may be less stringent. There is a possibility that faulty position determining equipment on an aircraft could generate anomalous position reports but mark these as high accuracy and integrity, although the probability of this occurring is considered extremely low. To detect and eliminate these spurious reports, some form of basic surveillance processing is recommended, such as a ‘reasonableness check’ on distance traveled between subsequent reports. For example, it is not ‘reasonable’ for an aircraft to appear to have travelled 25 miles in the half or one second interval between two ADS-B messages.

3.2 Integrating Data from Different Sensors in the Multi- Sensor Fusion Process

The multi-sensor fusion process needs to be adapted to make best use of the performance characteristics of each of the contributing sensor systems.

Mapping to common datum, the process which converts the various sensor reports to a common datum. Uncertainties can be created in conversion of radar data (based on slant range measurements) to a geographic reference without accurate altitude information. Consideration of processing requirements when there is poor altitude data needs to be considered.

Correlation, the process of deciding which sensor reports are updates to the track of a given aircraft, is a critical part of the fusion process. ADS-B, SSR Mode S and some WAM reports will include the unique 24 bit aircraft address of the aircraft, and this provides a very high confidence indicator that should be used for correlating new reports with an existing multi-sensor track. These reports may also include the aircraft Flight Identification, which is also a good indicator. For SSR Mode A/C systems, the Mode A code is a reasonable measure for correlation, but as explained above it is subject to corruption in garbling situations, and cannot be used with the same confidence as an aircraft address. (Label swaps in garbling situations are not unknown in Mode A/C multi-radar fusion systems). The position data in a report is also a factor in correlating a new report with an existing fused track – the change in position since the last update should be within the bounds of an airplanes' aerodynamics. For correlating primary radar only reports, position correlation is the only measure that can be used.

Position Estimation in a multi-sensor fusion process should to take full advantage of the characteristics of each contributing sensor system – items such as position accuracy, resolution, integrity and update rates differ from sensor to sensor, and the contribution that each makes to the multi-sensor fusion process should be weighted accordingly. **Update rate** is particularly important in tracking the position of a manoeuvring aircraft, and ADS-B and WAM, with typically an update every second, can provide large performance benefits over the typical five, ten or twelve second updates provided by radars. **Position accuracy and integrity** of the data from each sensor type should also influence the weighting given in estimating the multi-sensor track position (and position noise) at each update. For ADS-B the NUC (or DO260A equivalent) should be taken into account in some way – for example, discarding reports with NUC below some threshold, and then perhaps assigning higher weights to higher NUC value reports. High NUC value reports are likely to be the most accurate of all sensors.

The accuracy of WAM position reports are dependent on the geometry of the ground receivers and the aircraft, and it is important that the multi-sensor fusion process is provided with information on WAM position accuracy – for example, all reports are better than a specified accuracy threshold (other reports having been discarded in pre-processing), or each report is accompanied by a "Figure of Merit" based on the geometry of the received signals.
For all types of radar sensors, the accuracy is likely to be constant in range from the sensor, but will decrease in azimuth with increasing range. Less weight should be given in the position estimation process to the azimuth component of radar reports as range increases. It is also necessary to protect against biases in the data from different sensor types.

Bias: ADS-B data is all based on WGS-84 latitude and longitude, and for all values of NUC likely to be used operationally, will be derived from GNSS. ADS-B bias can be assumed to be zero. WAM bias should also be low, but is dependent on the accuracy of survey of ground sites and the time tagging of receptions. Radar bias is mainly a factor of how accurately the north mark encoding of antenna position has been aligned on each radars, combined with the accuracy of survey of the sites. These are both manual processes, and significant errors are not unknown.

Velocity and Acceleration Estimation is important for a number of purposes, including presentation to the controller, safety net functions (such as STCA) and for predicting the multi-sensor track position as part of the correlation process for deciding which new reports should be correlated with which multi-sensor tracks. There are several ways of estimating velocity and acceleration. The traditional approach in multi-radar fusion processes was to look backwards at the last few position reports and calculate a direction, speed and sometimes an indication of whether the aircraft appeared to be turning or travelling straight. This use of historical data works moderately well in constant speed straight flight with accurate position data, but always lags when the aircraft accelerates (including in turns). If the position data is noisy and needs to be damped, this lag increases. The lag can be reduced by more frequent position updates. New sensors offer other ways of determining velocity and acceleration. For example, SSR Mode S with DAPS includes the capability to extract from an aircraft FMS parameters such as ground speed and bank angle, while each ADS-B report includes a velocity value that has been calculated by the position determining equipment (GPS) on board the aircraft. These sources can provide data that is superior to that estimated from an analysis of the historical position reports from the aircraft, and should be used to improve the multi-sensor fusion velocity and acceleration estimation process.

Collection, validation and reporting of downlink data is also to be considered. Downlink data includes barometric altitude, geometric altitude, selected flight level, Flight ID, 4 digit octal code etc. Rules and processes are required to treat these appropriately from each data source. In some cases it may be appropriate to cross check this data with the track trajectory Eg: velocity vector. In other cases the downlinked data may actually support the tracking itself.

4 Performance Requirements

There are no publicly available performance specifications for multisensor fusion processing systems. However an example specification for multiradar tracking is Eurocontrol Standard Document for Radar Surveillance in Enroute Airspace and Major Terminal Areas SUR.ET1.ST01.1000-STD-01-01. This is available on the Eurocontrol Web site.

The performance requirements of a multisensor fusion process will typically include the following:

a) for defined aircraft manoeuvres and defined sensor performance (eg defined radar systematic and random errors):

- Accuracy in straight line flight including position error, speed error, and heading error; and
- Accuracy in manoeuvres of defined characteristics (.5 g , 2 g turns etc)

b) Track initiation delay;
c) False track probability;
d) Track continuity;
e) Tracker processing capability taking into account the relevant sensors, reporting rates and sensor overlap;
f) Anomaly rates such as split tracks, track swap rate, ghost track rate; and
g) Latency – defined as appropriate with the system track display methodology.

ATTACHMENT 1

Some Typical Performance Characteristics of Surveillance Sensor Systems

Performance Characteristic	Primary Radar (PSR)	SSR Mode A/C sliding window	SSR Mode A/C monopulse	SSR Mode S	SSR Mode S withs DAPs	Wide Area Multilateration	ADS-B
Position Accuracy	Decreases with range	Decreases with range	Better than PSR and sliding window SSR – decreases with range	Similar to monopulse SSR	Similar to monopulse SSR	Depends on Rx geometry – can vary from better than radar to worse than radar	GPS – reported by avionics (NUC /NIC, NAC, SIL).
Position updating rate (typical)	5 to 12 seconds	5 to 12 seconds	5 to 12 seconds	5 to 12 seconds	5 to 12 seconds	1 second	1 second
Anomalous position reports	Yes (weather, road vehicles etc)	Yes (multipath reflections)	Yes (multipath reflections	Low probability	Low probability	Low probability	Low probability (NUC/NIC, NAC, SIL protection)
24 bit Airframe Address	No	No	No	Yes (if Mode S avionics)	Yes (if Mode S avionics)	Yes (if Mode S avionics)	Yes
Flight Identification	No	No	No	Yes (if Mode S avionics)	Yes (if Mode S avionics)	Yes (if Mode S avionics)	Yes
Identity code (Mode A)	No	Yes	Yes	Yes	Yes	Yes	No
Altitude (LSB)	No	Yes (100’)	Yes (100’)	Yes (25’ if Mode S avionics))	Yes (25’ if Mode S avionics))	Yes (25’ if Mode S avionics))	Yes (25’)
Susceptibility to garbling	Not applicable	High	Moderate	Eliminated	Eliminated	Low	Low
Data error check/correct	Not applicable	No	No	Yes	Yes	Yes (if Mode S avionics)	Yes
Velocity	No	No	No	No	Yes (DAPS)	No	Yes (GPS)

Sample ADS-B Data Sharing Agreement

INTERNATIONAL CIVIL AVIATION ORGANISATION
ASIA AND PACIFIC OFFICE

SAMPLE AGREEMENT FOR THE SHARED USE OF ADS-B DATA

Edition	**:**	**1.0**
Edition Date	**:**	**2008**
Status	**:**	

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Sample ADS-B Data Sharing Agreement

DOCUMENT CHANGE RECORD

The following table records the complete history of the successive editions of the present document.

EDITION	DATE	REASON FOR CHANGE	SECTIONS PAGES AFFECTED
1.0	February 2008		

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1. FOREWORD

1.1 The present document concerns the guidelines for the drafting of agreements for the shared use of ADS-B data.

1.2 This document is related to the SEA ADS-B WG.

1.3 These guidelines were constituted from:
the Guidelines for an Agreement for the shared use of radar sensor data used by Eurocontrol.

1.4 Notes containing extra information on the use of the proposed contract text are printed in light face, the status being indicated by the prefix **NOTE.**

1.5 The original version of this document is in the English language.

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2. SCOPE

2.1 This document constitutes the SEA ADS-B WG guideline concerning the drafting of an agreement for the shared use of ADS-B data between ATS Organisations in the SEA ADS-B WG and the provision of ADS-B data by service providers. This document contains the proposed text for a bilateral sharing agreement for ADS-B data. The changes required to make it a multilateral sharing agreement for ADS-B data are put in as suggestions.

2.2 The agreement consists of the proposed text for twelve numbered articles and nine annexes, named Annex A up to Annex I. These annexes contain information which is likely to change from time to time. Deviations from the proposed text in the agreement as well as in the annexes, can be necessary due to legal, organisational or technical reasons. Examples of such changes are:

- The starting date could be set to the date the radar data has been delivered for the first time;
- The notice period to end the contract could be chosen differently;
- When installation at the providers' premises requires, i.e. additional staff, the cost could be charged to the user.

The clauses enclosed in brackets ([]) should be replaced by the information described in these clauses.

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3. REFERENCE DOCUMENTS

The following documents and standards contain provision which, through reference in this text, constitute provisions of the document. At the time of publication of this document the editions indicated for the referenced documents were valid.

Revisions of the referenced documents shall not form part of the provisions of this document until they are formally reviewed and incorporated into this document.

In case of conflict between this document and the contents of these other referenced documents, this document shall take precedence.

1 [To list the relevant documents]

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4. ABBREVIATIONS AND ACRONYMS

For the purposes of these guidelines the following are used:

ADS-B Automatic Dependent Surveillance - Broadcast

ASTERIX All Purpose Structured Eurocontrol Radar Information Exchange

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5. PROPOSED TEXT FOR THE AGREEMENT

The [name of the State's responsible Organisation or name of the (privatised) ATC Organisation] represented by [function],

hereinafter called "the *Provider*",

And

The [name of the State's responsible Organisation or name of the (privatised) ATC Organisation] represented by [function],

hereinafter called "the *User*";

Suggestion: If there are more than one Provider or more than one User, the above lines are to be repeated for each Provider or User.

In case the Providers are also Users (e.g. each party supplies information from an Automatic Dependent Surveillance – Broadcast (ADS-B) to the other party), one can replace the words Provider and User with the names of the Organisations and indicate in Annex A who is Provider and who is User for each source of the ADS-B data.

- Having regard to the South East Asia Sub-regional Automatic Dependent Surveillance – Broadcast (ADS-B) Implementation Working Group (SEA ADS-B WG) objectives, including the optimisation of the provision and use of the ADS-B surveillance function through the installation of new facilities or the sharing of ADS-B data;

- With a view to the establishment of the categories of services through the airspace of the regions specified in Annex A and I;

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NOTE- More reasoning and motivations for the contract can be inserted here

- Have agreed as follows:

ARTICLE 1 - Objective of the Agreement

1 The objective of this Agreement is to improve safety and operations efficiency of civil air traffic by enhancing ADS-B coverage and ADS-B data availability in the Flight Information Regions for which the *User* is responsible and the areas within 150Nm from the boundaries of these Flight Information Regions.

2 For this purpose, the *Provider* shall provide its ADS-B data to the *User* with effect from [date] and in accordance with the implementation schedule in Annex G.

3 he ADS-B data to be provided are specified in Annex B, H and I.

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ARTICLE 2 - Limitations

1 The *User* shall use the ADS-B data provided only to ensure the safe, proper and continuous operation of civil Air Traffic Services or activities in support of his Air Traffic Services and for technical demonstration, evaluation and test purposes related to his operational tasks, unless otherwise specified in Annex A.

2 The *User* shall not communicate to any party not specified in this Agreement in any matter of form whatsoever any information supplied pursuant to this Agreement. The said information shall not be used for any purpose other than those specified in paragraph 1 hereof, without the prior written consent of the *Provider*.

[NOTE : To include a definition: Air Traffic Services shall mean Civil Air Traffic Services.]

ARTICLE 3 - Installation

1 The *Provider* and the User shall install all required equipment at their respective premises.

2 Both the *Provider* and the *User* shall arrange for the provision, installation and commissioning of private circuits and other associated equipment as specified in Annex B and F, required for the transmission of the ADS-B data from the *Provider* to the *User*.

3 Initial testing of the equipment and private circuits for the provision of the ADS-B data shall be carried out in conjunction with the *Provider* and the *User*.

The provision of the present article shall also apply in the event of modifications to the equipment or private circuits.

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ARTICLE 4 - Maintenance

1 Unless otherwise specified in Annex C, the routine maintenance, repair and replacement service for the equipment and the private circuits installed for the provision of ADS-B data under this Agreement shall be executed by technical staff available at the *Provider's* and at the *User's* premises.

2 Unless otherwise specified in Annex D, the routine maintenance, repair and replacement at the Provider's premises referred to in paragraph 1 hereof shall be carried out free of charge by the Provider to the standards of maintenance commonly adopted by the Provider.

3 The routine maintenance, repair and replacement at the User's premises shall be done by and at the expense of the *User* to the standard of maintenance commonly adopted by the *User*.

ARTICLE 5 - Modifications

1 Both the *Provider* and the *User* shall implement any modification in the equipment and the private circuits for the provision of ADS-B data at their respective premises due to any decision of the *Provider*. The modification shall be carried out in accordance with Article 3.

2 The *User* may propose technical modifications of the specifications for the provision of ADS-B data to the *Provider*. The *Provider* shall decide on the implementation of it.

3 The modifications to be implemented shall be specified by the *Provider* in writing to the *User* not less than six months before the date the modification shall be implemented.

ARTICLE 6 - Cost

1 The cost apportionment for the use of ADS-B data as specified in Annex A, B and I shall be in accordance with Annex D.

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ARTICLE 7 - Integrity

1 The *Provider* shall take all reasonable steps, in accordance with the standards commonly adopted by him, to monitor and maintain the quality and continuity of the provision of ADS-B data of the facilities specified in Annex B and F.

2 Where this is reasonably practicable the *Provider* shall give the *User* such notice in respect to any planned periodic break in service as soon as such information is available and a minimum of 24 hours notice in case of any other planned break in service.

3 The *Provider* shall report immediately or at the earliest reasonable opportunity any failure in the provision of the ADS-B data or any abnormality of ADS-B data provided, to the *User's* technical supervisor centre.

4 The *User* shall, in accordance with the standards commonly adopted by him, monitor the ADS-B data received from the *Provider* and report immediately or at the earliest reasonable opportunity any failure in the reception or any abnormality of the ADS-B data, to the *Provider's* technical supervisor centre.

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ARTICLE 8 - Liability [*The requirements on this Article should be agreed bilaterally between States]*
ARTICLE 9a - Legal Aspects
ARTICLE 9b - Settlement of Dispute

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ARTICLE 10 - Correspondence

1 Correspondence to be applied in the framework of this Agreement is specified in Annex E.

ARTICLE 11 - Annexes

1 Annex A, B, C, D, E, F, G, H and I are attachments to this Agreement. The *Provider* and *User*, in mutual consent and formal acceptance, are allowed to amend and up-date, as circumstances deem necessary, the contents of the Annexes, in so far as the amendments are not in contradiction to or out of scope with the text in this Agreement.

ARTICLE 12 - Duration

1 The present Agreement shall enter into force on the day on which it is signed by the last of the contracting Parties, for a period of [duration to be decided by the Parties].

2 Thereafter, that period shall be automatically prolonged unless any of the contracting Parties has, by giving written notice at least [duration to be decided by the Parties] before the expiry of the contract period or the termination date of prolonged period, terminated the Agreement.

3 The Agreement can early terminate in the event the provision of ADS-B data as specified in Annex A hereof is to be permanently withdrawn from service. The *Provider* shall give to the *User* not less than [duration to be decided by Parties] notice in writing in advance thereof.

4 The Agreement can early terminate on request of the *User* in the event of modifications to be implemented. The *User* shall give to the *Provider* not less than [duration to be decided by Parties] notice in writing in advance thereof.

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In witness whereof, the undersigned having been duly authorized, sign the present Agreement.

Done at [place] on [date] in the English language in [number] originals.

NOTE-If the Agreement is in more than one language the following text can be used to replace the previous paragraph.

Done at [place] on [date] in the English, [other language(s)] languages in [number] originals. In the event of any inconsistency, the text in the [language] language will prevail.

For [State's Organization/name of the (privatized) ATC Organisation, Provider] :
[name]
[function]

For [State's Organization/name of the (privatized) ATC Organisation, *User*] :
[name]
[function]

ANNEX A. PARTIES

A.1 In the Framework of this Agreement the providers and users are :

Provider 1 :
Provider 2:
User 1:
User 2:

(NB: In a many cases, each ANSP is likely to be both a Provider and user. Ie ANSP sends & receives ADS-B data))

. Having regard to Article 2 : Limitations,

the *Provider* authorises the *User* to communicate the provided ADS-B ground station data to the

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following parties :

. insert the name of the 3rd parties (if any)

USER 1 :
- List of 3rd parties (if any)

USER 2 :
- List of 3rd parties (if any)

A.2 For this purpose, the *User* to this Agreement shall arrange for (an) identical ADS-B ground station Sharing Agreement(s) acting as *Provider*, with the specified parties.

NOTES -
Whenever the user wants to supply the ADS-B ground station data or a processed version thereof to a third party, the name of the third party has to be added to the list in this annex. The sharing agreement made between the user and the third party must be approved by the Provider in writing. The Provider decides whether it is necessary to update this agreement between Provider and user(s).
The User could become a Provider of data to another specified party

ANNEX B. INTERFACE SPECIFICATION

B.1 This Annex describes the Interface Specification, needed for the interfacing between the *Provider* and the *User* to share ADS-B ground station data.

B.2 ADS-B Data sharing interface

B.2.1 Data Elements
ADS-B messages shall comprise the data elements defined in Eurocontrol Asterix Category 21 version 0.23.

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[NOTE : To include a definition: Asterix Category 21 shall mean Eurocontrol Asterix Catergory 21 Version 0.23.] ADS-B Data received from each aircraft from each ADS-B ground station shall be transmited at a rate of <Rate to be agreed between *User* & *Provider*> The Asterix Category 21 version 0.23 standard allows packaging of multiple ADS-B records into a single data block, or alternatively to place a single ADS-B record per data block. Record packaging shall be performed to the extent possible to minimise communication bandwidth requirements without delaying transmission of any given record.
B.2.2 Message Description The message format shall be in accord with the Asia Pacific ADS-B data interface sharing standard : Namely Asterix Cat 21 version 0.23.
<Not required>
B.2.4 Communication Protocol NOTE : The communication protocol should be decided by the Parties. Relevant aspects of the communication protocol should be specified in this Annex such as ; • name of the communication protocol including version of the protocol; • options used of the protocol, if any; • parameter setting; • addressing issue; • link speed; etc {eg *The network layer is to be implemented using the Internet Protocol (IP). The network shall support Internet Group Management Protocol (IGMP) level 0, 1 and 2 as defined in RFC3300.* *Note: IGMP level 1 supports transmission of Multicast datagrams, level 2 supports transmission and reception of multicast datagrams, while level 0 corresponds to IP unicast.*

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For Asterix messages, the Network Layer shall use the Internet Protocol (IP) for the delivery of packets
using MULTICAST broadcast techniques. A multicast addressing scheme, as agreed, shall be used. }

B.2.5 Physical Aspects

Add appropriate details as available.

Eg DDS circuit using service from <Company>
Eg: Satellite datalink service using <Company> and Modems…

ANNEX C. MAINTENANCE

C.1 The maintenance, repair and replacement service for equipment installed at the *Provider*'s and the *User*'s premises shall include the following activities during normal working hours:

. routine maintenance, repair and replacement service for the equipment installed at the *Provider*'s and the *User*'s premises;

. support by staff for testing the equipment and modifications.

C.2 During as well as outside normal working hours, the maintenance service at their premises shall be carried out by the *Provider* and the *User* in accordance with the standards of maintenance commonly adopted by the *Provider* and the
User.

C.3 The *User* shall collect and replace any faulty equipment or spare part, subject of this Agreement, at the *Provider*'s and the *User*'s premises.

The *User* shall procure at its own expense the following maintenance and repair support service contracts:

. [equipment] with [maintenance and repair support agency]
....
. [equipment] with [maintenance and repair support agency]

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The *Provider* shall procure at its own expense the following maintenance and repair support service contracts:

. [equipment] with [maintenance and repair support agency]

<In some cases it may be appropriate for the Provider to procure or provide the maintenance of equipment located at the Provider premises>

C.4 For routine co-ordination and report the following technical supervisor centres shall be responsible:

At the *Provider*'s premises : [telephone and fax number]
At the *User*'s premises : [telephone and fax number]

ANNEX D. COST

<the details of cost issues will be agreed bi-laterally>

D.1 General
Costs borne by parties will based on a mutually-agreed basis between ANSPs of adjoining member States and/or ADS-B data service providers.

Costs considered include equipment costs, installation costs, maintenance costs, line or equipment lease costs, costs of performance reporting and costs of related services.

Cost apportionment is based upon the user-pays principle, elaborated as follows:

(a) If an ADS-B ground station serves solely (or significantly) the need of the Provider, as far as possible the cost of installation and maintenance should be borne by the Provider.

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(b) If an ADS-B ground station provides surveillance data to the *Provider* as well as the *User*, the Provider may, if it desires to do so, work out the cost apportionment with the User. Cost apportionment should be on a mutually-agreed basis between the User & Provider, and could cover three cost components: (i) installation of the ADS-B ground station; (ii) maintenance of the ADS-B ground station; and (iii) costs of sharing of ADS-B surveillance data.

(c) If it is necessary for an ADS-B ground station to be installed to serve solely (or significantly) the need of the *User*, the cost of installation and maintenance should, as far as possible be borne by the *User*.

D.2 Data Cost

The cost for providing ADS-B ground station data itself, as agreed between *provider*(s) and *User*(s) should be specified here. When the data is supplied free of charge it should be mentioned here too.

D.3 Installation Cost

The cost of installing communication circuits and the equipment for the provision of ADS-B ground station data as agreed between *provider*(s) and *User*(s) should be specified here.

D.4 Maintenance Cost

The routine maintenance, repair and replacement service for the equipment installed for the provision of ADS-B ground station data as agreed between *provider*(s) and *User*(s) should be specified here..

D.5 Periodical Cost

Periodic cost of rental of private circuits, private circuit line checks, service contracts or any other periodic rent or fee as agreed between *provider*(s) and *User*(s) should be specified here.

The use at the *Provider*'s premises and the *User*'s premises of any installation space and the use of the power supply as agreed between *provider*(s) and *User*(s) should be specified here.

D.6 System technical and operational support Cost

The cost of any technical or operational support provided by one party to the other to establish an operational and sustainable *Provider* ADS-B system as agreed between *provider*(s) and *User*(s) should be specified here.

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D.7 Termination costs

The pre-agreed cost of termination of the *Provider* ADS-B system as agreed between *provider*(s) and *User*(s) should be specified here..

D.8 Modification costs

If the *User* require and *Provider* may agree to modify the service. In such cases, the costs of any modification shall be negotiated in good faith taking into account the principles of cost sharing as described above,.

ANNEX E. CORRESPONDENCE

All correspondence in connection with this agreement shall be mail as follows:

[*Provider* State's Organisation or name of ATC Organisation, mail address, email address, telephone and fax number]

[*User* State's Organisation or name of ATC Organisation, mail address, email address,
telephone and fax number]

ANNEX F. EQUIPMENT PROVIDED BY ONE PARTY to the OTHER.

(only required if necessary – which is unlikely)

ANNEX G. IMPLEMENTATION SCHEDULE

Define Milestones :

FIR1 to FIR2

a) Inter FIR datalink installed for testing :<Dates>
b) Completion of data link testing :<Dates>
c) Ground station installation : <Dates>

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d) Availability of ADS-B data for testing :<Dates>
e) Use of ADS-B data for situational awareness by ATC :<Date>
f) Use of ADS-B data for delivery of separation services: :<Date>

FIR2 to FIR1

g) Inter FIR datalink installed for testing :<Dates>
h) Completion of data link testing :<Dates>
i) Ground station installation : <Dates>
j) Availability of ADS-B data for testing :<Dates>
k) Use of ADS-B data for situational awareness by ATC :<Date>
l) Use of ADS-B data for delivery of separation services: :<Date>

ANNEX H. FUNCTIONAL PERFORMANCE REQUIREMENT

Capacity: The *Provider* ADS-B system shall be able to support no less than <to be agreed between Parties> aircraft from every site at one time.

Accuracy: Accuracy is provided by the airborne avionics and no accuracy requirement is imposed on the *Provider* ground system.

Update Rate: The *Provider* ADS-B system shall provide positional and information updates at a rate of <To be agreed> times per second.

The *Provider* ADS-B system may collect received ADS-B messages between updates and then transmit a composite message to the ATC centre using the most up to date positional data. This allows collection of velocity and positional data into a single Asterix package and lowers the processing load of the ATC system. When data is received from an aircraft, the *Provider* ADS-B system track data is updated.

Network latency: The ADS-B network shall deliver reports to the User interface within 2 seconds of their output from the ADS-B ground station for 95% of the time. (Tier 1)

Network latency: The ADS-B network shall deliver reports to the User interface within 15 seconds of

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their output from the ADS-B ground station for 95% of the time. (Tier 2)

The *Provider* ADS-B system shall provide a MTBF (loss of ADS-B Service) to the User interface exceeding 50,000 hours. (Tier 1)

This requirement will typically require
= the communications infrastructure to be completely duplicated without a single point of failure.
= Two ADS-B ground stations shall be installed at each site. There shall be no common point single point of failure . Each ground station shall provide ADS-B data to the ATC centre.

The *Provider* ADS-B system shall provide a MTBF (loss of ADS-B Service) to the User interface exceeding 400 hours. (Tier 2)

Availability : The service shall be provided with a service availability from each ground station site of better than 99.9%. In calculation of availability, planned outages shall be included. (Tier 1)

Availability : The service shall be provided with a service availability from each ground station site of better than 95%. In calculation of availability, planned outages shall be included. (Tier 2)

Integrity

Integrity of ADS-B data is critical to system safety. The ADS-B ground station, the data communication system, and any processing before the interface shall not introduce errors (compared to the received ADS-B messages) more frequent than 1 in every million messages ($1 * 10^{-6}$).

The provided service shall not deliver any received data to the interface which has not satisfied ADS-B downlink message cyclic redundancy checks (CRC)

Ground Station Receiver & Processing functionality requirements

The *Provider* ADS-B system shall be based upon Mode S extended squitter technology.

The *Provider* ADS-B system shall receive and decode all Mode S DF17, DF18 and DF19 messages

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defined in the RTCA standards DO-260 and DO-260A.

The *Provider* ADS-B system shall receive and decode Mode S DF17, DF18 and DF19 messages using the Lincoln Laboratory error detection and decoding techniques specified in RTCA DO-260 or demonstrate equivalent performance using other techniques

The *Provider* ADS-B system shall be configurable to transmit or not to the interface

- Messages for aircraft indicating they are "on ground"
- Messages resulting from aircraft equipped with DO260 compliant avionics
- Messages resulting from aircraft equipped with DO260A compliant avionics

The *Provider* ADS-B system shall be designed so that when DO260A messages are received, the *Provider* ADS-B system must calculate a Asterix FOM field. The FOM value for each combination of NIC, NAC and SIL shall be configurable and agreed

Site Monitor

The concept of the ADS-B Site Monitor is to independently test the end to end functional performance of the ADS-B System. The position, geometric altitude, FOM value, other asterix data and presence of the site monitor is tested by the ATC automation system

Site monitor Asterix messages including GPS determined position and GPS geometric altitude from each ADS-B ground station shall be transmitted to the interfaces to provide an independent system integrity verification function.

The FOM value that is transmitted to the ATC centre shall be based upon the HPL value of the GPS receiver

A failure of the site monitor shall not adversely affect the operation of the *Provider* ADS-B system equipment.

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ANNEX I. COVERAGE or GROUND STATION DETAILS

- The category of service and coverage of each source of ADS-B data provided;
- Which party is the provider for each source

Describe either the coverage volume or ground station supporting the shared service:

Eg:

Coverage volume: Above FL180 within the geographical region defined in the attached diagram.>
Or

Within line of sight coverage from ADS-B ground station at <lat-Long>

COST APPORTIONMENT FRAMEWORK FOR ADS-B GROUND STATIONS AND ADS-B SURVEILLANCE DATA SHARING

The following provide the guidelines on the formulation of cost apportion framework between States.

(a) If an ADS-B ground station serves solely (or significantly) the need of the owner ANSP, as far as possible the cost of installation and maintenance should be borne by the owner ANSP.

(b) If an ADS-B ground station provides surveillance data to the owner ANSP as well as the adjacent ANSPs, the owner ANSP may, if it desires to do so, work out the cost apportionment with the adjacent ANSPs. Cost apportionment should be on a mutually-agreed basis between the ANSPs, and could cover three cost components:

(i) installation of the ADS-B ground station;

(ii) maintenance of the ADS-B ground station; and

(iii) sharing of ADS-B surveillance data.

(c) If it is necessary for an ADS-B ground station to be installed in one Member State which serves solely (or significantly) the needs of an adjacent ANSP (the user ANS P), the cost of installation and maintenance of the ADS-B ground station should as far as possible be borne by the user ANSP.

(d) The tier of service level should also be considered when formulating the actual cost apportion.

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SURVEILLANCE STRATEGY FOR THE ASIA/PACIFIC REGION

Considering that:

1. States are implementing CNS/ATM systems to gain safety, efficiency and environmental benefits, and have endorsed the move toward satellite and data link technologies;

2. The future air traffic environment will require increased use of aircraft-derived surveillance information for the implementation of a seamless automated air traffic flow management system;

3. The 11th Air Navigation Conference endorsed the use of ADS-B as an enabler of the global air traffic management concept and encouraged States to support cost-effective early implementation of ADS-B applications;

4. APANPIRG has decided to use the 1090MHz Extended Squitter data link for ADS-B air-ground and air-air applications in the Asia/Pacific Region, noting that in the longer term an additional link type may be required;

5. SSR and ADS-C will continue to meet many critical surveillance needs for the foreseeable future;

6. ACAS acts as situational awareness tool and last resort for safety conflict resolution;

7. SARPs, PANS and guidance material for the use of ADS-B have been developed;

8. ADS-B avionics and ground systems are available; and

9. Multilateration is a technology that can supplement SSR and ADS-B.

THE SURVEILLANCE STRATEGY FOR THE ASIA/PACIFIC REGION IS TO:

1. Minimise the reliance upon pilot position reporting, particularly voice position reporting, for surveillance of aircraft;

2 Maximise the use of ADS-B on major air routes and in terminal areas, giving consideration to the mandatory carriage of ADS-B Out as specified in Note 1 and use of ADS-B for ATC separation service;

3. Reduce the dependence on Primary Radar for area surveillance;

4 Provide maximum contiguous ATS surveillance coverage of air routes using 1090MHz Extended Squitter ADS-B and Mode S SSR based on operational requirements;

5. Make full use of SSR Mode S capabilities where radar surveillance is used and reduce reliance on 4-digit octal codes;

6. Make use of ADS-C where technical constraint or cost benefit analysis does not support the use of ADS-B, SSR or Multilateration;

7. Make use of Multilateration for surface, terminal and area surveillance where appropriate as an alternative or supplement to other surveillance systems;

8. Increase the effectiveness of surveillance and collision avoidance systems through mandatory use of pressure altitude reporting transponders;

9. Improve safety through sharing of ATS surveillance data across FIR boundaries;

10. Ensure provision of communication, navigation, and data management capabilities necessary to make optimal use of surveillance systems;

11. Enhance ATM automation tools and safety nets through the use of aircraft-derived data such as flight identification, trajectories and intentions; and

12. Ensure civil-military interoperability.

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Note 1:

a) *Version 0 ES as specified in Annex 10, Volume IV, Chapter 3, Paragraph3.1.2.8.6 (up to and including Amendment 82 to Annex 10) and Chapter 2 of* Technical Provisions for Mode S Services and Extended Squitter*(ICAO Doc 9871) (Equivalent to DO260) to be used till at least 2020.*

Or

b) *Version 1 ES as specified in Chapter 3 of* Technical Provisions for Mode S Services and Extended Squitter *(ICAO Doc 9871) (Equivalent to DO260A)*

SUMMARY OF RECENT AND FORTHCOMING DEVELOPMENTS TO THE WAFS

(Information presented by WAFC London and WAFC Washington at CNS/MET SG/12 Meeting)

1. RECENT DEVELOPMENTS

1.1 Adoption of Standards and Recommended Practices of Amendment 74 to ICAO Annex 3

Amendment 74 to ICAO Annex 3 – *Meteorological Service for International Air Navigation*, was adopted on 07 November 2007. Accordingly, a small number of changes pertinent to the WAFS have been implemented by the WAFC Provider States. Of note, the WAFCs are:

i) no longer required to issue amendments to WAFS SIGWX forecasts; and

ii) no longer required to depict surface fronts, well-defined convergence zones (ITCZ) and non-CB cloud amount and type on WAFS SIGWX forecasts.

Suggested action: *Note this information only.*

Concerning tropical cyclones (TC), Amendment 74 to Annex 3 added the identification of an unnamed TC (by using the term 'NIL') in the name block of the TC advisory message template, issued by a designated TC Advisory Centre (TCAC). The new provisions were designed to cater for those developing systems which were expected to reach tropical storm intensity (with a maximum wind of 63 km/h (34 kt) or more) during the period covered by the advisory, but had not yet been given a name. However, using the term 'NIL' in the WAFS SIGWX forecasts could lead to ambiguity amongst users which may be misled to consider that the TC identified with 'NIL' was expected to dissipate by the validity time. The WAFSOPSG/4 meeting (February 2008) agreed that the abbreviation 'TC' with no name/qualification should be used for *an unnamed TC which is forecast to reach tropical storm intensity by the SIGWX forecast validity time* (WAFSOPSG Decision 4/7 refers). Once the TC has been given a name by the TCAC concerned, the WAFCs will use that name on subsequent WAFS SIGWX forecasts.

Suggested action: *Note this information only.*

1.2 Earlier issuance time of WAFS SIGWX

On 06 February 2008, in accordance with WAFSOPSG Conclusion 3/14, the WAFC Provider States advanced the lead time of issuance of WAFS SIGWX forecasts in the BUFR code form to 17 hours for high-levels (SWH) and 16 hours for medium-levels (SWM). For WAFS SWH and SWM forecasts in portable network graphics (PNG) chart format, a lead time of issuance of 16 hours applies.

Users are to note that when the WAFCs are operating in ***backup mode***, SWH BUFR will continue to be issued with a lead time of 17 hours. However, SWM BUFR, and all PNG charts (SWH and SWM) will be issued with a lead time of 15 hours.

Accordingly, new issuance times for the T+24 WAFS SIGWX forecasts are:

i) 0100 UTC, 0700 UTC, 1300 UTC and 1900 UTC for routine and back-up mode SWH BUFR;

ii) 0200 UTC, 0800 UTC, 1400 UTC and 2000 UTC for routine SWM BUFR, SWH PNG and SWM PNG; and

iii) 0300 UTC, 0900 UTC, 1500 UTC and 2100 UTC for back-up mode SWM BUFR, SWH PNG and SWM PNG.

Suggested action: *Users may require a workstation software update to accommodate the new SIGWX issue times. Users are urged to contact their workstation provider where necessary.*

1.3 **Provision of PNG formatted SIGWX charts**

To minimise the impacts for end users of the cessation of T4 formatted SIGWX charts, and BUFR migration issues, the WAFS Provider States have provisioned PNG formatted SIGWX charts on the WAFS broadcasts since mid-late 2005. PNG formatted SIGWX charts are expected to be available at least until 2010, as a backup to BUFR encoded SIGWX forecasts.

On the SADIS 1G and 2G satellite broadcasts, these products are available as bulletinised PNGs (i.e. enclosed by a WMO telecommunications wrapper). The 'envelope' is necessary to enable these charts to be transmitted via satellite. For a product recipient to be able to display these charts, the 'envelope' needs to be removed by a client workstation system.

On SADIS FTP, these products are available as unbulletinised PNGs (i.e. with their WMO telecommunications wrapper removed). This enables SADIS FTP users to display the products via commercial off-the-shelf (COTS) applications, including internet web browsers. High-level and medium-level SIGWX forecasts in PNG format are available for standard ICAO regions.

Suggested action: *All approved SADIS workstation vendors have software that can visualise the PNG formatted SIGWX charts. Users who cannot view these products are encouraged to contact their workstation/software vendor with a view to obtaining a software upgrade which includes PNG viewing capabilities.*

1.4 **BUFR encoded WAFS SIGWX forecasts and BUFR guideline documentation.**

Since July 2005, the WAFS Provider States have produced BUFR encoded SIGWX forecasts for dissemination over the WAFS broadcasts (SADIS and ISCS). Global high-level (SWH) and regional medium-level (SWM) SIGWX forecasts in BUFR format are available for approved users. A SADIS workstation and/or software visualisation suite is required to visualise the BUFR encoded products. It is recommended that SADIS users unable to visualise the BUFR data contact their workstation/software vendor with a view to obtaining a software upgrade. *Consideration needs to be given to the financing and implementation of subsequent software upgrades that may be required should the BUFR standards change in future.*

To assist users and workstation vendors intending to utilise BUFR encoded WAFS SIGWX forecasts, the WAFC Provider States has compiled a BUFR guideline document, that is reviewed on a regular basis and updated as required. The document, titled "*Representing WAFS significant weather (SIGWX) data in BUFR*" is available as a link from the WAFSOPSG website via URL: www.icao.int/anb/wafsopsg/. The most recent copy, version 4.1, was published in December 2007.

Suggested action: *All approved SADIS workstation vendors have software that can visualise the BUFR encoded SIGWX data. Users who cannot decode and view this data are encouraged to contact their workstation/software vendor with a view to obtaining a software upgrade which includes BUFR decoding and viewing capabilities.*

1.5 SADIS FTP Service developments and documentation

The SADIS FTP service has been in operation since mid-2005. It offers approved SADIS users with an alternative, high-quality internet based solution for receiving WAFS and OPMET data. The SADIS FTP service is an ICAO-approved distribution system and an integral part of the SADIS service, complementing, and providing backup for, the SADIS 1G and 2G satellite services. To assist users intending to access this service, the SADIS Provider State has produced a SADIS FTP user guide. The document, titled "*SADIS FTP Service*" is available as a link from the SADISOPSG website via URL: www.icao.int/anb/sadisopsg. The document is reviewed on a regular basis and updated as required to take account of any modifications to the service. The most recent copy, version 4.1, was published in December 2007.

Suggested action: *Approved SADIS users who have internet capabilities, but do not have an active SADIS FTP account, are invited to contact the SADIS Provider State seeking access to the service. Details can be found in the SADIS FTP Service document (outlined above) or through their State Met Authority.*

Since October 2006, new GRIB 1 encoded WAFS forecast data for icing, turbulence and cumulonimbus clouds have been made available on the SADIS FTP service. These products are available to users of the SADIS FTP service broadcast on a *trial and evaluation* basis only at the present time. Further development of these products is continuing. In order to foster the future implementation and correct use of these gridded WAFS forecasts, users who have the ability to decode and visualise the trial and evaluation products are kindly requested to forward comments and suggestions to the WAFC Provider States – details provided in the SADIS FTP Service document outlined above.

Suggested action: *Note this information and forward any feedback to the WAFCs as appropriate.*

1.6 Trust Fund in support of LDC members to access WAFS products

A Trust Fund has been established to support the Commission for Aeronautical Meteorology (CAeM) in its efforts to assist Least Developed Country (LDC) Members to ensure that their NMHS has sustainable access to WAFS products by the most appropriate means. The Trust Fund will be used to assist LDC Members to meet the target date of 31 December 2008 for the replacement of first generation SADIS installations, where all other reasonable means have been demonstrably exhausted, and thereby to ensure sustainable access to WAFS products by the most appropriate means, in conformance with ICAO provisions.

The Commission has reviewed and endorsed the Terms of Reference of the Trust Fund, and requested that the Secretary-General of WMO manage and administer the Fund in accordance with WMO Financial Regulations.

Suggested action: *LDC Member States seeking more information about the Trust Fund, including Terms of Reference, should contact the WMO Secretary-General for further information.*

1.7 Enhancements to the provision of SADIS Administrative Messages

In November 2007, the SADIS Provider (UK Met Office) initiated a complementary service for provision of SADIS Administrative Messages (NOUK10 EGRR) via email. Dissemination of admin messages via email is *in addition to*, and *not instead of*, the standard ICAO AFS dissemination method (SADIS broadcasts) and the Met Office SADIS webpage. Any approved SADIS user who feels that their organisation would benefit from email notification of the administrative messages (in addition to the standard dissemination methods described above), are invited to contact the SADIS Manager at their convenience via email: greg.brock@metoffice.gov.uk or aviation@metoffice.gov.uk. Please mark your enquiry "For attention of the SADIS Manager".

Users are kindly requested to note that the email address (or addresses) to which they would like messages to be sent must be fully functioning and preferably generic - i.e. avoid the use of personal email accounts such as myname@provider.com. An ideal approach is for the user to define an email address associated with a technical expert or technical area within their organisation, such as opsadmin@mycompany.org. This will ensure that messages can be dealt with by the appropriate authority during their hours of operation. A maximum of two email addresses will be permissible per user site.

Suggested action: *Users are invited to contact the SADIS Manager, as detailed above, if, in addition to the standard dissemination methods, they would like to receive SADIS Admin Messages via email.*

2. FUTURE DEVELOPMENTS

2.1 Migration from GRIB 1 to GRIB 2 WAFS upper-air forecasts

The WAFSOPSG/4 meeting (February 2008) endorsed a detailed implementation plan for migration from GRIB1 to GRIB2 code-form WAFS upper-air forecasts, based on IATA requirements. The WAFC Provider States are expected to develop and test WAFS forecasts in the GRIB2 code-form, encompassing higher-resolution data (temporal and spatial), as well as gridded icing, turbulence and cumulonimbus (CB) cloud forecasts, by the end of 2009. Subject to further endorsement at WAFSOPSG/5, WAFS workstation vendors, flight planning companies and users will be afforded at least 3 years of parallel GRIB1-GRIB2 broadcasting to facilitate migration of end-user systems to accept the new format, before the GRIB1 code-form forecasts are withdrawn.

The higher-resolution element of the GRIB2 code-form data will encapsulate 3-hourly time-step intervals T+6 to T+36 (presently 6-hourly) and a 1.25 degree latitude and longitude regular (*unthinned*) grid (presently 1.25 degree *thinned*). Due to the considerable increase in data volume by moving to higher temporal and spatial resolutions, the GRIB 2 WAFS data will be compressed on the SADIS (and ISCS) broadcasts.

Suggested action: *The sub-group is advised to monitor development of the GRIB2 code form WAFS upper-air forecasts, encompassing higher-resolution data and icing, turbulence and CB forecasts, through the WAFSOPSG.*

2.2 Improved WAFS forecasts for icing, turbulence and cumulonimbus clouds in the GRIB 2 code form

As expressed in 2.6 above, trial and evaluation versions of gridded icing, turbulence and cumulonimbus (CB) cloud forecasts in GRIB1 code-form have been available for download on SADIS FTP since October 2006. These products will eventually form part of the remit for GRIB2 WAFS upper-air forecasts as outlined in 3.3 above. The WAFSOPSG/4 meeting endorsed the further development of these automated SIGWX products, including the creation of high 'at a glance' products, algorithm alignment and systematic comparison of the WAFC London and WAFC Washington output, verification assessment, and generation of guidance for the (future) use of these products.

To facilitate the implementation of these new gridded WAFS forecasts, and in particular their visualisation, a workshop involving the WAFC Provider States, WAFS user States and users is tentatively planned for September 2009. A training package will be made available but the exact format of this training is still to be agreed by the WAFSOPSG.

Suggested action: *The sub-group is advised to monitor development of the automated icing, turbulence and CB forecasts through the WAFSOPSG, and monitor the development of a training package.*

2.3 **Establishment of a web-based distribution of WAFS forecasts**

The WAFSOPSG/4 meeting endorsed a proposal of the WAFC Provider States to develop a web-based interface (one from each WAFC) for the provision of a minimum set of WAFS charts – based on the automated gridded SIGWX forecasts for icing, turbulence and CB cloud and derived from the GRIB 2 code-form data, for intended use in flight documentation. The WAFC Provider States intend to make this new service available by the end of 2009. The service will be designed to be easily accessible, user friendly, and allow users the freedom to visualise a selection of products within the T+6 to T+36 time frames at 3-hourly intervals. The service will be targeted primarily at the least developed countries which may not be in a position to convert the GRIB and/or BUFR coded SIGWX forecasts into chart form.

Suggested action: *The sub-group is advised to monitor development of the web-based distribution of WAFS forecasts through the WAFSOPSG.*

2.4 **Use of concatenated WAFS forecasts for long-haul flights**

An ad-hoc group of the WAFSOPSG has been studying the feasibility of joining together (i.e. 'concatenating') wind/temperate and SIGWX charts containing up to 3 validity periods – to cater for the needs of long-haul flight operations. Whilst initial findings and feedback from a small number of users has been generally positive, the group noted some concerns regarding missing point data where two wind/temperature charts were joined, and observed discontinuities when SIGWX charts of differing validity were joined. With such discontinuities, users may not be able to get a clear understanding of the meteorological situation from the concatenated SIGWX chart.

A follow-up study is to be conducted by the ad-hoc group to determine the applicability of the use of concatenated visualisation as far as the new gridded forecasts for icing, turbulence and CB clouds are concerned. The findings are expected to be published at the WAFSOPSG/5 meeting. ICAO, in co-ordination with WMO, is also expected to develop Annex 3 enabling clauses for the provision of concatenated route-specific wind/temperature forecast – generated preferably from interpolating data from consecutive forecast times – for review by the WAFSOPSG/6 meeting.

Suggested action: *The sub-group is advised to monitor the progress of developing concatenated WAFS forecasts through the WAFSOPSG.*

2.5 Further development of WAFC Performance Indicators

The WAFC Provider States have been invited by the WAFSOPSG/4 meeting to assess the possibility of further developing the WAFC Performance Indicators – that are publicly available via URLs: http://www.metoffice.gov.uk/icao/index.html and http://www.emc.ncep.noaa.gov/gmb/icao/ncep_scores.html

The recommendations for improvements include wind and temperature performance indicators for a) the WMO defined verification area covering Australia and New Zealand; b) all standard levels; and c) in digital and chart format. The assessment of these proposals will be presented to the WAFSOPSG/5 meeting.

Suggested action: *The sub-group is advised to monitor the further development of the WAFC performance indicators through the WAFSOPSG.*

2.6 Corrections to WAFS SIGWX forecasts

As expressed in paragraph 2.1 above, Amendment 74 to ICAO Annex 3 eliminated the requirement for the WAFCs to issue *amendments* to the meteorological content of WAFS SIGWX forecasts. The WAFSOPSG/3 meeting however, called on the WAFC Provider States to undertake a study to assess the implications on WAFS users of a proposal to introduce WMO standards for issuance of *corrections* to SIGWX forecasts (BUFR and PNG chart form). The study, presented at WAFSOPSG/4, determined that substantial changes would be necessary at both provider and receiver (end-user) locations, with associated cost implications, if the proposals were adopted for implementation.

Given these remarks and the infrequent occurrence when SIGWX corrections would be required, the group concurred that a practical and minimal procedure to handle errors within SIGWX should be introduced. This procedure, to be implemented by WAFSOPSG/5, will be for the WAFCs to issue an administrative message/bulletin drawing attention to the error identified. The BUFR data and PNG charts themselves, which contain erroneous data, will not be re-issued due to the downstream implications detailed in the WAFSOPSG/4 report. User notification of the administrative message header(s) to be used for will be made through the WAFSOPSG Change Notice Board, at URL:

http://www.icao.int/anb/wafsopsg/WAFS%20change%20notice%20board.pdf

Suggested action: *Users are advised to monitor the WAFSOPSG website for details of the implementation of corrections to SIGWX forecasts by WAFC London and WAFC Washington. A minor software update may be required to accommodate reception and handling of the administrative message(s).*

2.7 Cessation of SADIS 1G satellite broadcast system

The SADIS first generation satellite broadcast system (SADIS 1G) has been in operation since the mid-1990's. Since the implementation of the SADIS second generation satellite broadcast system (SADIS 2G) in 2004, all existing SADIS 1G users have been advised to consider upgrading their SADIS VSAT receiving equipment to accept SADIS 2G, and all prospective new satellite broadcast users have been advise to procure a SADIS 2G receiving system. The SADISOPSG/13 meeting (27-29 May 2008) endorsed the cessation of the SADIS 1G service at the end of 2008, in view of the implementation of SADIS 2G. Any SADIS 1G users who have not migrated to SADIS 2G by that time are to consider utilisation of the SADIS FTP service as an interim measure until they have procured their SADIS 2G VSAT receiving system.

Suggested action: *Users of the legacy SADIS 1G service are strongly advised to consider procurement of a SADIS 2G receiver system upgrade, ahead of the planned cessation of SADIS 1G at the end of 2008. Any SADIS 1G users who have not migrated to SADIS 2G by that time are to consider utilisation of the SADIS FTP service as an interim measure until they have procured their SADIS 2G VSAT receiving system.*

2.8 **Enhancements to the SADIS FTP service**

The SADIS Provider (UK Met Office) has tabled a number of enhancements to the SADIS FTP service to improve service resilience and security. The SADISOPSG/13 endorsed a revised implementation plan for SADIS FTP enhancements, which will include dual server capability, and development of a SADIS FTP Secure service.

Enhanced capability of the SADIS FTP service to include dual server resilience is expected to be available by the SADISOPSG/14 meeting. In addition, the SADIS FTP Secure service will endorsement, be developed with a view to becoming operational towards the end of 2010. Initially, the SADIS FTP Secure service will be provided in parallel with the existing service. However, SADIS FTP Secure will eventually become the sole service after an overlapping period (yet to be determined). This will mean SADIS FTP end-users may require a workstation update to accommodate the enhanced security features of SADIS FTP Secure. Further details of the impact of these changes will be presented through the SADISOPSG.

Suggested action: *New and existing SADIS FTP users are invited to note the discussions of SADISOPSG in relation to SADIS FTP enhancements, with a view to determining the impact (if any) on their workstation arrangements.*

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ICAO Indicator	Aerodrome name	Country
	AOP aerodormes 30H TAF SADIS	
OPKC	KARACHI INTL	Pakistan
OPLA	LAHORE INTL	Pakistan
OPPS	PESHAWAR	Pakistan
PAFA	FAIRBANKS	USA
PANC	ANCHORAGE	USA
PACD	COLD BAY	USA
PAKN	KING SALMON	USA
PGUM	GUAM	USA
PHNL	HONOLULU	USA
RCKH	KAOHSIUNG INTERNATIONAL	China
RCTP	TAIPEI/CHIANG KAI SHEK	China
RJAA	NARITA	Japan
RJBB	OSAKA	Japan
RJCC	SAPPORO	Japan
RJCH	HAKODATE	Japan
RJGG	NAGOYA	Japan
RJSS	SENDAI	Japan
RKPC	JEJU	Republic of Korea
RKSI	SEOUL INCHEON INTL	Republic of Korea
RKSS	SEOUL GIMPO	Republic of Korea
ROAH	NAHA	Japan
VAAH	AHMEDABAD	India
RPLL	MANILA	Philippines
RPVM	CEBU	Philippines
UEEE	YAKUTSK	Russia
UHHH	KHABAROVSK	Russia
UHMM	MAGADAN	Russia
UHPP	PETROPAVLOVSK-KAMCHATSKY	Russia
UHSS	YUZHNO	Russia
VABB	MUMBAI/CHHATRAPATI SHIVAJI INT	India
VHHH	HONG KONG	Hong Kong (China)
VIAR	AMRITSAR	India
VIDP	DELHI/INDIRA GANDHI	India
VMMC	MACAU	Macao (China)
VTBD	BANGKOK	Thailand
VTBS	BANGKOK/SUVARNABHUMI INTL	Thailand
VTCC	CHIANG MAI	Thailand
VTSP	PHUKET	Thailand
VVTS	HOCHIMINH/TANSONNHAT	Viet Nam

WAAA	UJUNG PANDANG	Indonesia
WABB	BIAK	Indonesia
WALL	BALIKPAPAN	Indonesia
WAMM	MANADO	Indonesia
WIII	JAKARTA/SOEKARNO HATTA	Indonesia
WMKK	KUALA LUMPUR SEPANG	Malaysia
WMSA	KUALA LUMPUR/SUBANG	Malaysia
WSSS	SINGAPORE/CHANGI	Singapore
YBBN	BRISBANE	Australia
YMML	MELBOURNE	Australia
YPAD	ADELAIDE	Australia
YPDN	DARWIN	Australia
YPPH	PERTH INTL	Australia
YSSY	SYDNEY / KINGSFORD SMITH	Australia
ZBAA	BEIJING/CAPITAL	China
ZBTJ	TIANJIN/BINHAI	China
ZGGG	GUANGZHOU/BAIYUN	China
ZGSZ	SHENZHEN BAOAN	China
ZMUB	ULAAN BAATAR	Mongolia
ZPPP	KUNMING WUJIABA	China
ZSPD	SHANGHAI PUDONG	China
ZWSH	KASHI	China
ZWWW	URUMQI	China
Non-AOP aerodormes 30H TAF SADIS		
ZJHK	HAIKOU/MEILAN	China
PADK	ADAK	USA
PASY	SHEMYA	USA
PMDY	MIDWAY	USA
PWAK	WAKE IS	USA
VOHS	HYDERABAD	India

ICAO Indicator	**Aerodrome name**	**Country**
	AOP aerodormes 24H TAF SADIS	
RJTT	HANEDA	Japan
YPPD	PORT HEADLAND	Australia

TABLE MET 1A - METEOROLOGICAL SERVICE AT AERODROMES

EXPLANATION OF THE TABLE

Column

1 Name of the aerodrome or location where service is required.

2 Designation of the aerodrome.

RS = international scheduled air transport, regular use
RNS = international non-scheduled air transport, regular use
RG = international general aviation, regular use
AS = international scheduled air transport, alternate use

3 ICAO location indicator of the aerodrome.

4 Name of the meteorological office responsible for the provision of meteorological service at the aerodrome concerned.

5 ICAO location indicator of the responsible meteorological office.

6 Requirement for trend forecasts.

7 Requirement for TAF with period of validity of 24 hours

8 Requirement for TAF with period of validity of 30 hours

9 Availability of OPMET information for the aerodrome:

"24" - OPMET data as listed issued for the aerodrome all through the 24-hour period

"P" – (part time) OPMET data as listed not issued for the aerodrome for the entire 24-hour period

"N" – (not available) No OPMET data issued for the time being

Aerodrome/location where service is required			Responsible MET office		Forecasts to be provided			Issuance of OPMET info
Name	**ICAO loc ind**	**Desig-nation**	**Name**	**ICAO loc ind**	**Trend**	**TAF 24 H**	**TAF 30 H**	
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
AUSTRALIA								
ADELAIDE/ADELAIDE INTL	YPAD	RS	ADELAIDE/ADELAIDE INTL	YPAD			Y	24
ALICE SPRINGS	YBAS	AS	DARWIN/DARWIN INTL	YPDN				24
BRISBANE/BRISBANE INTL	YBBN	RS	BRISBANE/BRISBANE INTL	YBBN	Y		Y	24
CAIRNS/CAIRNS INTL	YBCS	RS	TOWNSVILLE/TOWNSVILLE INTL	YBTL	Y	Y		24
CHRISTMAS ISLAND	YPXM	RS	PERTH/PERTH INTL	YPPH		Y		24
COCOS (KEELING) ISLAND INTL	YPCC	RS	PERTH/PERTH INTL	YPPH				24
DARWIN/DARWIN INTL	YPDN	RS	DARWIN/DARWIN INTL	YPDN	Y		Y	24
HOBART	YMHB	RS	HOBART	YMHB		Y		24
MELBOURNE/MELBOURNE INTL	YMML	RS	MELBOURNE/MELBOURNE INTL	YMML	Y		Y	24
NORFOLK ISLAND INTL	YSNF	RS	SYDNEY/SYDNEY (KINGSFORD SMITH) INTL	YSSY	Y	Y		24
PERTH/PERTH INTL	YPPH	RS	PERTH/PERTH INTL	YPPD	Y		Y	24
PORT HEDLAND	YPPD	RS	PORT HEDLAND	YPPD				24
ROCKHAMPTON	YBRK	AS	BRISBANE/BRISBANE INTL	YBBN				24
SYDNEY/SYDNEY (KINGSFORD SMITH) INTL	YSSY	RS	SYDNEY/SYDNEY (KINGSFORD SMITH) INTL	YSSY	Y		Y	24
TINDAL	YPTN	RS	DARWIN/DARWIN INTL	YPDN				24
TOWNSVILLE/TOWNSVILLE INTL	YBTL	RS	TOWNSVILLE/TOWNSVILLE INTL	YBTL	Y	Y		24

AMENDMENT PROPOSAL TO
TAF-RELATED PROVISIONS IN THE ASIA/PAC BASIC ANP

The current provision about TAF in the Basic ANP reeds as follows:

> Aerodrome forecasts should be issued as TAF, normally at intervals of six hours, with the period of validity beginning at one of the main synoptic hours (00, 06, 12, 18 UTC). The period of validity should be of eighteen or twenty-four hours' duration to meet the requirements indicated in Table MET 1A. The filing time of the forecasts should be approximately two hours before the start of the period of validity.
> [ASIA/PAC/3, Rec. 8/16]

The proposed new text is:

> TAF should be issued at intervals of six hours, with the period of validity beginning at one of the main synoptic hours (00, 06, 12, 18 UTC). The period of validity should be of 24 or 30 hours to meet the requirements indicated in FASID Table MET 1A. The filing time of the TAF bulletins should be one hour before the start of the period of validity.
> [APANPIRG/19 Conclusion 19/xx]

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ASIA/PAC PLAN FOR IMPLEMENTATION OF NEW TAF PROVISION

Note: In order to comply with the Basic ANP, the filing time shall be 1 hour before the start of the period of validity.

ROBEX Centre		TAF Bulletin					
Name	**CCCC**	**Bul No.**	**CCCC**	**Aerodrome**	**Filing Time**	**Start of Validity**	**TAF Validity**
Bangkok	**VTBB**	**FTAE31**	VTBS	BANGKOK/Suvarnabhumi Intl	0400	0600	24
			VTBD	BANGKOK/Donmueang	1000	1200	24
			VTBU	RAYONG/U-Taphao	1600	1800	24
			VTCC	CHIANG MAI/Chiang Mai Intl	2200	0000	24
			VTSS	SONGKHLA/Hat Yai			24
			VTSP	PHUKET/Phuket Intl			24
			VGZR	DHAKA/Sia Intl			24
			VLVT	VIENTIANE/Wattay *			18
				* Issues valid 0400/1000/2200 only			
		FTAE32	VDPP	PHNOM PENH/Phnom Penh *	0400	0600	18
			VVTS	HO CHI MIN/Tan Son Nhat Intl	1000	1200	18
			VVNB	HA NOI /Noibai Intl	1600	1800	18
			VVDN	DA NANG/Da Nang Intl	2200	0000	18
			VYYY	YANGON/Yangon Intl			24
			VYMD	MANDALAY/Mandalay Intl **			24
			VDSR	SIEM REAP *			18
				* Issues valid 0400/1000/2200 only			
				** Issues valid 0400/1000 only			
		FTTH31	VTCT	CHIANG RAI/Chiang Rai Intl *	0400	0600	24
			VTCL	LAMPANG	1600	1800	24
					Note: issued twice per day		
			VTCN	NAN			24
			VTCP	PHRAE			24
			VTCH	MAE HONGSON			24
			VTPM	TAK/Mae Sot			24
			VTPP	PHITSANULOK/Phitsanulok			24
			VTPT	TAK			24
			VTPO	SUKHOTHAI			24
			VTPB	PETCHABUN			24

				* Issued 0400/1000/1600/2200			
		FTTH32	VTSB	SURAT TANI/Surat Thani	0400	0600	24
			VTSM	SURATHANI/Samui	1600	1800	24
					Note: issued twice per day		
			VTSC	NARATHIWAT			24
			VTSK	PATTANI			24
			VTST	TRANG			24
			VTSR	RANONG			24
			VTSF	MAKHON SI THAMARAT			24
			VTSH	SONGKHLA			24
			VTSE	CHUMPON			24
			VTSG	KRABI *			24
				* Issued 0400/1000/1600/2200			
		FTTH33	VTUD	UDON THANI	0400	0600	24
			VTUI	SAKON HAKHON/Ban Khai	1600	1800	24
					Note: issued twice per day		
			VTUK	KHON KHAEN			24
			VTUU	UBON RATCHATANI *			24
			VTUL	LOEI			24
			VTUO	BURI RAM			24
			VTUW	NAKHON PHANOM			24
			VTUQ	NAKHON RATCHASIMA/Khorat			24
			VTUV	ROI ET			24
			VTUJ	SURIN			24
				* Issued 0400/1000/1600/2200			
Beijing	**ZBBB**	**FTCI31**	ZBAA	BEIJING/Capital	0400	0600	24
			ZBSJ	SHIJIAZHUANG/Zhengding	1000	1200	24
			ZBTJ	TIANJING/Binhai	1600	1800	24
			ZBYN	TAIYUAN/Wusu	2200	0000	24
			ZGGG	GUANGZHOU/Baiyun			24
			ZSHC	HANGZHOU/Xiaoshan			24
			ZSPD	SHANGHAI/Pudong			24
			ZSSS	SHANGHAI/Hongqiao			24
			ZWSH	KASHI/Kashi			24
			ZWWW	URUMQI/Diwopu			24
			ZYTL	DALIAN/Zhoushuizi			24

			ZYTX	SHENYANG/Taoxian			24
		FTCI32	ZGKL ZGNN ZGOW ZGSZ ZLXY ZMUB ZPPP ZSAM ZSQD ZUUU	GUILIN/Liangjiang NANNING/Wuxu SHANTOU/Shantou SHENZHEN/Bao'an XIAN/Xianyang ULAANBAATOR/Bryant-Ukhaa KUNMING/Wujiaba XIAMEN/Gaoqi QINGDAO/Liuting CHENGDU/Shuangliu	0400 1000 1600 2200	0600 1200 1800 0000	24 24 24 24 24 24 24 24 24 24
		FTCI41	ZBHH ZGHA ZHCC ZHHH ZJHK ZJSY ZLLL ZSNJ ZSOF ZUCK ZYCC ZYHB	HOHHOT/Baita CHANGSHA/Huanghua ZHENGZHOU/Xinzheng WUHAN/Tianhe HAIKOU/Meilan SANYA/Phoenix LANZHOU/Zhongchuan NANJING/Lukou HEFEI/Luogang CHONGQING/Jiangbei CHANGCHUN/Dafangshen HARBIN/Taiping	0400 1000 1600 2200	0600 1200 1800 0000	24 24 24 24 24 24 24 24 24 24 24 24
Brisbane	**YBBN**	**FTAU31**	YPAD YBBN YPDN YMML YPPH YSSY	Adelaide/Adelaide Brisbane/Brisbane Darwin/Darwin Melbourne/Melbourne Intl Perth/Perth Sydney/Kingsford Smith Intl	0500 1100 1700 2300	0600 1200 1800 0000	30 30 30 30
		FTAU32	YBAS YMAV YBCS	Alice Springs/Alice Springs Avalon/Avalon Cairns/Cairns	0500 1100 1700	0600 1200 1800	24 24 24

			YSCB	Canberra/Canberra	2300	0000	24
			YPKG	Lkalgoorlie/Kalgoorlie			24
			YPLM	Learmonth/Learmonth			24
			YPTN	Tindal/Tindal RAAF			24
			YBTL	Townsville/Townsville			24
		FTAU33	YBRM	Broome/Broome Intl	0500	0600	18
			YPXM	Christmas Island/Christmas Isld	1100	1200	18
			YPCC	Cocos Island/Cocos Island	1700	1800	18
			YBCG	Coolangatta/Coolangatta	2300	0000	18
			YSDU	Dubbo/Dubbo			18
			YMLT	Launceston/Launceston			18
			YPEA	Pearce/Pearce RAAF			18
			YPPD	Port Hedland/Port Hedland			18
			YSRI	Richmond NSW/Richmond RAAF			18
			YBRK	Rockhampton/Rockhampton			18
			YWLM	Williamtown/Williamtown RAAF			18
			YMHB	Hobart/Hobart			18
			YMLT	Launceston/Launceston			18
			YSNF	Norfolk Island/Norfolk Island			18
		FTAU34	YAMB	Amberley/Amberley RAAF	0100	0200	12
			YCIN	Curtin-Derby/Curtin RAAF	0700	0800	12
			YFRT	Forrest/Forrect	1300	1400	12
			YPGV	Gove/Gove	1900	2000	12
			YBHM	Hamilton Isld/Hamilton Isld			12
			YBMA	Mount Isa/Mount Isa			12
			YPKU	Kunnurra/Kunnunurra			12
		FTTM31	WPDL	DILI/Komoro	0100	0200	12
					0700	0800	
					1300	1400	
					1900	2000	
		FTNG31	AYPY	Port Moresby	0445	0600	24
			ANYN	Nauru	1045	1200	24

			AGGH	Honiara	1645 2245	1800 0000	24
Hong Kong	**VHHH**	**FTHK31**	VHHH RCTP RCKH RCSS VMMC RPLL RPVM RPMD RPLB RPMZ RPLI	HONG KONG/Hong Kong Intl TAIBEI/Taiwan Taoyuan Intl GAOXIONG/Gaoxiong TABEI/Sungshan MACAU/Macau Intl MANILA/Ninoy Aquino Intl LAPU LAPU/Mactan Cebu Intl DAVAO/Francisco Bangoy Intl SUBIC BAY/Subic Bay Intl ZAMBOANGA/Zamboanga Intl LAOAG/Laoag Intl	0400 1000 1600 2200	0600 1200 1800 0000	30 30 30 24 30 24 24 24 24 24 24
Incheon	**RKSI**	**FTKO31**	RKSI RKSS RKPC RKPK RKTU RKNY RKTN	INCHEON/Incheon GIMPO/Gimpo JEJU/Jeju GIMHAE/Gimhae CHEONGJU/Cheongju YANGYANG/Yangyang DAEGU/Daegu	0500 1100 1700 2300	0600 1200 1800 0000	30 24 24 24 24 24 24
Karachi	**OPKC**	**FTPK31**	OPKC OPRN OPLA OPNH OPPS OPGD	KARACHI/Jinnah Intl ISLAMABAD/Chaklala LAHORE/Allama Iqbal Intl NAWABSHAH/Nawabshah PESHWAR/Peshwar GWADAR/Gwadar	0400 1000 1600 2200	0600 1200 1800 0000	18 18 18 18 18 18
Mumbai	**VABB**	**FTIN31**	VAAH VABB VANP VECC VEPT	AHMEDABAD/Ahmedabad MUMBAI/Chhatrapayi Shivaji Intl NAGPUR/Nagpur KOLKATA/Netaji Subhash Chandra Bose Intl PATNA/Patna	0400 1000 1600 2200	0600 1200 1800 0000	30 30 30 30 30

			VIAR	AMRITSAR/Amritsar			30
			VIBN	VARANASI/Varanasi			30
			VIDP	DELHI/Indira Gandhi Intl			30
			VIJP	JAIPUR/Jaipur			30
			VILK	LUCKNOW/Lucknow			30
		FTIN32	VCBI	COLOMBO/Katunayake	0400	0600	30
			VNKT	*KATHMANDU/Tribhuvan Intl **	1000	1200	*24*
			VOCI	COCHIN/Cochin	1600	1800	30
			VOCL	CALICUT/Calicut	2200	0000	30
			VOHY	HYBERABAD/Hyderabad			30
			VOMM	CHENNAI/Chennai			30
			VOTR	TIRUCHCHIRAPALLI/Tiruchchirapalli			30
			VOTV	TRIVANDRUM/Trivandrum			30
			VRMM	*MALE/Male Intl **			*24*
				* Not confirmed part of bulletin			
Nadi	**NFFN**	**FTPS31**	NFFN	Nadi, Fiji	0400	0600	24
			NWWW	*NOUMEA/La Tontouta **	1000	1200	*24*
			NSTU	*PAGO PAGO/Pago Pago Intl **	1600	1800	*24*
			NCRG	RAROTONGA, Cook Isld	2200	0000	24
			PLCH	*Christmas Isld, Kirrabati*			24
			NGTA	BONRIKI, Kirribati			24
			NIUE	NIUE INTL, New Zealand			24
			NSFA	FALEOLO, Samoa			24
			NFTF	FAU'AMOTU, Tonga			24
			NFTV	VAVA'U, Tonga			24
			NVVV	*PORT VILLA/Bauerfield **			*24*
			NVSS	*SANTO/Pekoa **			*24*
			NFNA	NAUSORI, Fiji			24
			NLWW	HIHIFO, Wallis (Fr)			24
			NSAP	APIA, Samoa			24
			NGFU	FUNAFUTI INTL, Tuvalu			24
				* Not confirmed part of bulletin			
Singapore	**WSSS**	**FTSR31**	WSSS	SINGAPORE/Changi	0400	0600	30
			WSAP	PAYA LEBAR/Paya Lebar (RSAF)	1000	1200	30

			WSSL	SELETAR	1600	1800	30
			WAAA	UJUNG PANDANG/Hasanuddin	2200	0000	24
			WABB	BIAK/Frans Kaisieppo			24
			WADD	BALI/Ngurah Rai (Bali Intl)			24
			WARR	SURABAYA/Juanda			24
			WIIH	JAKARTA/Halim			24
			WIII	JAKARTA/Soekamo-Hatta			24
			WIMM	MEDAN/Polonia			24
		FTSR32	WMKJ	JOHOR BAHUR/Sultan Ismail	0400	0600	24
			WMKK	SEPANG/Kuala LumpurL Intl	1000	1200	24
			WMKL	PULAU LANGKAWI/Pulau Langkawi Intl	1600	1800	24
			WMKM	MALACCA/Malacca	2200	0000	24
			WMKP	PENANG/Penang Intl			24
			WMSA	SUBANG/Sultan Abdul Aziz Shah			24
		FTSR33	WBSB	BANDAR SERI BEGAWAN/Brunei Inlt	0400	0600	24
			WBGB	BINTULU	1000	1200	24
			WBGG	KUCHING/Kunching Intl	1600	1800	24
			WBGR	MIRI	2200	0000	24
			WBGS	SIBU			24
			WBKK	KOTA KINABALU/Kota Kinabalu Intl			24
			WBKL	LABUAN *RMAF)			24
			WBKS	SANAKAN			24
			WBKW	TAWAU/Tawau			24
Tokyo	**RJTD**	**FTJP31**	RJAA	TOKYO/Narita Intl	0200	0300	27
			RJBB	KANSAI/Kansai Intl	0800	0900	27
			RJTT	TOKYO/Tokyo Intl	1400	1500	27
			RJOO	OSAKA/Osaka Intl	2000	2100	27
			ROAH	NAHA/Haha			27
			RJCH	HAKODATE/Hakodate			27
			RJSS	SENDAI/Sendai			27
		FTJP32	RJFF	FUKUOKA/Fukuoka	0200	0300	27

			RJGG	NAGOYA/Chuba Centrair Intl	0800	0900	27
			RJCC	SAPPORO/New Chitose	1400	1500	27
			RJFK	KAGOSHIMA/Kagoshima	2000	2100	27
			RJSN	NIGATA/Nigata			27
			RJFU	NAGASAKI/Nagasaki			27
			RJFT	KUMAMOTO/Kumamoto			27
			RJOA	HIROSHIMA/Hitoshima			27
			RJOB	OKAYAMA/Okayama			27
			RJOT	TAKAMATSU/Takamatsu			27
			RJFO	OITA/Oita			27
			RJNT	TOYAMA/Toyama			27
			RJNK	KANAZAWAK/Komatsu			27
Wellington	**NZKL**	**FTNZ31**	NZWN	WELLINGTON/Wellington Intl	0445	0600	24
			NZAA	AUCKLAND/Auckland Intl	1045	1200	24
			NZCH	CHRISTCHURCH/Christchurch Intl	1645	1800	24
					2245	0000	

Note: In order to comply with the Basic ANP, the filing time shall be 1 hour before the start of the period of validity

3. RESULTS OF THE SURVEY

3.1 IATA Response

Airlines operating in the Asia/Pacific Regions	Is the TAF in VOLMET useful?		Comments
	Yes	No	
Malaysian Airlines	Y		VOLMET is backup for ACARS & SATCOM
Singapore Airlines	Y		VOLMET is backup for ACARS
All Nippon Airlines	Y		VOLMET is backup system
Cathay Pacific Airways	Y		VOLMET is backup system
Air New Zealand	Y		B767 fleet does not have ACARS & SATCOM
Continental Airways		N	VOLMET not used
British Airways	Y		
United Airlines	Y		B757 Fleet has only HF comms
Eva Air	Y		VOLMET is backup information
Korean Air	Y		VOLMET is useful backup info
KLM Airlines	Y		VOLMET is backup for ACARS
Thai Airways	Y		Backup for ACARS & SATCOM
China Airlines	Y		Backup for ACARS
Air France	Y		Backup in case of ACARS failure
Japan Airlines	Y		VOLMET backup for ACARS
Fedex	Y		Backup for ACARS
Air Canada	Y		VOLMET backup for ACARS

3.2 IFALPA Response

The IFALPA response by Captain Stu Julian was very considered and informative in regard to a pilot's use of TAF during flights in a number of classes of aircraft and I consider that it is relevant to the discussion by the Region on the use of 30-hour TAF. As such I have appended Captain Julian's comments as Attachment A for the interest of members.

3.3 IFALPA represents 18 member associations in Asia/Pacific (18 Contracting States), who nominate that TAF in VOLMET is useful. IFALPA commented that VOLMET is a primary in-flight source of MET information for a large proportion of jet transport aircraft and secondary source of MET information for SATCOM equipped aircraft. HF remains required dispatch system for long range operations. SATCOM is not required for dispatch under MEL (25-1) within 180 minutes ETOP's.

3.4 Responses of surveys conducted by OPMET TF team members.

Singapore RODB

TAF in VOLMET Survey - conducted by RODB Singapore in Apr 2008

Airlines Operating @ Changi Airport	**Is the TAF in VOLMET useful**		**Other Comments**
	Yes	No	
Singapore Airlines	√		NIL
China Airlines	√		NIL
Shanghais Airlines Cargo	√		NIL
Qantas Airways		√	Cpt Hewitt
	√		Cpt S Adamson - TAF is useful but not critical
	√		Cpt William - for backup purpose
		√	Cpt S Johnsone - 30 hrs ahead seems too long
		√	Cpt W Spalding
	√		Cpt K Peter
	√		Cpt E.R. Bradley
Japan Airlines	√		One valid TAF 30hr is enough to contain the forecast covering shorter period to 9 hr TAF. We suggest you omit the forecast longer than first 9 hrs from the 30hr TAF in the VOLMET.
Jetstar Asia	√		Cpt Seng C G
	√		Cpt Zhao A Q
	√		Cpt Alejandro C
	√		SFO Yong J
	√		SFO Lewis Shan
	√		Cpt Heng S L
	√		Cpt Chen S
British Airways	√		SFO Keen
	√		Cpt W Borke
	√		Cpt B Ken

Total 21
No 3 14.3%
Yes 18 85.7%

Metservice New Zealand
Air New Zealand, Air Pacific, Air Vanuatu, Air Tahiti Nui, all require TAF to be included in the Auckland VOLMET.

Fiji RODB
Stated that they were looking at starting VOLMET and airlines using Fiji would require TAF in VOLMET

Hong Kong Observatory
Cathay Pacific had no problem with removal of TAF, other airlines no response.

Australia – Bureau of Meteorology/ Airservices Australia
There is no TAF in the Australian VOLMET only TREND, except Cairns where the TAF is used during periods when no TREND is issued.
Qantas Airways, Virgin Blue, Jetstar and Singapore Airways required TAF in VOLMET where it was available.

ATTACHMENT A

9th June 2008

Dear Mr. Mokhtar A. Awan

Thank you for your letter email and request for the IFALPA input on the subject of VOLMET and the proposed removal of TAF from VOLMET.

I have raised this Survey and the general issue of VOLMET with my IFALPA Representatives and the overriding response is that it is a premature decision to take to remove current TAF’s from VOLMET.

The results of the VOLMET survey highlight a number of important aspects which are multileveled. For example VOLMET is an in-flight MET Product with a typical mission time remaining of up to 12 hours so that relevant meteorological related to the enroute alternates, the destination and the destination alternate become the primary focus for a “how goes it” should a diversion be required. A 30 hour TAF does not have a current in flight focus or use to the flight crew. The TAF for an enroute alternate at the beginning of a long haul flight is of primary focus as compared to that of the distant alternate; however the destination TAF will remain important for the entire flight so that any deviations from the departure forecast can be managed safely and efficiently. The focus therefore is in the 3-9 hours window for most flights and within 12 hours for the remaining flights.

The need to access this meteorological information in flight can be via two mediums. Those two mediums are voice or data. The method of transmission in long range operations also comes in two forms, HF or SATCOM. If the commercial jet aircraft that are operating more than 180 minutes from a suitable airport SATCOM is a required despatch communication device, however HF also remains a required communication link as the minimum regulatory level of required onboard communication. The only required long range communications system for any long range flight is an HF radio; therefore this is the minimum regulatory standard for communication. It is common practice as a result of the requirements under Annex 6 at 4.4.1 for commercial jet aircraft to use TAF’s to ensure the safe and efficient operation of that flight in respect of current meteorological information relevant to the enroute, destination and alternate phases of that flight and at the estimated time of landing. Therefore the concept of removing TAF’s from VOLMET raises the issue of adversely impacting the safe and efficient operations of commercial jet aircraft and also raises the spectre of increasing costs to the operation by requiring SATCOM for all TAF reporting. This applies not only to the Asia Pacific based airlines but all those airlines from around the world that fly to, from and within the Asia Pacific region.

Every air line pilot would like to enjoy the benefits that SATCOM delivers to all commercial jet aircraft operations and IFALPA will endeavour to achieve that minimum entry level however this is not the current regulatory required standard except for the beyond 180 minutes ETOPS aircraft which are currently few in number and few in operations. Whilst this beyond 180 minutes operations is forecast to expand it will take some time before this becomes the significant portion of commercial jet operations. The feedback that IFALPA has is that even with SATCOM equipped aircraft, pilots via there Airline management recommendations are encouraged to use VOLMET as this is a more cost effective solution than the use of SATCOM for the current time. All the non SATCOM equipped commercial jet aircraft which are still engaged in the long haul jet fleet use HF as both their primary and secondary source of communication. This means that TAF’s from the VOLMET become a critical part to the safe and efficient operation of that flight

Clearly over the next 20 years the commercial jet transport fleet will change in number and makeup. Both Boeing and Airbus produce detailed analysis of growth so it is interesting to note that the aircraft population that will need a 30 hour TAF product will be by far in the minority and likely to remain in the minority of the world fleet for some time to come. The 30 hour TAF as a flight planning tool is a welcome product for use in the Ultra Long Range (ULR) flights which by definition is greater than 16 hours flight time. It is interesting to consider the ULR proportion of flights as compared to both short and long haul flights. The use of aircraft populous provides a coarse measure with which to gauge exposure. For example single isle jet aircraft are used for short haul operations so that those flight operations do not require 30 hour TAF's and in fact these longer TAF's may introduce human factors related problems when these Meteorological products are used for short haul flights due to complexity of determining what is relevant to the impending flight given the often frequent and tight timetabling of these operations. The twin isle (wide body) aircraft population growth for long haul aircraft are about 30% of the number of the forecast single isle (short haul) fleet and combined with the fact that this single isle fleet will conduct more sectors typically up to 8 times per day as compared to the twin isle long haul fleet the need for current and up to date TAF's is in favour of the single isle fleets by a very large percentage. Boeing and Airbus both see a market over the next 20 years for over 28,000 new jet aircraft and both see the mix at about 17,000 single isle jets, about 7,000 twin isle jets and about 4,000 regional jets. The turbo prop operations are not considered in this mix but that would fall within the short haul fleet as additional numbers. Of those twin isle jets the manufactures see a population of half that number as ULR compatible. In summary out of a new jet fleet delivery of 28,000 over 24,500 (28,000 – 3500) commercial jet are not going to require 30 hour TAF's and of that 24,500 new jet fleet some 17,000 jets will conduct multiple sectors requiring the most up to date TAF information prior to each sector. This can easily be extrapolated that shorter hour TAFs will be in the highest demand and 30 hour TAF's will be in the least demand. Clearly both ends of the meteorological products will be in demand and the as acknowledged the 30 hour TAF is a welcome new product but this needs to be kept in perspective for now and the foreseeable growth in the next 20 years.

In summary IFALPA appreciates the opportunity to comment and provide some survey feedback to the ICAO Regional Office in Bangkok on the matter of the proposal to withdraw TAF's from VOLMET. IFALPA believes that this is a premature decision to remove TAF's from VOLMET. The removal of TAF's from VOLMET would adversely impact the safe and efficient operations of commercial jet aircraft flights. The use of VOLMET is used as a cost effective tool on SATCOM equipped commercial jet aircraft. The use of 30 hour TAF product is primarily limited to pre flight use for ULR aircraft operations which whilst this is a significant volume of flights it will remain none the less be a small population of the total population of commercial jet flights requiring TAF's prior to departure. Therefore 30 hour TAF's will not feature in any in-flight use by a majority of commercial jet operations.

I look forward to the positive progress of this very important matter.

Yours sincerely

Stu Julian

Captain Stu Julian
EVP Asia Pacific
IFALPA

PROPOSED SIGMET EXAMPLES FOR
UPDATING THE ASIA/PACIFIC REGIONAL SIGMET GUIDE

1. SIGMETs for severe turbulence

1.1 At 1358 UTC, an aircraft report of moderate turbulence in clear air in the HONG KONG FIR was received by VHHH. Considering the presence of meteorological factors favourable to the intensification of turbulence, severe turbulence is forecast over the area concerned. As the intensity of the aircraft report is not severe, "SEV TURB OBS" should not be used (and issuance of special air-report is not required). Instead, "SEV TURB FCST" is to be used. A SIGMET with the beginning of the period of validity coinciding with the time of commencement of the phenomenon (SIGMET Guide Section 3.4.3.1.3) is to be issued:

WSSS20 VHHH 071410
VHHK SIGMET 1 VALID 071410/071800 VHHH-
VHHK HONG KONG FIR SEV TURB FCST N OF N2200 E OF E11330
FL300/400 MOV E 10KT INTSF=

1.2 If the intensity of the turbulence reported by the aircraft is severe, "SEV TURB OBS" should be used:

WSSS20 VHHH 071410
VHHK SIGMET 1 VALID 071410/071800 VHHH-
VHHK HONG KONG FIR SEV TURB OBS AT 1358Z
N OF N2200 E OF E11330 FL300/400 MOV E 10KT INTSF=

2. SIGMETs for tropical cyclones (TCs) and associated thunderstorms

2.1 At 0200 UTC, TC Pabuk (with 10-minute mean surface wind speed of 34 knots or more) is observed by VHHH. The centre of Pabuk is observed outside the HONG KONG FIR but is expected to enter the HONG KONG FIR at 0400 UTC. As the TC has not yet been observed in the HONG KONG FIR, "FCST" should be used instead of "OBS" (SIGMET Guide Section 3.4.5.3). A TC SIGMET with a period of validity commencing at 0400 UTC for a maximum period of 6 hours (SIGMET Guide Section 3.4.2.3), and providing two forecast locations of the TC centre, pertaining to the beginning and end of the validity period respectively, is to be issued:

WCSS20 VHHH 080200
VHHK SIGMET 3 VALID 080400/081000 VHHH-
VHHK HONG KONG FIR TC PABUK FCST N2224 E11730
CB TOP FL450 WI 240NM OF CENTRE MOV W 15KT NC
FCST 1000Z TC CENTRE N2224 E11600=

2.2 Before the commencement of the TC SIGMET, a thunderstorm SIGMET for warning thunderstorms associated with the TC affecting the HONG KONG FIR, if warranted, should be issued:

WSSS20 VHHH 080155
VHHK SIGMET 2 VALID 080155/080555 VHHH-
VHHK HONG KONG FIR EMBD TS FCST N OF N20 E OF E114
TOP FL450 MOV W 15KT INTSF=

2.3 At 0400 UTC, the TC SIGMET issued above, viz. SIGMET 3, would become effective. The thunderstorm SIGMET, viz. SIGMET 2, should be cancelled:

WSSS20 VHHH 080400
VHHK SIGMET 4 VALID 080400/080555 VHHH-
VHHK HONG KONG FIR CNL SIGMET 2 080155/080555=

2.4 However, if the time for the TC to enter the HONG KONG FIR turns out to be later than 0400UTC, the thunderstorm SIGMET, viz. SIGMET 2, should be kept while the TC SIGMET, viz. SIGMET 3, should be updated to reflect the latest assessment, e.g. validity period.

2.5 At 1630 UTC, the centre of TC Pabuk is observed within HONG KONG FIR but it is expected to weaken into a tropical depression (with 10-minute mean surface wind speed of less than 34 knots) at 2100 UTC. A TC SIGMET with a period of validity commencing at 1630 UTC and ending at 2100 UTC is to be issued:

WCSS20 VHHH 081630
VHHK SIGMET 13 VALID 081630/082100 VHHH-
VHHK HONG KONG FIR TC PABUK OBS AT 1500Z N2218 E11612
CB TOP FL450 WI 240NM OF CENTRE MOV W 15KT WKN
FCST 2100Z TC CENTRE N2200 E11424=

2.6 However, if it turns out that TC Pabuk has already weakened into a tropical depression at 1800 UTC, SIGMET 13 should be cancelled and a thunderstorm SIGMET for warning thunderstorms associated with the TC affecting the HONG KONG FIR, if warranted, should be issued:

WSSS20 VHHH 081800
VHHK SIGMET 14 VALID 081800/082200 VHHH-
VHHK HONG KONG FIR EMBD TS FCST N OF N2000
TOP FL450 MOV W 15KT WKN=

WCSS20 VHHH 081800
VHHK SIGMET 15 VALID 081800/082100 VHHH-
VHHK HONG KONG FIR CNL SIGMET 13 081630/082100=

3. SIGMETs for Volcanic Ash

EXAMPLE 1

WVID21 WAAA 140600
WAAZ SIGMET B01 VALID 140600/141200 WAAA-
WAAZ UJUNG PANDANG FIR VA ERUPTION MT SOPUTAN LOC N0107 E12443
VA CLD OBS AT 0600Z APRX SFC/FL200 N0110 E12440 - N0155 E12455 - N0130 E12530 - N0110 E12440 MOV NE 10KT
FCST 1200Z VA CLD APRX SFC/FL200 N0110 E12440 - N0230 E12455 - N0135 E12605 - N0110 E12440

WVID21 WAAA 140800
WAAZ SIGMET B02 VALID 140800/141400 WAAA-
WAAZ UJUNG PANDANG FIR VA ERUPTION MT SOPUTAN LOC N0107 E12443
VA CLD OBS AT 0800Z APRX SFC/FL200 N0110 E12440 - N0155 E12455 - N0130 E12530 -

N0110 E12440 MOV NE 10KT APRX FL200/FL350 N0200 E12345 - N0300 E12410 - N0310 E12250 - N0200 E12230 - N0200 E12345 MOV NW 25KT
FCST 1400Z VA CLD APRX SFC/FL200 N0110 E12440 - N0230 E12455 - N0135 E12605 - N0110 E12440 APRX FL200/FL350 N0200 E12245 - N0320 E12305 - N0345 E12115 -N0220 E12115 - N0200 E12245

WVID21 WAAA 141100
WAAZ SIGMET B03 VALID 141100/141400 WAAA-
WAAZ UJUNG PANDANG FIR CNL SIGMET B02 140800/141400

EXAMPLE 2

WVID21 WAAA 140600
WAAZ SIGMET A01 VALID 140600/141200 WAAA-
WAAZ UJUNG PANDANG FIR VA ERUPTION MT SOPUTAN LOC N0107 E12443
VA CLD OBS AT 0600Z APRX SFC/FL200 N0110 E12440 - N0155 E12455 - N0130 E12530 - N0110 E12440 STNR
FCST 1200Z VA CLD APRX SFC/FL200 N0110 E12440 - N0155 E12455 - N0130 E12530 -N0110 E12440

WVID21 WAAA 141100
WAAZ SIGMET A02 VALID 141200/141800 WAAA-
WAAZ UJUNG PANDANG FIR VA ERUPTION MT SOPUTAN LOC N0107 E12443
VA CLD OBS AT 1100Z APRX SFC/FL200 N0110 E12440 - N0155 E12455 - N0130 E12530 - N0110 E12440 MOV NE 10KT
FCST 1800Z VA CLD APRX SFC/FL200 N0110 E12440 - N0230 E12455 - N0135 E12605 - N0110 E12440
WVID21 WAAA 141700
WAAZ SIGMET A03 VALID 141700/141800 WAAA-
WAAZ UJUNG PANDANG FIR CNL SIGMET A02 141200/141800

CNS/ATM Implementation Planning Matrix

State/ Organization	ATN G/G Boundary Intermediate System (BIS) Router/AMHS	AIDC	CPDLC	Navigation*			ADS-B/ Multilateration	ADS-C	Remarks
				En-route	Terminal	Approach			
AUSTRALIA	ATN tests were conducted. BIS Router and Backbone BIS Router and AMHS implemented.	AFTN based AIDC Implemented between Brisbane and Melbourne, Auckland, Nadi and Auckland. AIDC is also in use between Melbourne and Mauritius.	Implemented and integrated with ATM systems to support FANS1/A equipped aircraft.	Implemented	Implemented		5 ADS-B sites are operational. A total of 28 ground stations are expected to become operational throughout 2007. Additional 20 stations will be delivered in June 2007 for installation at en-route radar site and other sites. 5NM Separation service being introduced. NFRM on the carriage and use of ADS-B avionics to be issued in Apr.07	FANS 1/A ADS-C implemented.	
BANGLADESH	BIS Router and AMHS planned for 2007.								
BHUTAN	ATN BIS Router and UA service 2008.					Procedures developed for NPA.			

CNS/ATM Implementation Planning Matrix									
State/ Organization	**ATN G/G Boundary Intermediate System (BIS) Router/AMHS**	**AIDC**	**CPDLC**	**Navigation***			**ADS-B/ Multilateration**	**ADS-C**	**Remarks**
				En-route	**Terminal**	**Approach**			
BRUNEI DARUSSALAM	ATN BIS Router planned for 2009 and AMHS planned for 2009-2011.								
CAMBODIA	BIS Router and AMHS planned for 2007.					Procedure developed for NPA.			

CNS/ATM Implementation Planning Matrix									
State/ Organization	**ATN G/G Boundary Intermediate System (BIS) Router/AMHS**	**AIDC**	**CPDLC**	**Navigation***			**ADS-B/ Multilateration**	**ADS-C**	**Remarks**
				En-route	**Terminal**	**Approach**			
CHINA	ATN Router deployed in 2008. Tripartite BBIS trial completed with Bangkok and Hong Kong, China in Jan. 2003. ATN trial with Hong Kong, China conducted 2008. AMHS with Hong Kong, China planned to conduct in2008. AMHS/ATN trial with Macau is under planning. AMHS/ATN trial with Kuwait is to be delayed.	AIDC between some of ACCs within China has been implemented. AIDC between several other ACCs are being implemented. Operational trial on the AFTN based AIDC between Sanya and Hong Kong commenced on Aug. 2006 and put into operational use in Feb 2007.	Implemented to support certain AIS Rout. L888 route, polar routes and Chengdu-Lhasa route. Trial on HF data link conducted for use in western China.	Implemented in certain airspace. L888, Y1 and Y2 routes.	RNAV (GNSS) implemented in certain airports. Beijing, Guangzhou, Tianjin and Lhasa airports.		ADS-B trial has been conducted in 2006. 5 UAT ADS-B sites are operational and used for flight training of CAFUC. Another ADS-B of 1090ES trial will be commenced in 2007.	FANS 1/A ADS-C implemented to support certain routes. L888 route polar routes and Chengdu-Lhasa route.	

CNS/ATM Implementation Planning Matrix									
State/ Organization	**ATN G/G Boundary Intermediate System (BIS) Router/AMHS**	**AIDC**	**CPDLC**	**Navigation***			**ADS-B/ Multilateration**	**ADS-C**	**Remarks**
				En-route	**Terminal**	**Approach**			
		Shanghai ACC and Japan to be implemented. TBD with Korea to be deleted.							

CNS/ATM Implementation Planning Matrix

State/ Organization	ATN G/G Boundary Intermediate System (BIS) Router/AMHS	AIDC	CPDLC	Navigation*			ADS-B/ Multilateration	ADS-C	Remarks
				En-route	Terminal	Approach			
HONG KONG, CHINA	ATN/AMHS technical trials with Japan conducted in 2003. Operational trials planned in 2010. 64 Kbps ATN Link with Bangkok put into operational use in Jun 2004. AMHS trials planned in 2009. ATN/AMHS technical trials with Beijing, China using VPN over Internet conducted in Sep 2006. Further ATN/AMHS trials planned in 2009. ATN/AMHS technical trials with Macao, China planned for 2009.	Trial on the AFTN based AIDC with Guangzhou and Sanya, China commenced. Operational trial with Sanya commenced in Aug. 2006 and put into operational use in Feb. 2007.	FANS 1/A based CPDLC trials conducted. VDL Mode-2 technical trial conducted. D-ATIS D-VOLMET implemented. PDC service at Hong Kong International Airport (HKIA) upgraded from 1-way data link to 2-way data link on 5 Jun 2008.	Implemented in certain airspace	Implemented in certain airspace.	RNAV (GNSS) departure procedures implemented in July 2005. Flight check for RNAV Procedures conducted in Apr 2008. Operational trial is planned for end 2008.	A-SMGCS trial using ADS-B/ Multilateration technology on the prime airport surveillance area completed in 2006. A larger-scale A-SMGCS covering the whole HKIA put into operational evaluation in July 2008. Data collection/ analysis on aircraft ADS-B equipage in Hong Kong airspace conducted on quarterly basis. ADS-B trial using a dedicated ADS-B system was conducted in Apr 2007. Planning on further trial is in progress.	FANS 1/A trials for ADS-C conducted.	

CNS/ATM Implementation Planning Matrix									
State/ Organization	**ATN G/G Boundary Intermediate System (BIS) Router/AMHS**	**AIDC**	**CPDLC**	**Navigation***			**ADS-B/ Multilateration**	**ADS-C**	**Remarks**
				En-route	**Terminal**	**Approach**			
MACAO, CHINA	ATN and AMHS installation and local training starts in Aug.2008. Test arrangement with China will start in oct.08. Test with Hong Kong in 2009.						"A-SMGCS" being planned with ADS-B as option for consideration.		ATZ within Hong Kong and Guangzhou FIRs. In ATZ full VHF coverage exist. Radar coverage for monitoring purposes.
COOK ISLANDS									
DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA	ATN/AMHS technical trials with Beijing China planned in 2010.	AIDC between some ACCs are planned in 2010.	Planned for implementation in 2010.				1090 ES based ADS-B ground station is in trial operation.		

CNS/ATM Implementation Planning Matrix									
State/ Organization	**ATN G/G Boundary Intermediate System (BIS) Router/AMHS**	**AIDC**	**CPDLC**	**Navigation***			**ADS-B/ Multilateration**	**ADS-C**	**Remarks**
				En-route	**Terminal**	**Approach**			
FIJI	AMHS in-house trials completed in 2006. AMHS trials completed in 2007. ATN BIS Router and AMHS plans to be implemented in 2008.	AFTN based AIDC with Brisbane and Auckland operational in 2005. AFTN based AIDC implement with Oakland.	FANS-1 implemented	Implemented as (S)		NPA procedures for (S) completed in Dec. 2002	ADS-B implementation in 2008/2009. Estimate 10 Ground Stations.	ADS-C implemented in oceanic airspace using EUROCAT 2000 X.	
FRANCE *(French Polynesia Tahiti)*		Implementa-tion 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 BBIS router and AMHS Physical installation over. SAT in May, coordinating with China, Thailand and Singapore for conduct of test.	AFTN Based AIDC Coordinating with Bangladesh and Pakistan, Both are ready.	FANS-1 implemented at Kolkata, Chennai, Mumbai and Delhi.	SBAS Technical development in 2007. Implementation planned for 2009.			Trial planned for 2006. ASMGCS Implemented at IGI Airport New Delhi.	FANS 1/A ADS-C implemented at Kolkata, Chennai, Delhi and Mumbai.	

CNS/ATM Implementation Planning Matrix									
State/ Organization	**ATN G/G Boundary Intermediate System (BIS) Router/AMHS**	**AIDC**	**CPDLC**	**Navigation***			**ADS-B/ Multilateration**	**ADS-C**	**Remarks**
				En-route	**Terminal**	**Approach**			
INDONESIA	ATN BIS Router and AMHS planned for trial in 2008. Trial with Singapore planned	AFTN based AIDC planned for implementa-tion between Brisbane and Jakarta in 2010. Brisbane and Makassar in planned in June2008.	FANS-1/A. CPDLC in Jakarta, Ujung Pandang FIRs trial planned for 2007.			Procedure to be completed in 2006 for NPA.	2 ADS-B ground stations to be installed in 2007. Upgrading ATC automation at Makasar for ADS-B application capabilities in 2007.	FANS 1/A ADS-C trial planned at Jakarta and Ujung Pandang ACC in 2007.	
JAPAN	ATN BBIS already implemented. AMHS implemented between Japan and USA in 2005 and between Japan and Hong Kong, China planned for 2009-2010.	AIDC based. AFTN procedure implemented with Oakland and Anchorage. Planned between Incheon ACC and Fukuoka ATMC 2008. Between Fukuoka, Sanya .	FANS1/A system Implemented in Fukuoka FIR	SBAS operational in 2007		NPA implemented at 4 aerodromes.	Amendment work to be radio law regulations for using ADS-B out (1090 MHz ES) is under way.	FANS 1/A. ADS-C implemented in Fukuoka FIR	

CNS/ATM Implementation Planning Matrix									
State/ Organization	**ATN G/G Boundary Intermediate System (BIS) Router/AMHS**	**AIDC**	**CPDLC**	**Navigation***			**ADS-B/ Multilateration**	**ADS-C**	**Remarks**
				En-route	**Terminal**	**Approach**			
KIRIBATI									
LAO PDR	ATN BIS Router and AMHS completed planned for implementation with Bangkok in 2009.	AIDC with Bangkok planned for 2010.							
MALAYSIA	ATN BIS Router completed 2007. AMHS planned in 2010.	AFTN AIDC planned with Bangkok ACC in 2010.	Implemented for Bay of Bengal.	.Implemented for Oceanic Routes.	Basic RNAV implemented.	NPA at KLIA implemented.	Implementation of ADS-B proposed in 2008-2013. Multilateration implemented at KLIA.	FANS 1/A ADS-C implemented for Bay of Bengal.	
MALDIVES	ATN BIS Router/AMHS planned for implementation in the 2008.	Planned for 2008.	FANS1/A installed Trials planned in last quarter of 2007.	Trials planed for 2005-2008. Implementation in later 2008.			Trials planned for 2007-2008. Implementation in late 2008.		

CNS/ATM Implementation Planning Matrix									
State/ Organization	**ATN G/G Boundary Intermediate System (BIS) Router/AMHS**	**AIDC**	**CPDLC**	**Navigation***			**ADS-B/ Multilateration**	**ADS-C**	**Remarks**
				En-route	**Terminal**	**Approach**			
MARSHALL ISLANDS						NPA implemented at Majuro Atoll.			
MICRONESIA FEDERATED STATES OF									
Chuuk				Implemented					
Kosrae				Implemented					
Pohnpei				Implemented					
Yap				Implemented					
MONGOLIA	ATN BIS Router and AMHS planned for 2005 and 2006. Trial with Bangkok conducted.		Function available. Regular trials are conducted.		GPS procedures are being developed and implemented at 10 airports.		ADS-B trial in progress implementation planned for 2006.	FANS 1/A ADS-C implemented since August 1998.	
MYANMAR	Trial for ATN BIS Router with Thailand planned for 2006. Test with China planned for 2006.		Implemented since August 1998.					Implemented since August 1998.	
NAURU									

CNS/ATM Implementation Planning Matrix									
State/ Organization	**ATN G/G Boundary Intermediate System (BIS) Router/AMHS**	**AIDC**	**CPDLC**	**Navigation***			**ADS-B/ Multilateration**	**ADS-C**	**Remarks**
				En-route	**Terminal**	**Approach**			
NEPAL	BIS Router and AMHS planned for 2010.	AFTN/AMHS based AIDC between KTM-CAL, KTM-BAN, KTM-LHASA planned for 2010.	Will be implemented as required.		GPS departure and approach has been developed for 8 airports and planned for implementation in 2008.		ADS-B feasibility study planned for 2007.		
NEW CALEDONIA							Tontouta ACC 2009 Tontouta APP 2009.		

CNS/ATM Implementation Planning Matrix									
State/ Organization	**ATN G/G Boundary Intermediate System (BIS) Router/AMHS**	**AIDC**	**CPDLC**	**Navigation***			**ADS-B/ Multilateration**	**ADS-C**	**Remarks**
				En-route	**Terminal**	**Approach**			
NEW ZEALAND	BIS Router and AMHS implementation planned for 2010.	AFTN based AIDC implemented between New Zealand, Australia, Fiji, Tahiti, Chile and USA.	FANS-1/A. Implemented	Will be implemented as required.	RNAV procedures being implemented as developed.	RNP AR APCH implemented at Queenstown (ZQN).	Surface surveillance MLAT being installed at Auckland, operational late 2008. Wide area MLAT will be installed in the Queenstown region, will be operational mid 2009. ADS-B included as an element of MLAT installation.	FANS 1/A Implemented.	
PAKISTAN	Implementation of ATN considered for Phase II (2005-2010).	Implemented between Karachi and Lahore ACCs	Implementation planned from 2005-2010.	Planned for 2005-2010.	RNAV arrival and departure procedure being developed	NPA procedure are being developed.	Feasibility study for using ADS-B is in hand. One station planned for 2009 to establish confidence.	Planned for 2005-2010.	Existing Radar system being upgraded.
PAPUA NEW GUINEA				Implemented		Implemented at certain aerodromes.			

CNS/ATM Implementation Planning Matrix									
State/ Organization	**ATN G/G Boundary Intermediate System (BIS) Router/AMHS**	**AIDC**	**CPDLC**	**Navigation***			**ADS-B/ Multilateration**	**ADS-C**	**Remarks**
				En-route	**Terminal**	**Approach**			
PHILIPPINES	ATN G/G BIS Router/AMHS implemented in 2006 AMHS trials with Singapore by end 2008 and Hong Kong planned in 2009.	Planned for 2011.	CPDLC Planned for 2011.				Included in CNS/ATM Project and scheduled for implementation in 2011.	FANS 1/A ADS-C planned for 2011.	
REPUBLIC OF KOREA	ATN BIS Router/AMHS planned for 2011	AFTN based AIDC planned for 2008 between Incheon ACC and Fukuoka ATMC	PDC & D-ATIS implemented 2003.			NPA planned for 2008 at Incheon International Airport	ADS-B implemented for ASMGCS at Incheon International Airport in 2008.	Trial for FANS 1/A ADS-C implemented since 2003.	

CNS/ATM Implementation Planning Matrix									
State/ Organization	**ATN G/G Boundary Intermediate System (BIS) Router/AMHS**	**AIDC**	**CPDLC**	**Navigation***			**ADS-B/ Multilateration**	**ADS-C**	**Remarks**
				En-route	**Terminal**	**Approach**			
SINGAPORE	AMHS and ATN router were implemented in 2007. ATN trial with Malaysia started in 2007. ATN trial with Indonesia and Australia under planning.	AIDC to be implemented in 2010.	Implemented since 1997. Integrated in the ATC system in 1999.	Implemented	RNAV SIDS and STARS implemented in 2006.	Baro VNAV implemented in 2006.	ASMGCS with ADS-B and Multilateration operational since 2007. ADS-B for air surveillance will be implemented in 2009. Trial commenced in 2006.	FANS 1/A ADS-C implemented since 1997. Integrated with ATC system in 1999.	
SRI LANKA	ATN BIS Router Planned for 2009. AMHS planned along with BIS in 2009.		PDLC in trial operation since November 2000.				ADS-B Trials planned for 2010 and implementation in 2011.	FANS 1 /A ADS-C trial since November 2000.	GPS based domestic route structure being developed.
THAILAND	BBIS/BIS Routers already implemented. Target date for AMHS in 2008.	AFTN based AIDC planned for 2010.	FANS-1/A Implemented .	Under implementation	Implemented at Phuket Airport	Implemented at Phuket	Multilateration implemented in 2006 at Suvarnbhumi Intl. Airport. 22 ADS-B ground stations will be implemented in 2008.	FANS 1/A ADS-C Implemented.	

CNS/ATM Implementation Planning Matrix									
State/ Organization	**ATN G/G Boundary Intermediate System (BIS) Router/AMHS**	**AIDC**	**CPDLC**	**Navigation***			**ADS-B/ Multilateration**	**ADS-C**	**Remarks**
				En-route	**Terminal**	**Approach**			
TONGA	AMHS planned for 2008.					NPA planned for 2007.	Trial planned for 2010		CPDLC and ADS-C is not considered for lower airspace
UNITED STATES	AMHS implemented. AMHS Atlanta August 2008 to serve CAR/SAM.	AFTN based AIDC implemented.	FANS-1/A based CPDLC implemented.	Implemented	Implemented		Implemented	Implemented	
VANUATU									
VIET NAM	BIS Routers planned for 2009. ATN/AMHS trial in 2010 and operation in 2012.	AFTN based AIDC implemented in 2009. Trial for ATN based AIDC planned in 2010.	CPDLC operational April 2008.	For en-route TBD.	RNAV		Planned for trial 2010. Planned for operation 2011.	Implemented April 2008.	

* Navigation – Navigation including Performance Based Navigation (PBN), APV and precision approach

KEY PRIORITIES FOR CNS/ATM IMPLEMENTATION IN THE ASIA/PACIFIC REGION

No.	KEY PRIORITIES	DESCRIPTION	MILESTONES	SUB-GROUP	STATUS	DISCUSSION/ACTION
1.	Performance Based Navigation (RNP/RNAV) Implementation GNSS Implementation • GBAS • SBAS	Implement performance based navigation, operation and procedures to improve the efficiency and flexible use of airspace. To implement GNSS in accordance with the Asia Pacific Regional Strategy Facilitate market available GBAS ground system (CAT I) certified to Annex 10 SARPs	Report to APANPIRG On-going 2008	ATM/AIS/SAR CNS/MET CNS/MET	On-going Phased implementation. SBAS Receivers – (TSO C145/6) now available Lead aircraft with certified GBAS avionics now in service	Reflect performance based navigation, not just RNP. Strategy for Approach, Landing and Departure identified GBAS as a preferred CAT I option. No ground equipment is available that is certified to Annex 10 SARPs
2.	ADS-C	The implementation of ADS-C in oceanic or remote areas in accordance with the Regional CNS/ATM Plan is required for the enhancement of safety and ATM.	Report to APANPIRG FIT-BOB reconvened September 2003. Bay of Bengal operational trial of ADS/CPDLC commenced February 2004, trial on going. FIT-SEA inaugural meeting May 2004. South China Sea operational trial of ADS/CPDLC expected 2006/2007.	ATM/AIS/SAR	Phased implementation. Implementation focus and timetable need to be developed. States are gaining experience in the use of ADS-C.	

KEY PRIORITIES FOR CNS/ATM IMPLEMENTATION IN THE ASIA/PACIFIC REGION

No.	KEY PRIORITIES	DESCRIPTION	MILESTONES	SUB-GROUP	STATUS	DISCUSSION/ACTION
3.	Co-operation in Regional CNS/ATM Planning, Implementation & Training.	The continuation and enhancement of ICAO's co-ordinating role of technical co-operation in CNS/ATM planning and implementation, in close co-operation with all partners and taking into account the regional approach, is required.	Report to APANPIRG	All	Sub-Groups to identify requirements.	Emphasis needs to be on sharing information and training. Title 'Technical Co-operation" is confusing with assistance programs. Need to inform States of opportunities for training well in advance of scheduled date. Training opportunities should include ICAO programs as well as associated organizations programs. ATN Seminar was conducted. Two ADS-B Seminars were conducted QMS Seminar SAIDS-2G MET/ATM Coordination Seminars were conducted PBN Seminar were conducted
~~4.~~	Preparation for WRC-2011	The co-operative participation of States is required with their respective telecommunications regulatory authorities, regional groups, at the APT forums and at the WRC	WRC-2011	All	States are designating contact points responsible for preparation for WRC 2011 and are providing contact details for posting on the website to facilitate coordination.	High importance task. Spectrum must be available to enable CNS/ATM implementation. States to nominate the focal point of contact

KEY PRIORITIES FOR CNS/ATM IMPLEMENTATION IN THE ASIA/PACIFIC REGION

No.	KEY PRIORITIES	DESCRIPTION	MILESTONES	SUB-GROUP	STATUS	DISCUSSION/ACTION
		regional preparatory meetings for WRC-2011 to ensure that aviation spectrum requirements are fulfilled and protected.				
5.	MET support for the new CNS/ATM System.	To identify new MET products supporting ATM	2010	CNS/MET	Survey conducted, paper presented at CNS/MET SG/12, future studies needed	MET/ATM coordination meeting in 2009 and seminar in 2010 to seek guidance from ATM to MET requirements
		Implementation of new gridded WAFS icing, turbulence, and cumulonimbus products	2013			Analysis of 2 models being conducted in effort to harmonize before WAFC work shop in 3rd quarter 2009

KEY PRIORITIES FOR CNS/ATM IMPLEMENTATION IN THE ASIA/PACIFIC REGION

No.	KEY PRIORITIES	DESCRIPTION	MILESTONES	SUB-GROUP	STATUS	DISCUSSION/ACTION
6.	ADS-B	Airline aircraft certificated to participate in ADS-B operations. Develop sub-regional implementation plan: SEA etc.	2009 2009	ADS-B SI Task Force ADS-B SI Task Force	Lead aircraft certified for initial ADS-B OUT operation Sample agreement for data sharing has been developed and initial implementation plan has been developed	Roll-out of ADS-B considered an on-going activity. Further develop and finalize the plan.
7.	Implementation of APV	Review applicability of APV and aircraft certification. Develop implementation strategy.	2006 2007	CNS/MET ATM/AIS/SAR	APV standards now in PANS OPS. Aircraft certified APV approaches.	Completed ATM/AIS/SAR/SG to consider operational issues including charting.
8.	Data Link Flight Information Services (DFIS) applications	To implement the following applications via request/response mode of data link in the Asia and Pacific Regions: a) Data link –automatic terminal information services (D-ATIS); b) VOLMET data link	2008	ATM/AIS/SAR CNS/MET	Trials and demonstrations are conducted and some operational services are provided by States.	Implementation of D-ATIS is progressing Expected to be implemented at all locations except one by

KEY PRIORITIES FOR CNS/ATM IMPLEMENTATION IN THE ASIA/PACIFIC REGION

No.	KEY PRIORITIES	DESCRIPTION	MILESTONES	SUB-GROUP	STATUS	DISCUSSION/ACTION
		service (D-VOLMET); c) Pre-Departure Clearance (PDC) delivery via data-link; d) DCL				2008 PDC implemented at several locations
9.	Safety Management Systems.	States to establish national safety management systems and effective application of safety programmes which are required for the provision of air traffic services. Required monitoring services available to support operational enhancements.		ATM/AIS/SAR RASMAG RASMAG	Annex 11 provisions effective 27 November 2003. On-going RASMAG activities. Operational enhancements suspended where effective monitoring is not available.	
10.	Air Traffic Flow Management.	States to consider and implement aspects of air traffic flow management (ATFM) including: a) centralized ATFM b) inter-regional cooperative ATFM; c) establishment of ATFM databases; d) application of strategic ATFM planning; and	2006	ATM/ ATIS/ SAR	On going	

KEY PRIORITIES FOR CNS/ATM IMPLEMENTATION IN THE ASIA/PACIFIC REGION

No.	KEY PRIORITIES	DESCRIPTION	MILESTONES	SUB-GROUP	STATUS	DISCUSSION/ACTION
		e) application of tactical ATFM planning				
11	Aeronautical Fixed Services (AFS)	Facilitate deployment of ATN/OSI and ATN/IPS applications including AIDC and AMHS	2011	**CNS/MET**	Deployment of routers in progress, some States will implement dual stack routers (TCP/IP and OSI). Backbone Boundary Intermediate System (BBIS) sites will deploy dual stack routers.	Some States are delaying implementation until TCP/IP connectivity is available. ATNICG is working with States to coordinate implementation and provide technical assistance as required

SUBJECT/TASKS LIST IN THE CNS/MET FIELDS

The priorities assigned in the list have the following connotation:
A = Tasks of a high priority on which work should be expedited;
B = Tasks of medium priority on which work should be under taken as soon as possible but not to the detriment of Priority "A tasks; and
C = Tasks of medium priority on which work should be undertaken as time and resources permit but not to the detriment of priority "A" and "B" tasks.
TOR = Terms of Reference of the Sub-Group

TASKS NO. 1 TO 31 HAVE BEEN COMPLETED AND REMOVED FROM THE LIST

No.	Ref.	Associated Strategic Objective & GPIs	Task	Priority	Action Proposed/In Progress	Action by	Target Date
1 (32)	RAN/3 C.8/14 APANPIRG/14 (TOR 3)	A-Safety E-Continuity GPI-19	Subject: Inadequate implementation of procedures for advising aircraft on volcanic ash and tropical cyclones Task: Monitoring of the implementation of international airways volcano watch (IAVW) and tropical cyclone advisories and SIGMETs	A	Monitor and provide assistance in the implementation of volcanic ash and tropical cyclone advisories and SIGMETs procedures to ensure provision of timely information on volcanic ash and tropical cyclones to aircraft.	CNS/MET SG Task Force on the implementation of Volcanic Ash and Tropical Cyclone advisories and SIGMETs (VA/TC/I TF)	On going
2 (35)	(TOR 3)	D – Efficiency All GPIs	Subject: To facilitate regional implementation of CNS/ATM Tasks: a) coordinate training/workshops to allow States to develop and implement new CNS/ATM procedures; b) encourage States to participate in the evaluation and training of new CNS/ATM systems;	A	1) Identify topics for training, develop syllabi and plan training programme; 2) Encourage States in the evaluation and training of new CNS/ATM systems; 3) Co-ordinate with States and monitor progress;	CNS/MET SG	On-going On-going On-going

No.	Ref.	Associated Strategic Objective & GPIs	Task	Priority	Action Proposed/In Progress	Action by	Target Date
			c) progress the adoption of WGS-84 co-ordinate system and introduction of high integrity systems for the management of the co-ordinate data.		4) Collect information and suggest methods of resolving problems commonly faced by States.	ATM/AIS/SAR CNS/MET SG	On-going
3 (36)	APANPIRG D. 4/46 RAN/3 C.12/3 APANPIRG 5/3 (TOR 3)	D – Efficiency All GPIs	Subject: Provision of adequate CNS/MET services Task: Monitor CNS/ATM systems research and development, trials and demonstrations in the fields of CNS/MET and facilitate the transfer of this information and expertise between States.	A	1) Encourage States to conduct R&D, trials & demonstrations of new CNS/MET services; 2) Monitor global developments that may have beneficial consequences on regional planning activities; 3) Consolidate information on new capabilities in the CNS/ATM system, for the Sub-Groups review and action; 4) Serve as a focal point for review of ongoing work of Regional formal and informal working groups that is relevant to CNS/MET; 5) Provide for coordinated training/seminars to keep all States informed on developments of trials and demonstrations.	CNS-MET	On-going
4 (37)	C 12/24	D – Efficiency GPI-19	Subject : Transition to the GRIB and BUFR coded WAFS products	A	1) Monitoring of implementation of BUFR coded SIGWX forecasts	CNS/MET SG	Completed

No.	Ref.	Associated Strategic Objective & GPIs	Task	Priority	Action Proposed/In Progress	Action by	Target Date
			Task : Implementation of the transition to the GRIB and BUFR coded WAFS products		2) Monitoring of the migration to SADIS 2G 3) Assist in preparation for the new gridded products for turbulence, icing and cumulonimbus 4) Monitoring of the migration to ISCS G3	WAFS Implementation Task Force WAFS/I TF WAFS/I TF	5 Jan. 2009 2013 Dec. 2009
5 (38)	C12/36 APANPIRG C14/45	D – Efficiency GPI-19	Subject: Developing the new requirements for MET products and services in support of ATM.	A	1) Development of the initial draft of the MET Chapter; 2) Development of the MET components of the CNS/ATM concept/ strategy; 3) Inclusion of ATM requirements for MET information in the CNS/ ATM Plan; 4) MET/ATM Coordination Seminar – February 2006. 5) Conduct survey on ATM requirements for MET information 6) MET/ATM meeting in 2009 7) MET/ATM seminar in 2010	CNS/MET SG with assistance of MET WG on CNS/ATM Plan CNS/MET SG METATM TF METATM TF MET ATM TF MET ATM TF	Completed Completed Completed Completed On-going 2009 2010

No.	Ref.	Associated Strategic Objective & GPIs	Task	Priority	Action Proposed/In Progress	Action by	Target Date
6 (39)	APANPIRG/13 D 13/28	A - Safety D – Efficiency GPI-19	Subject: To improve the efficiency of the regional and inter-regional OPMET exchange and the availability of OPMET information from the ASIA/PAC Region Task: Review and optimize the ROBEX scheme and other OPMET exchanges; introduce monitoring and management procedures for the ROBEX centres and Regional OPMET data banks	A	1) Review and update regional ROBEX tables and relevant documents; 2) Propose optimization changes to the ROBEX scheme; 3) Improve the availability of OPMET data at the Regional OPMET Data Banks (RODB); 4) Improve the availability of OPMET information from the Pacific States; 5) Introduce monitoring and management Procedures.	CNS/MET SG OPMET Management Task Force (OPMET/M TF)	Completed Completed On-going On-going Completed
7 (43)		D- Efficiency GPI17,18,19,22	Subject: Implementation of data link Task: Encourage implementation	A	Encourage States to implement CPDLC, D-ATIS, D-VOLMET, PDC and DPC	CNS/MET SG	2008
8 (45)	APANPIRG List of deficiencies	A – Safety GPI - 19	Subject: Implementation of SIGMET Task: Improve regional procedures and availability of SIGMET from ASIA/PAC States	A	1) Assist States in implementing SIGMET requirements; 2) Conduct regular SIGMET tests; 3) Produce training and guidance material; 4) Regular monitoring on the availability and quality of SIGMET and advisories.	CNS/MET SG VA/TC/I TF	Recurrent task Recurrent task Completed Recurrent task

No.	Ref.	Associated Strategic Objective & GPIs	Task	Priority	Action Proposed/In Progress	Action by	Target Date
9 (46)	APANPIRG/17 C 17/23	D-Efficiency GPI-5 GPI-11	Subject: To implement Performance Based Navigation Concept in Asia/Pacific Region Task: Implement Performance Based Navigation in the Region.	A	1) To conduct Workshops/Seminars in the Region to familiarize the States about PBN Concept 2) To develop roadmap for implementation of RNP and RNAV procedures	CNS/MET SG ATM/AIS/SAR SG CNS/MET SG	2007 2008
10 (48)		D-Efficiency GPI22	Subject: FASID Task: Updating of FASID Table CNS-1B and CNS-1C	A	Seek State revisions of Table CNS-1B and CNS -1C prior to March 2009. Review and update Table CNS-1B and CNS-1C with the assistance of the Secretariat	CNS/MET SG	 2009
11 (49)		A-Safety D-Efficiency E-Continuity GPI23	Subject: WRC-2011 Task: Supporting ICAO position for ITU WRC-2011 on agenda items related to civil aviation	A	Seek States to support ICAO position at regional telecommunity – APT APG and at WRC.	CNS/MET SG	2011

*** Number in bracket indicates sequential number since establishment of the Sub-group.**

Agenda Item 3.5: ATS Coordination group activities

Agenda Item 3: Regional Air Navigation Planning and Implementation Issues

3.5 ATS Coordination Group Activities

3.5.1 The following meetings of the regional ICAO and State ATS coordination groups that contribute to the work of APANPIRG have been held since APANPIRG/18 in September 2007. It was noted that reports of the ICAO meetings are available on the ICAO Asia and Pacific Office website http://www.bangkok.icao.int/ under the 'Meetings' menu. Where available, the web address for State meeting reports has also been included below.

1. <u>ICAO ATS Coordination Groups</u>

- **Bay of Bengal ATS Coordination Group (BBACG)**

  BBACG/19 (Bangkok, 21 - 25 January 2008, with FIT-BOB/9)

  Air Traffic Flow Management Task Force (ATFM/TF)
    - ATFM/TF/11 (Bangkok, 26 – 30 November 2007)
    - ATFM/TF/12 (Cairo, 13 – 17 July 2008, with IRAI)

  FANS 1/A Implementation Team, Bay of Bengal (FIT-BOB)
    - FIT-BOB/9 (Bangkok, 21 - 25 January 2008, with BBACG/19)
    - FIT-BOB/10 (Mumbai, 7 − 11 July 2008, with ASIOACG/3)

- **South-East Asia ATS Coordination Group (SEACG)**

  SEACG/15 (Bangkok, 20-23 May 2008, with FIT-SEA/8)

  South East Asia RNP Implementation Task Force (RNP-SEA/TF)
    - RNP-SEA/TF/2 (Singapore, 4 – 7 March 2008)
    - RNP-SEA/TF/3 (Bangkok, 4 – 6 June 2008)

  FANS 1/A Implementation Team, South -East Asia (FIT-SEA)
    - FIT-SEA/7 (Fukuoka, 30 January – 1 February 2008)
    - FIT-SEA/8 (Bangkok, 20 - 23 May 2008, with SEACG/15)

- **Western Pacific/South China Sea RVSM Scrutiny Working Group (WPAC/SCS RSG)**

    - WPAC/SCS RSG/3 (Bangkok 30 October – 2 November 2007)
    - WPAC/SCS RSG/4 (Bangkok, 26 – 29 February 2008)

- **China, Mongolia, Russian Federation, IATA ATS Coordination Group (CMRI)**

    - Did not meet, last meeting CMRI/5 (Bangkok, 20 -22 June 2007)

- **Trans-Regional Airspace and Supporting ATM Systems Steering Group (TRASAS)**

    - TRASAS/2 (Bangkok, 18 – 19 March 2008)

2. ICAO Special Coordination Meetings

- **SCM for Implementation of Reduced Horizontal Separation on ATS Routes L642 and M771**
  - SCM/RNP 10 (Singapore, 25 – 27 September 2007)

3. ICAO Interregional Coordination Meetings

- **Inter Regional Afghanistan Interface meeting**
  - IRAI (Cairo, 13-17 July 2008, with ATFM/TF/12)

4. State ATS Coordination Groups

- **Informal South Pacific ATS Coordinating Group (ISPACG)**
  - ISPACG/22 and ISPACG-FIT/15 (Papeete, 10 – 14 March 2008) (http://www.faa.gov/ats/ato/ispacg.htm)

- **Informal Pacific ATS Coordination Group (IPACG)**
  - IPACG/27 and IPACG-FIT/14 (Tokyo, 5 – 9 November 2007)
  - IPACG/28 and IPACG-FIT/15 (Las Vegas, 12 – 16 May 2008) (http://www.faa.gov/ats/ato/ipacg.htm)

- **Asia/Pacific Regional Air Navigation Service Providers Conference (ANSP Conf)**
  - ANSP/3 (Singapore, 21-23 May 2008)

- **Arabian Sea/Indian Ocean ATS Coordination Group (ASIOACG)**
  - ASIOACG/2 (Dubai, 15-17 January 2008)
  - ASIOACG/3 (Mumbai, 7 – 11 July 2008, with FIT-BOB/10) (http://ekgroup.com/raws , raws, r@Ws123)

Nineteenth Meeting of the Bay of Bengal ATS Coordination Meeting (BBACG/19)

3.5.2 The following are main points of interest arising from BBACG/19:

a) BBACG reviewed and noted relevant parts of the reports of the APANPIRG/18, the 44th meeting of the Directors-General of Civil Aviation (44th DGCA, October 2007) and other relevant meetings;

b) BBACG/19 and FIT-BOB/9 agreed to accelerate planning for implementation of 50 NM longitudinal separation widely in the Bay of Bengal using CPDLC with target date 2009;

c) Australia, Indonesia and Sri Lanka agreed to use the opportunity provided by the reduction of longitudinal separation to 10 minutes MNT in the Colombo

FIR to review route requirements with the objective of implementing RNP 10 routes as widely as possible;

d) BBACG agreed to assist ASIOACG to work towards establishing Indian Ocean User Preferred Routes (UPRs) between Southern Africa and Southeast Asia;

e) BBACG considered that there was an urgent need for an ATS routes meeting to be conducted between, at the least, Afghanistan, India, Iran, Kazakhstan, Pakistan, Uzbekistan, ICAO and IATA; and

f) States were urged to take action in accordance with APANPIRG/17 Conclusion 17/11 to adapt the model provided by Indonesian Contingency Plan for use by States regionally.

Eleventh and the Twelfth Meetings of the Air Traffic Flow Management Task Force (ATFM/TF 11 & 12)

3.5.3 ATFM/TF/11 conducted a post-implementation review of the long range international ATFM procedures across the Bay of Bengal and South Asia, which were implemented in July 2007. The following benefits, amongst others, had been demonstrated:

a) ATFM aircraft now depart on their allocated wheels-up time in an orderly fashion, which lessens overall ground delay and ensures remaining ground delays are absorbed with engines off;

b) There is an orderly entry into the Afghanistan airspace with more even distribution of aircraft across the four available ATS routes;

c) Preferred optimal flight level allocation is achieved more often and more reliably;

d) Reroutes around Afghanistan, which often resulted in expensive technical stops, have been virtually eliminated;

e) Many benefits have been reported by en-route ANSPs, characterized by orderly traffic sequences resulting in greatly reduced ATC workload; and

f) Based on information supplied from IATA and their member airlines during mid-2007 (i.e. $80 oil), the overall fuel savings for aircraft using ATFM procedures during this nightly four-hour period of operation is approximately 12 million kilograms of fuel per year, resulting in very worthwhile savings in direct operating costs.

3.5.4 ATFM/TF/12 noted that 17 510 flights submitted slot requests to BOBCAT in the 11-month period between 5 July 2007 and 5 June 2008, with 94.27 percent (16 506 aircraft) accepting slot allocation.

3.5.5 Arising from the previous work of the ATFM/TF, Afghanistan had agreed to implement an ATS route segment between SERKA and SOKAM across the southern portion of the Kabul FIR. Accordingly, Afghanistan recently published AIP Supplement 01/08 (**Appendix A** to the

Report on Agenda Item 3.5 refers) which implements route SERKA - SOKAM as an extension to UL333 with effect from AIRAC 28 August 2008.

3.5.6 The ATFM/TF conveyed strong appreciation to Afghanistan for their goodwill and assistance in implementing the extension to UL333. Many challenges had been overcome by Afghanistan, Iran and Pakistan in arranging the implementation and it was anticipated that this route would bring significant extra capacity and flexibility to civil flights transiting Kabul FIR. This would be particularly beneficial in managing the peak night time traffic flows from Southeast Asia to Europe.

3.5.7 During ATFM/TF/11, it was agreed that the Phase 1 implementation program dealing with the management of Kabul FIR transit flights should be considered as completed. ATFM/TF/11 also recognized many aspects of the Phase 2 and Phase 3 implementation objectives described in the terms of reference (TOR) had also been addressed. It was therefore possible that the ATFM/TF could be considered for dissolution in due course. ATFM/TF/11 agreed that the matter should be more fully addressed at the next meeting in July 2008.

3.5.8 ATFM/TF/12 was informed that the Key Priorities for CNS/ATM Implementation in the Asia/Pacific Region adopted by APANPIRG/18 included ATFM, in which States are to consider and implement aspects of ATFM. Further, during ATM/AIS/SAR/SG/18 (June 2008, Bangkok), it was noted that in coordination with Japan, the Regional Office had scheduled a 3-day Regional ATFM Seminar/Workshop in October 2008 in Fukuoka to address APANPIRG Conclusion 18/7. Preliminary coordination for the conduct of the ATFM Seminar/Workshop had commenced and venue bookings had been made in Fukuoka, Japan for the three day period Tuesday, 7 October until Thursday, 9 October 2008.

3.5.9 Given the expectation that the ATFM Seminar/Workshop will engage in further discussions on the TOR established for the ATFM/TF, and the possibility that revisions may be recommended that will expand the work to include implementation within the Asia/Pacific Regions, ATM/AIS/SAR/SG/18 considered that it would not be appropriate to recommend dissolution of the ATFM/TF during the deliberations of ATFM/TF/12. It was agreed that the outcomes of the October 2008 ATFM Seminar/Workshop and other relevant commentary from APANPIRG/19 (September 2008) should be reviewed by the ATFM/TF prior to making a decision on the future of the ATFM/TF.

Ninth and the Tenth meetings of FANS Implementation Team Bay of Bengal (FIT-BOB 9 & 10)

3.5.10 IATA informed FIT-BOB/10 that they had now formally entered into an agreement with the Boeing Company to establish and operate a CRA facility with a view to investigate and resolve any data link problems in Indian FIRs. IATA also simultaneously entered into a formal agreement with the Airports Authority of India (AAI) to enable Boeing Company to establish and operate the CRA facility and to collate air traffic data for the purposes of levying a CRA charge. In summary, the two agreements authorize IATA to collect a CRA charge on a per flight basis, based on traffic data to be provided by AAI, and to pay Boeing Company for the CRA service.

3.5.11 FIT-BOB/10 recognized that although India would be the State involved in providing data to IATA for charging purposes, the remaining States of the Arabian Sea, the Bay of Bengal and the Indian Ocean should also be alerted to the imminent commencement of CRA services and requested to appraise affected parties accordingly. FIT-BOB/10 considered that the information in the India AIP Supplement 40/2008 (**Appendix B** to the Report on Agenda Item 3.5 refers) was adequate for AIS purposes and that duplication of AIS information by other States was unnecessary. The CRA was activated with effect from 1 September 2008 in accordance with India NOTAM G0155.

3.5.12 In welcoming the progress on establishment of CRA services the meeting recognized that having BOB-CRA services available would enable suitable technical assessment of end-to-end data link performance to be made and would assist markedly in the full implementation of data link services. Recognizing the long term complexities that had been overcome, the meeting congratulated India, IATA and Boeing for their persistence over many years in establishing these agreements.

Fifteenth Meeting of the South-East Asia ATS Coordination Group (SEACG/15)

3.5.13 SEACG/15 noted that the RNAV route M772 was established exclusively for aircraft operating from Jakarta to Hong Kong and beyond. Singapore reported to SEACG/15 that aircraft for other destinations were using this route resulting in traffic bunching. ATM/AIS/SAR/SG/18 subsequently reviewed this matter and recalled that the circumstances surrounding the implementation of M772 were agreed at the ICAO Special Coordination Meeting (SCM, April 2004) held in Manila, Philippines. In particular, the model AIP Supplement prepared by the SCM included the restriction "*Aircraft on M772 are restricted to aircraft operating via Jakarta bound for Hong Kong and beyond*". The SCM had agreed that the restriction was necessary on the basis that, in the Manila FIR, a considerable portion of M772 was outside radar and VHF radio coverage, and crossed a number of other routes. Indonesia and the Philippines undertook to follow up the matter within their authorities to enforce restricted access to the route to the aforementioned destinations. Particularly, Indonesia agreed that the city-pair restriction would be published in Indonesia AIP, in accordance with the outcomes of the April 2004 ICAO SCM.

3.5.14 Thailand presented SEACG/15 with the outcomes of the Second Meeting of Air Traffic Services Coordination Meeting between Bangkok, Ho Chi Minh, Phnom Penh, and Vientiane ACCs to improve the ATS coordination procedures amongst the four ACCs. Lao PDR and Thailand had reached an agreement to transfer the ATS responsibility for the southern part of the Vientiane FIR back to Lao PDR, which took place on 3 July 2008. Thailand reported implementation of 40 NM radar spacing on some major routes; establishment of ATS route R345, and realignment of ATS route R588. Thailand was advised of actions to be taken to attempt to remove R345 and G473 from the ICAO Asia and Pacific Deficiency List.

3.5.15 SEACG/15 also drafted a Conclusion inviting the Philippines to expedite implementation of ADS-C and CPDLC, for consideration by the ATM/AIS/SAR/SG. The outcomes in this regard have been included in Agenda Item 3.2 of this report.

SCM for Implementation of Reduced Horizontal Separation on ATS Routes L642 and M771, and the Second and the Third Meetings of South-East Asia Required Navigation Performance (RNP) Implementation Task Force (SCM/RNP10, RNP-SEA/TF 2 & 3)

3.5.16 The following are main points of interest arising from SCM/RNP 10 (September 2007, Singapore) and RNP-SEA/TF/2 (March 2008, Singapore) & 3 (June 2008, Bangkok):

a) all affected States supported the implementation of 50NM lateral/50NM longitudinal reduced horizontal separations on RNAV routes L642 and M771 in South China Sea based on RNP 10;

b) target implementation date of 3 July 2008 was agreed;

c) noted the engagement of a safety assessment expert by Singapore;

d) proposed amendment to the *Regional Supplementary Procedures* (Doc 7030);

e) agreed that the safety assessment was robust and the safety assessment supported the implementation of 50 NM/50 NM horizontal separation on L642 and M771;

f) noted that Singapore had adopted the title *"South East Asia Safety Monitoring Agency"* (SEASMA) as the name for the SMA; and

g) agreed to a 'Go" decision for the implementation of 50 NM/50NM reduced horizontal separations, with effect from early July 2008.

3.5.17 The reduced horizontal separations of 50NM longitudinal and 50NM lateral based on RNP 10 on RNAV routes L642 and M771 were successfully implemented at 2100 UTC on 2 July 2008 as planned.

Seventh and the Eight Meetings of FANS Implementation Team, Southeast Asia (FIT-SEA/7 & 8)

3.5.18 The meeting noted the following highlights of the work of FIT-SEA:

a) Viet Nam conducted the ADS/CPDLC Phase 2 trial on six oceanic RNAV routes of L625, L628, M765, M768, N500 and N892 in the Ho Chi Minh FIR;

b) The system performance in Singapore and Viet Nam satisfied the FOM criteria in all elements, but the CPDLC downlink performance in Viet Nam only marginally met the criteria;

c) FIT-SEA/7 recognized that the Manila FIR was the last integral part for the seamless data link operations in the entire South China Sea area and formulated a draft recommendation for consideration by SEACG/15 in May 2008, urging the Philippines to take appropriate steps for data link services to be provided in the Manila FIR as soon as possible.

d) Viet Nam reported to FIT-SEA/8 that the post implementation outcomes of the ADS/CPDLC operations were satisfactory and expressed that they were looking forward to further cooperation, support and assistance from Japan for their CRA services, Singapore, ICAO, IATA and others concerned for the enhancement of ADS/CPDLC operations in the Ho Chi Minh FIR.

Third and Fourth meetings of the Western Pacific/South China RVSM Scrutiny Group (WPAC/SCS RSG/3 & 4)

3.5.19 The WPAC/SCS RVSM Scrutiny Group was formed by APANPIRG to address the continued exceedance of the TLS in WPAC/SCS RVSM operations. Existing flight level arrangements had resulted in the need to continuously transition the flight levels of many flights entering and leaving the WPAC/SCS area between the modified single alternate FLOS in the WPAC/SCS area and the single alternate FLOS in surrounding RVSM areas. In order to minimise flight level transition requirements for flights entering and leaving the WPAC/SCS area, affected States agreed to implement revised flight level arrangements during July 2008, comprising:

a) a single alternate FLOS (i.e. 'east odd flight levels, west even flight levels') in compliance with the Table "RVSM-FEET" of Appendix 3 of Annex 2 and in accordance with the FLOS in surrounding areas;

b) special high capacity arrangements for six unidirectional parallel routes (L642, M771, N892, L625, N884 & M767) that involve managed use of odd and even flight levels in the same direction of flight; and

c) an associated FLAS agreed between affected ACCs to facilitate ATC 'No-PDC' operations.

3.5.20 Additionally, the following significant issues were identified and were being progressed by the WPAC/SCS RSG:

a) that TLS has now been met for WPAC/SCS area as a direct result of the work of the Scrutiny Group;

b) work actively continues in terms of identifying the reasons for Large Height Deviations (LHDs) and implementing solutions;

c) as a result of the implementation of RVSM in China during November 2007, a number of the RVSM transition requirements in FIRs neighboring the Bangkok FIR were eliminated which had improved ATC capability and flexibility; and

d) Indonesia would make FL 290 and FL 300 available as part of the RVSM level band in Indonesian airspace from early July 2008;

3.5.21 ATM/AIS/SAR/SG/18 noted the very positive outcomes of the Scrutiny Group which were evident in the improved safety performance being demonstrated. The implementation of the new flight level arrangements in early July was expected to bring additional improvements to safety performance. The meeting considered that these outcomes had been achieved in an exceptionally short time frame, given their complexity and the number of parties' involved in the coordination process. This was a tribute to the performance of all members of the Scrutiny Group and demonstrated the effectiveness of the Scrutiny Group mechanism in providing a 'core team' focused approach to address a specific problem.

3.5.22 The meeting was informed that widespread implementation of new flight level arrangements in the Western Pacific/South China Sea area took place smoothly and successfully at 2100 UTC on 2 July 2008 as planned, in conjunction with a number of supporting changes to ATS routes and the increase of RVSM flight level band in Indonesian FIRs. The meeting commended the excellent outcomes in this regard.

Second Meeting of the Trans-Regional Airspace and Supporting ATM Systems Steering Group (TRASAS/2)

3.5.23 TRASAS/2 noted the activities of the following forums: the related Planning and Implementation Regional Groups (PIRGs) and North Atlantic System Planning Group Special 2007 meetings; the first meeting of the Asia/Pacific Performance Based Navigation Task Force; the 32nd meeting of the RVSM Implementation Task Force regarding the implementation of RVSM in the Chinese airspace; GREPECAS/14; the 5th Special ATS Coordination Meeting – China, Mongolia, Russian Federation and IATA (CMRI/5); and the 4th Meeting of the Cross-Polar Working Group (CPWG/4). An update was also received on the implementation of an internet-based automated flow management tool (BOBCAT – Bay of Bengal Cooperative ATFM System), and on the progress of regional partnerships for increasing efficiency and reduction of greenhouse gas emissions in aviation.

3.5.24 TRASAS/2 noted the progress on Data Link Harmonization activities in the European (EUR) and North Atlantic (NAT) Regions, and agreed to invite APANPIRG/19 to consider a draft Conclusion TRASAS/2 - 1 – Data Link Harmonization Strategy. The outcomes in this regard have been included in Agenda Item 3.2 of this report.

Inter-Regional Afghanistan Interface meeting (IRAI)

3.5.25 The Afghanistan area represents the interface between three of the ICAO Regions (Asia, Middle East and European), which lie under the jurisdiction of the ICAO Regional Offices in Bangkok (Thailand), Cairo (Egypt) and Paris (France), respectively. Accordingly, the primary objective of the IRAI meeting, held in Cairo, Egypt, was to bring as many of the affected parties as possible to a face-to-face meeting forum at which matters of mutual interest would be progressed.

3.5.26 Afghanistan provided a comprehensive briefing to the IRAI meeting regarding many aspects of the transition of civil aviation responsibilities in the Kabul FIR. Because of the security situation in Afghanistan, in coordination with the Secretary General of ICAO an arrangement was made in 2003 to allow control of the airspace in the Kabul FIR by a combined military agency, known as the Airspace Control Authority (ACA). This arrangement will remain in place until adequate facilities and resources are available within the Afghanistan Ministry of Transport and Civil Aviation (MOTCA).

3.5.27 To assist in the process of preparing for return of airspace management responsibilities, MOTCA has engaged the ICAO Technical Cooperation Bureau (TCB) to provide a project team in Kabul to manage and implement the project for Transition of Civil Aviation responsibilities. The TCB team includes technical experts in Air Traffic and Airspace Management and the many other disciplines necessary for transition of responsibilities.

3.5.28 As part of this work, specific advice is being provided in respect to the implementation of RVSM and planning will take into account schedules for implementation in adjacent States wherever possible, with the objective of achieving coordinated RVSM implementations. Although recognized as being in excess of ICAO provisions, in light of the complex traffic circumstances in Kabul FIR MOTCA has adopted the provision of adequate electronic surveillance of those air routes to be used by RVSM traffic as one of the major requirements for RVSM implementation. Current planning indicates that RVSM implementation is unlikely to occur prior to 2010.

3.5.29 MOTCA has recognized that the current air-ground and ground-ground coordination communications infrastructure in the Kabul FIR and with adjacent States is not sufficiently robust or extensive to support RVSM. A high priority in the planning is improvement of the ground-ground coordination communications with adjacent States and MOTCA has had discussions with relevant agencies and is preparing a project to improve coordination with adjacent States and extend and upgrade the existing VSAT network.

3.5.30 Over recent months the Kabul ACC has taken the initiative to draft updates to many of the operational Letters of Agreement (LOAs) with the ACCs surrounding Afghanistan. Accordingly, updated draft LOAs for most of the Afghanistan interfaces were now available and Afghanistan was actively seeking opportunities to coordinate with surrounding States and agencies to finalise and sign the updated LOAs.

3.5.31 Afghanistan continued to participate actively in the work of the ATFM/TF, as described in paragraphs 3.5.3 to 3.5.6 above, leading to the extension of RNAV route UL333 and lifting of westbound restrictions on B466 in the Kabul FIR.

Twenty-Second Meeting of the Informal South Pacific Air Traffic Services Co-ordination Group (ISPACG)

3.5.32 Descriptions of ongoing activities and future plans within the ISPACG are summarized below:

a) UPRs were being introduced between Japan and New Zealand, with a paper trial proposed between Japan and Brisbane/Sydney/Cairns;

b) SEAC Tahiti reported that it was aggressively working to make the Dynamic Airborne Reroute Programmes (DARPs) available within the Tahiti FIR from mid-2009, radar services (including safety nets) from July 2009 and a reduction of oceanic en-route separation minima in 2009-2010;

c) Airports Fiji Ltd. reported two major projects: ADS-B/ATM Equipment Replacement Project and the Automated Message Handling System (AMHS) Project that includes an AIS system. Both projects are due for implementation in the first quarter of 2009;

d) The FAA reported that a study indicated that flexible laterally separated tracks were more fuel efficient than fixed tracks, and paper trials would commence in April 2008. The FAA has conducted HF data link trials on two Hawaiian Airlines flights and is sponsoring Iridium trials. The FAA will conduct a risk collision model on 50NM longitudinal separation in the Anchorage FIR;

e) Papua New Guinea Air Services Ltd (PNG ASL) announced a major restructuring over the last six months in the former Civil Aviation of Papua New Guinea;

f) Airways New Zealand (ANZ) reported a six month operational trial using FMC Way Point Reporting with the SATCOM equipped ANZ A320 fleet on 31 March 2008. UPRs have been implemented on South American routes with LAN Chile to/from Santiago; and

g) Oceanic airspace is the main re-entry point for the world's space debris. This important issue which affects everyone needs a uniform approach and would continue to be addressed by ISPACG participants.

Twenty-Seventh and Twenty-Eighth Meetings of the Informal Pacific Air Traffic Control Coordinating Group (IPACG/27 and IPACG/28)

3.5.33 The following are the summaries of the agreements reached at IPACG 27/FIT 14 and IPACG 28/FIT 15:

a) An ATFM data exchange agreement was signed between the FAA and Japan Civil Aviation Bureau (JCAB). Current plans are to complete all work to start actual data exchange by March 2011.

b) Fukuoka ATM Centre (ATMC) and Oakland ARTCC began a trial utilizing 50 NM longitudinal separation to aircraft crossing their common boundary between Asia and Hawaii on 13 March 2008.

c) JCAB concluded that a 10 minute interval of ADS periodic reporting would be used when implementing a longitudinal 30 NM, in a phased manner, beginning in August 2008 in the Fukuoka FIR.

d) Through the coordinated efforts of Fukuoka ATMC, Guam Center and Radar Approach Control (CERAP) and Oakland Center, ARINC and Jeppesen, the monumental undertaking to realign 13 ATS routes and establish a new route (M756) was completed on 30 August 2007.

e) The FAA and JCAB agreed to conduct a DARP trial on Tracks 14/15 within Oakland FIR, and based on the results, possibly agree to implement DARP throughout the Central Pacific. A target start date will be coordinated by Oakland Center and outcomes will be coordinated with JCAB and IPACG.

f) Fukuoka ATMC and FAA Air Traffic Control System Command Center (ATCSCC) agreed to work together on the establishment of routine and regular operational teleconferences to improve communication and collaboration between the two facilities.

g) The FAA presented an update on the Asia and South Pacific Initiative to Reduce Emissions (ASPIRE) Partnership, and how the FAA and JCAB could begin working together to expand the objectives of ASPIRE to the North Pacific.

Second and the Third Meetings of the Arabian Sea/Indian Ocean ATS Coordination Group (ASIOACG/2 & 3)

3.5.34 The following are main points of interest arising from ASIOACG/2:

a) Australia reported on 30/30 NM implementation plans in the Indian Ocean, ADS-B and ADS-C/CPDLC data link services;

b) Maldives confirmed that PBN-based TMA procedures for Male International Airport were introduced during 2005;

c) Mauritius and Melbourne ACCs had implemented AIDC messaging in 2006;

d) Seychelles advised that plans to introduce ADS-B and ADS-C/CPDLC data link communications in 2009 and 2010, respectively;

e) Sri Lanka had implemented 24 hour ADS-C/CPDLC data link communications throughout the Colombo FIR in 2006; and

f) A small working group was established to review the requirements for continuation of the flight level allocation scheme (FLAS) which currently exists between the Muscat and Mumbai FIRs.

3.5.35 ASIOACG/3 was informed of the following matters:

a) Australia had plans for a ground/ground voice coordination trial with Mauritius in 2009 and would implement RNP4 in the Indian Ocean (Melbourne FIR) in the latter part of 2008;

b) Agreements had been signed between India and IATA, and IATA and Boeing, in regard to funding arrangements for the BOB-CRA. Provision of data link services by Mumbai ACC would extended from 17 hours per day to H24 in October 2008;

c) Advanced discussions were taking place by Indonesia with SITA and it was anticipated that operational trials of ADS/CPDLC will commence in late 2008;

d) Maldives had extensive discussions with Sri Lanka and airlines on flex tracks and fixed connector routes;

e) Mauritius was working towards "voiceless" ATS coordination between Mauritius and Melbourne ACCs and would implement RNAV SIDs and STARS by the end of 2008;

f) Oman had recently commissioned 4 new radar systems and it was expected that the minimum radar separation would be reduced from 8 NM to 5 NM. A total of 6 new Airports (3 Domestic and 3 International) would be open in the Sultanate of Oman by the year 2011;

g) Seychelles had completed the VHF replacement programme in May 2008 with new VSAT facilities and improved VHF coverage;

h) States with FIRs bordering Africa region FIRs agreed to take all necessary action to ensure full preparedness for RVSM implementation on 25 September 2008;

i) In regard to the FLAS between Mumbai and Muscat FIRs, agreement was reached for a trial suspension of FLAS on a daily basis from 0530 to 0930 UTC daily, commencing 15th August 2008; and

j) Work on ATS route changes and proposals, including re-designation of ATS Routes as RNAV in the Colombo, Melbourne and surrounding FIRs and UPR and flex track arrangements between South Africa and South East Asia continued.

Proposed Indian Ocean/Arabian Sea Route Review Working Group

3.5.36 It was agreed that ASIOACG would establish the *"CNS/ATM Route Review Working Group"* - to work in cooperation with and to build on the initial work already undertaken by IATA. ASIOACG considered that ICAO should be involved at an early stage and foresaw the need for establishment of an ICAO Task Force to provide overall leadership and coordination across the three ICAO Regions concerned and to build on the work of the ASIOACG CNS/ATM Route Review Working Group. This matter is further discussed in Agenda Item 3.6 to this report.

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AFGHANISTAN
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AIP SUPPLEMENT (SUP)

01/08

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DATE: 28 AUG 08

EXTENSION OF RNP10 ROUTE UL333

1. INTRODUCTION

1.1 The purpose of this AIP Supplement (SUP) is to notify the extension of RNP 10 route UL333 with effect from 0001 UTC on 28th August 2008.

2. EXTENSION OF RNP10 ROUTE UL333

2.1 Details of the extended bi-directional RNP10 route UL333, applicable within the Kabul FIR between SOKAM and SERKA, are shown in Appendix 1. The purpose of extending this route is to alleviate the separation problems caused by bunching of flights during the nightly operational hours of ATFM procedures. Operating procedures and restrictions applicable to UL333 within the Kabul FIR are detailed below.

3. RNP 10 NAVIGATION REQUIREMENTS

3.1 RNP 10 approval is mandatory for aircraft to fly on UL333. Pilots must advise ATC of any deterioration or failure of the navigation systems below the navigation requirements for RNP 10.

3.2 Pilots of aircraft meeting RNP 10 navigation requirements must indicate /R in Item 10 of the ICAO Flight Plan.

4. AIRCRAFT NAVIGATION PERFORMACE

4.1 Aircraft navigation performance shall be such that the standard deviation of lateral track errors shall be less than 8.7 km (4.7 NM).

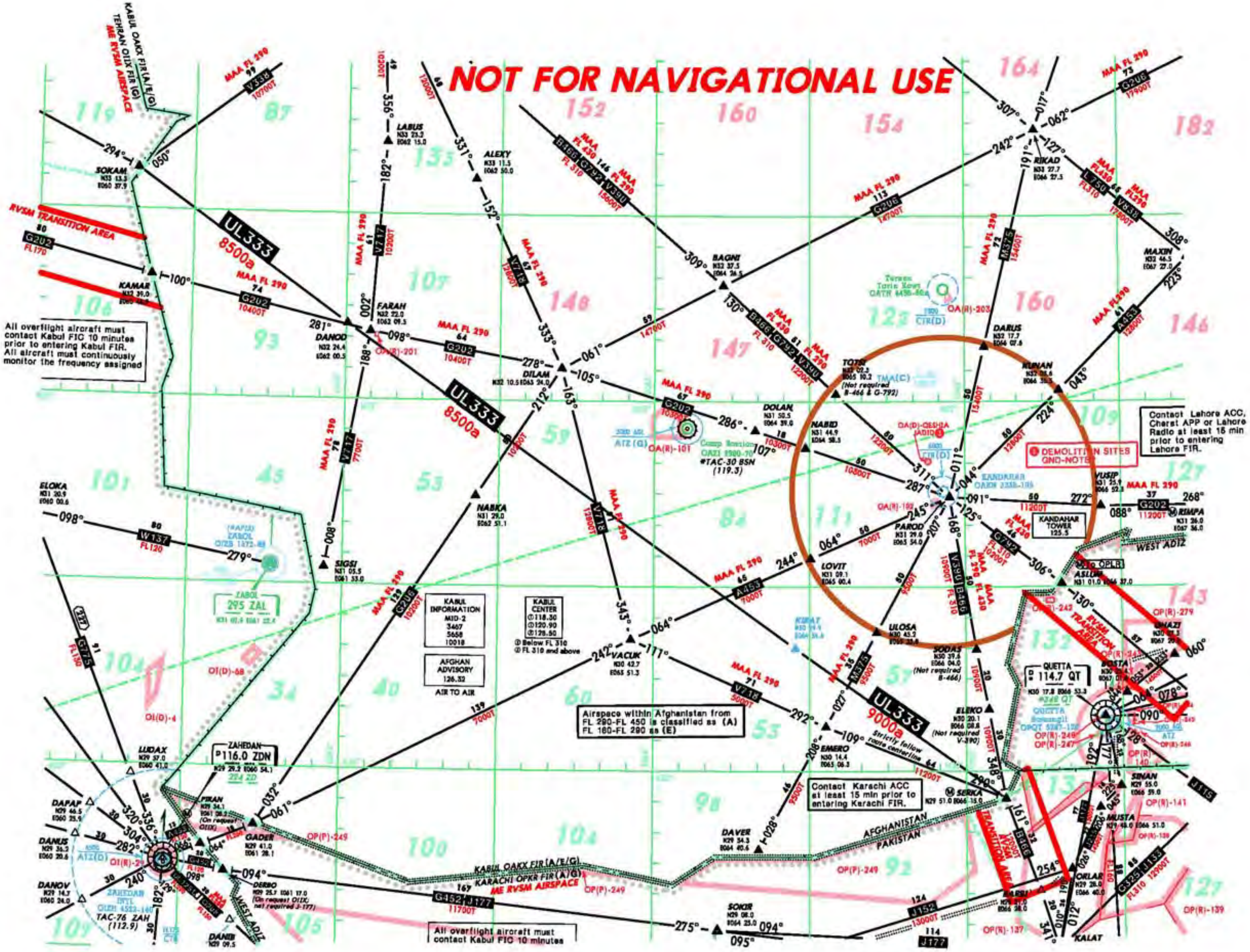
5. OPERATING LIMITATIONS

5.1 The following operating limitation is applicable to UL333 in the Kabul FIR aircraft only accepted at or above FL310.

6. OPERATORS PROCEDURES

6.1 Operator shall ensure in-flight procedures; crew manuals and training programmes are established in accordance with RNP 10 navigation requirements

APPENDIX 1
TO AIP SUPP 01/08 DATED 28 AUG 08



APPENDIX 1
TO AIP SUPP 01/08 DATED 28 AUG 08

AIR ROUTE	FIX — TO LAT/LONG	FIX LAT/LONG	MINIMUM OBSTACLE CLEARANCE (MOCA)	MINIMUM RADIO RECEPTION ALTITUDE (MRA)
UL333	**SOKAM** N33º13'16" E60º37'54"	**DANOD** N32º24'22" E62º00'32"	8 500	
	DANOD N32º24'22" E62º00'32"	**KIRAT** N30º39'54" E64º54'37"	8 500	
	KIRAT N30º39'54" E64º54'37"	**SERKA** N29º51'00" E66º15'00"	9 000	

```
A1027/08 NOTAMN
A) OAKX
B) WIE
C) 0809250259
E) QXXXX AFGHANISTAN AIP SUPP 01/08 EXTENSION OF RNP10 ROUTE UL333
EFFECTIVE 28 AUG 08 IS AVAILABLE AT THE MOTCA WEB PAGE:
HTTP://WWW.MOTCA.GOV.AF/  IF THE AIP SUPP DOES NOT APPEAR, HIT THE
REFRESH BUTTON ON YOUR WEB BROWSER OR CLEAR YOUR CACHE.
CREATED: 07 Jul 2008 09:37:00
SOURCE: OAKBYNYX
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AIP SUPPLEMENT

TEL: 91-11-24632950 Extn: 2219/2233 AFS: VIDDYXAX FAX: 91-11-24615508 E_mail:- gmais@aai.aero	AERONAUTICAL INFORMATION SERVICES AIRPORTS AUTHORITY OF INDIA RAJIV GANDHI BHAVAN SAFDARJUNG AIRPORT NEW DELHI - 110003	40/2008 **01 JULY 2008**

File No. AAI/NAD/09-09/03/AIP-SUPP (Part-AIS)

Following supplement is issued for information, guidance and necessary action.

K. RAMALINGAM
CHAIRMAN
AIRPORTS AUTHORITY OF INDIA

[EFFECTIVE DATE TO BE NOTIFIED BY G-SERIES NOTAM]

SUB: ESTABLISHMENT AND OPERATION OF A CENTRAL REPORTING AGENCY FOR DATA LINK SERVICES

INTRODUCTION

1. In accordance with regional planning agreements made under the auspices of International Civil Aviation Organization (ICAO) to enhance the safety and efficiency of air navigation, data-link capabilities have been installed in the Chennai, Delhi, Mumbai, and Kolkata Flight Information Regions (FIRs) within the jurisdiction of the State of India.

2. In co-operation with ICAO and the International Air Transport Association (IATA), a Central Reporting Agency (CRA) facility has been established to provide routine system and specific problem analyses for the progressive implementation of data link operations within the Kolkata, Chennai, Mumbai and Delhi (FIRs). The CRA facility shall be provided by Boeing Company through Boeing Technology Services (Boeing) in accordance with an agreement between IATA and Boeing under which Boeing will establish and operate the CRA facility in collaboration with IATA with a view to investigate and resolve any data-link problems in the above FIRs.

3. Automatic Dependent Surveillance (ADS) and Controller/Pilot Data Link Communication (CPDLC) is now available at Kolkata and Chennai for the Bay of Bengal oceanic airspace of Kolkata and Chennai FIRs, at Mumbai for the oceanic airspace of Mumbai FIR and at Delhi for Delhi FIR.

4. It order to fund the cost of the CRA facility, the Airports Authority of India, on behalf of the State of India, authorized IATA to defray such cost in the form of an aeronautical charge from all operators entering Indian airspace of Kolkata, Chennai, Mumbai, and Delhi FIRs. To that end,

data on daily flight movements operating in the above airspace will be provided to IATA by the Airports Authority of India.

5. All operators operating aircrafts through the above mentioned FIRs are required to cooperate and comply with the CRA requirements as per this AIP supplement, as may be amended from time to time. Relevant operators will be advised of the CRA reports of investigation and any action recommended by CRA to remedy the failure of airborne equipment.

PROBLEM REPORTING

6. In accordance with the provisions of the FANS 1/A Operations Manual, all operators using the above airspace should submit problem reports arising from, or in connection with, the use of data link to the CRA facility at:

The Boeing Company
Email: dung.q.nguyen@boeing.com
For the attention of: Mr. Dung Nguyen, Senior Engineer

Cc Email: Bradley.D.Cornell@boeing.com
For the attention of: Mr. Bradley Cornell

Mailing address: The Boeing Company
P O Box 3707 MC 07-25
Seattle
WA 98124-2207 United States

THE CRA CHARGE

7. With effect from the date which will be notified through a NOTAM, all operators entering Indian airspace shall pay an aeronautical charge for the establishment and operation of the CRA facility (the CRA Charge). The CRA Charge, at the rate of USD4 per flight movement, shall be levied on all aircraft entering Indian airspace of Mumbai, Delhi, Chennai and Kolkata FIRs.

8. The CRA Charge shall be invoiced by and in the name of IATA and shall be payable to IATA.

9. The invoices to be submitted by IATA to the operators shall be denoted and settled in United States Dollars and will state:

i. The period for which they are applicable;
ii. In relation to the operators who are members of the IATA Clearing House (ICH) that the invoice shall be settled through the ICH in accordance with the ICH Regulations;
iii. In relation to operators who are not members of the ICH, that the invoices shall be settled within thirty (30) days of receipt, and payments shall be made to:

Bank: Union Bank of Switzerland UBS- AG
Rue du Rhone
1211 Geneva
Switzerland

Account Name:	International Air Transport Association
Account Number:	332.208.53K
SWIFT	UBSWCHZH12A
IBAN	CH65 0024 0240 3322 0853K

iv. That all amounts remaining unpaid after thirty (30) days of the invoice's receipt shall be subject to a late payment fee denominated in USD and computed monthly using the prime rate in effect as published and defined in the Wall Street Journal on the 15th day of the month as adjusted month to month, plus two percent (2%) on any outstanding balance;

v. That any dispute arising from or in connection with a invoice shall be notified promptly by the operator to IATA setting out the nature of the dispute and that the operator shall cooperate with AAI and IATA to resolve the dispute as soon as possible.

10. The provisions of this AIP Supplement are valid until otherwise modified through a NOTAM, if required.

Agenda Item 3.6: Other Air Navigation Matters

Agenda Item 3: Regional Air Navigation Planning and Implementation Issues

3.6 Other Air Navigation matters

China – Olympic and Paralympic Games

3.6.1 China informed the meeting that the Air Traffic Management Bureau (ATMB) of the Civil Aviation Administration of China (CAAC) took many actions before the Beijing Olympic Games to ensure the streamlined handling of increased traffic volumes. ATMB and CAAC coordinated closely with relevant State departments and developed both fixed and temporary measures to optimize airspace structure to achieve increased capacity and high efficiency.

3.6.2 The measures taken included the implementation of RVSM throughout China, significant reorganization of airspace, optimization of airspace usage, development of an Operations Coordination and Decision Making Mechanism, establishment of a Different Level Response & Coordination Mechanism, implementation of special Flight Plan Application and Approvals procedures, adoption of air traffic flow management (ATFM) measures, activation of temporary routes and holding areas, publication of Olympics related aeronautical information and provision of briefings to affected operators, etc. All these actions, and others, made a valuable contribution to China's preparations to meet the traffic demands precipitated by the Olympic and Paralympic Games.

3.6.3 In order to improve air traffic efficiency, ATMB introduced the concept of Collaborative Decision Making (CDM) and established an integrated coordination mechanism to resolve issues involving daily operations. Under the mechanism, ATMB, CAAC, Regional ATMBs, North China Meteorology Center, four domestic airlines and four domestic airports were appointed to be the responsible members to participate in the CDM activities. Video conferences for operations coordination were held everyday.

3.6.4 All aeronautical information was published by AIP China. The meeting was invited to refer to AIC Nr.01/08 and AIP SUP Nr.04/08 for the information. China also established the AIS website, **www.aischina.com**. so that all relevant information could be downloaded. Additionally, in order to help operators understand the policy and operation procedures, ATMB held the Olympics Games Air Traffic Management Arrangement Briefing meeting in Beijing on 9 July 2008.

3.6.5 From 1st to 24th August, the average number of landings and take-offs at Beijing Capital Airport was 1198 per day. Thursday 7th August was the busiest day during the Beijing Olympic period, with 1340 flights landing and taking off at Beijing Capital Airport. The 45 VIP flights and 316 Olympic family members' flights on this day helped result in a new record in Chinese air traffic management history. Conversely, traffic volumes on 8th August were the lowest recorded during the Olympics, with only 794 flight movements at Beijing Capital Airport, including 10 VIP flights and 141 Olympic family members' or sponsors' flights.

3.6.6 In order to ensure a safe airspace for the opening ceremony, a five-hour prohibition for all flights was carried out at Beijing Capital Airport from 1900 to 2400 (Beijing time) on 8th August 2008, except for those flights with special authorization directly serving the Games. However, during the 5 hour prohibition period only 50 flights to/from Beijing Capital Airport needed to be changed or cancelled by the prohibition and only 89 flights were requested to fly-by due to the prohibition.

CNS/ATM Implementation Programme in the Philippines by 2012

3.6.7 The Philippines informed the meeting that the Civil Aviation Authority in the Philippines (CAAP), created under Republic Act No. 9497, is mandated by law to provide the safe, orderly, and expeditious flow of air traffic to the Manila Flight Information Region (FIR), comprising an airspace of about 809,967 square nautical miles. Air traffic management within the FIR is the responsibility of the Manila Area Control Center (ACC), which is supported by one Sub-ACC, 13 Approach Control Units, 23 Aerodrome Control Units, 24 Flight Service Stations (FSS) and four Terminal Approach Radar Facilities.

3.6.8 The implementation of the New Communications, Navigation and Surveillance/Air Traffic Management (CNS/ATM) Systems Development Project funded under the 25th Yen Loan Package of Japan Bank for International Cooperation (JBIC) is proceeding in accordance with the ICAO Global Air Navigation Plan (Doc 9750) to cope with the projected increases in air traffic demand. This project is aimed at modernizing the Philippine air navigation systems using satellite technology and, at the same time, will replace vital and ageing air traffic control equipment in order to enhance the safety, reliability and efficiency of air traffic and airspace systems in the Philippines. The project will cover the construction/installation of the following facilities:

Manila ATM Center Building

3.6.9 Manila ATM Center will combine Manila ACC, Mactan Sub-ACC, and all approach control units. The Manila ATM Center building will be constructed inside the compound of the CAAP’s headquarters. The building will have a floor area of approximately 4,000 sq. meters, two-storey and reinforced concrete structures to accommodate the computer system that will provide the functions enumerated below.

ATM Automation System

3.6.10 The ATM automation system will be a modern and integrated system consisting of data processing subsystems, data acquisition subsystems, consoles, displays, etc. It will include provision for, amongst others, air traffic management functions, decision tools/safety alerts and warnings, weather information, data recording/playback and a training and evaluation system.

Aeronautical Information Service (AIS) System

3.6.11 The AIS system will collect and dispatch domestic and foreign notices to airmen (NOTAM) messages concerning the establishment, condition or change in any aeronautical facility, service, procedures, etc. The AIS database will be installed in Manila ATM Center and 48 AIS Workstations will be installed in major airports/sites to provide direct access to the latest AIS information for airline operators, pilots and ATS personnel.

VHF Terminal and RCAG Facilities

3.6.12 A component of existing VHF equipment will be replaced and additional VHF radios for RCAG facilities will be installed. Twenty-one sets of en-route VHF radios will be replaced/added in the en-route RCAG sites. Seven sets of terminal VHF radios will be replaced/added for major international airports.

Microwave Link

3.6.13 Microwave links are currently used for the transmission of VHF/HF voice signals and radar data between remote sites or airports and Manila ACC. The 10 sets of microwave links will be replaced.

Very Small Aperture Terminal (VSAT)

3.6.14 Since current ground-based leased lines are not reliable enough for ATS voice and data transmission between Manila ATM Center and remote airports or sites, VSAT links that are more reliable will be installed. One VSAT hub-station shall be installed at Manila ATM Center and 39 VSAT remote stations will be installed at major airports and sites to transfer data between the remote sites and the ATM Center.

Automatic Dependent Surveillance (ADS)

3.6.15 ADS-C will be applied for remote and oceanic airspace.

3.6.16 About five ADS-B ground stations will be installed to augment the surveillance capability provided by the existing en-route radar network and as back-up in case of radar outages. The consolidated ADS data will be integrated into the ATM automation system in Manila ATM center for display at the ATC workstation.

MTSAT Weather Receiver

3.6.17 A MTSAT weather receiving system will be installed in the weather information room of ATM Center building to provide synoptic weather forecasts, which are stored and distributed to the relevant portions within the MDPS and to the ATM automation system.

3.6.18 The Philippines informed the meeting that the project would be implemented in two packages, as shown below:

System	Package 1	Package 2
ATM	- Manila ATM Center Building - ATM Automation - AIS Database Server - AIS Workstation - Tower Workstation - CPDLC	-
COM	- VSCS - AMHS - Upgrade of Existing AMHS	- Terminal VHF Radio - RCAG VHF Radio - Microwave Link - VSAT
NAV	- GNSS Signal Monitoring System (GSMS)	-
SUV	- ADS-C	- ADS-B Ground Station - Terminal Radar - En-route SSR
MET	- WAFS Data Receiving System - MTSAT Weather Receiver - Met. Data Storage, Dist. and Display System	-

3.6.19 Current planning indicated that Package 2 would be fully implemented by January 2012, with Package 1 implemented by April 2012. This would be followed by a 12 month defects notification period for all aspects of the project, following which the project would be considered as completed.

ATS Routes - Arabian Sea/Indian Ocean ATS Coordination Group (ASIOACG)

3.6.20 ASIOACG/2 (January 2008) proposed the establishment of an Indian Ocean/Arabian Sea Route Review Working Group to review the existing and future ATS route structures in the southern Indian Ocean, the central Indian Ocean, and the Arabian Sea. ATM/AIS/SAR/SG/18 recommended that this should be formalised as there are three ICAO Regions involved; and stressed the importance of securing the support of both APANPIRG and MIDANPIRG for this Working Group to undertake a route review for the Arabian Sea and Indian Ocean Area.

3.6.21 Subsequently ASIOACG agreed to establish the *"CNS/ATM Route Review Working Group"* to commence work on some of these matters. However ASIOACG/3 recognized that the airspace under consideration by the CNS/ATM Route Review Working Group would be much broader than the ASIOACG area of interest; possibly encompassing all of the Indian Ocean and Arabian Sea oceanic airspace.

3.6.22 Accordingly, ASIOACG considered that ICAO should be involved at an early stage and foresaw the need for the establishment of an ICAO Task Force to provide overall leadership and coordination across the three ICAO regions concerned and to build on the work of the ASIOACG CNS/ATM Route Review Working Group. In this regard Oman would present a paper to the next meeting of MIDANPIRG in February 2009 and ASIOACG requested IATA to present a working paper on the ASIOACG Route Review Working Group to the next meeting of APANPIRG in September 2008.

3.6.23 The meeting noted the information from ASIOACG. IATA updated the meeting that the matters raised by ASIOACG had been incorporated by IATA for consideration with the IATA Statement of users expectations described in Agenda Item 3 of this Report.

AGENDA ITEM 4: REGIONAL AIR NAVIGATION DEFICIENCIES

Agenda Item 4: Regional Air Navigation Deficiencies

4.1 The meeting noted that APANPIRG/18 placed highest priority in its future work programme on the urgent elimination of the safety related deficiencies in the region and decided to set up a performance objective related to the resolution of deficiencies calling upon States to establish action plans with target dates, and to inform the Regional Office of their plans. The meeting recalled the APANPIRG Conclusion 18/60 on the provision of a regional on-line database for air navigation deficiencies and noted that it is available through the ICAO APAC website www.bankok.icao.int via secure access provided by the Regional Office to States and International Organizations concerned

4.2 The meeting was informed that the APANPIRG deficiencies were further reviewed during the 44th DGCA Conference at Xian, China (October 2007) and Action Item 44/1 was raised urging Asia Pacific States to take action on APANPIRG Conclusions 18/60 and 18/62, and to collaborate in resolving of the safety related deficiencies according to the established action plans.

4.3 The meeting thanked IFALPA for providing the Regional Office with information on deficiencies at airports in the Asia/PAC regions and requested its continuous support in future.

4.4 The meeting urged States who have not provided the name of the contact person to coordinate with the Regional Office on matters related to deficiencies to do so immediately. Recognizing the importance of safety in aviation the meeting urged States to resolve the air navigation deficiencies.

Deficiencies in the ATM/AIS/SAR fields

4.5 The meeting noted the updates to the List of Air Navigation Deficiencies in the ATM/AIS/SAR fields received by ATM/AIS/SAR/SG/18 and encouraged States to continue to update the Regional Office as soon as deficiencies were resolved. States were to formally advise the Regional Office by letter of any updates, including those changes which had been verbally informed during the Sub Group meeting. The meeting took note that the Regional Office was liaising with the States to establish the current position on Conclusion 18/59 in relation to West Pacific Small Island Developing States to provide direct assistance before establishing a Technical Corporation Bureau (TCB) project.

4.6 The meeting recalled that APANPIRG/18 had raised Conclusion 18/2 – Non-Provision of Safety-Related Data by States. In reviewing this situation, the meeting was pleased to agree with the recommendation from RASMAG/9 that Fiji, Lao PDR and Tahiti be removed from the deficiencies list. Further details in this respect are included in Agenda Item 3.3 of this report.

4.7 The updated List of Air Navigation Deficiencies in the ATM, AIS and SAR fields is in **Appendix A** to the report on agenda item 4.

Deficiencies in the AOP field

4.8 The following updates from States/ ICAO mission have been received.

4.9 New Zealand advised that the construction of a 90m RESA at the southern end of Wellington International Airport runway has been completed. The 90m RESA at the northern end of runway has been completed but final CAA approval is awaited and is expected by October 2008.

4.10 Nepal advised that the high ground inside the airport has been removed completely and verbal negotiations with the stakeholders for dismantling the temple subject to replacement to other place have been made. The expected date of completion is December 2008.

4.11 The meeting noted that the Regional Office has assessed the IFALPA information in accordance with the established procedures and requested the concerned States to validate the status. Japan updated the status of the IFALPA information related to their State.

4.12 The updated List of Air Navigation Deficiencies in the AOP field is in **Appendix B** to the report on Agenda Item 4.

Deficiencies in the CNS/MET fields

Deficiencies in the CNS fields

Air-ground VHF Communication in Yangon FIR

4.13 The meeting was informed that the VHF systems within the Yangon FIR were upgraded using 6 RCAG sites supported by VSAT links to Yangon ACC in 2005 and that IATA regularly provided monitoring reports on the air/ground communications status within Yangon FIR. The reports in early 2008 indicated that some improvements for VHF communication had been achieved. However, some communication difficulties are still experienced by some pilots flying over the FIR. The shortage of manpower in the ATC could be one of the reasons for the poor communications as highlighted in ICAO mission reports for urgent attention by the Administration

ATIS at Dhaka and Kathmandu

4.14 The meeting noted that the ATIS function had not been implemented in Dhaka and Kathmandu for a long time due to an equipment problem. These deficiencies adversely affect the quality of VHF communication. Channel congestions during peak hours affect the Tower and Approach control frequencies because of the exchange of MET and other operational information which should have been broadcasted on ATIS. These deficiencies need to be corrected as soon as possible by implementing ATIS. On 29 August 2008 Nepal reported that the ATIS is now operating normally.

Hong Kong – Manila AFS circuits

4.15 The meeting was informed about the unstable and unreliable performance of the AFTN circuit between Hong Kong and Manila for exchanging safety related ATS messages. Hong Kong China expressed deep concern about this deficiency and confirmed that both ATS Direct Speech and AFTN circuits between Hong Kong and Manila have been out-of-service since June 2008. Philippines informed the meeting that full operation using two X.25 circuits will be restored by 30 September 2008.

4.16 The updated List of Air Navigation Deficiencies in the CNS field is in **Appendix C** to the report on Agenda Item 4.

Deficiencies in the MET fields

4.17 The meeting was informed that in the APANPIRG list of MET deficiencies, 15 items related to 10 States in the general categories of OPMET, MWO, SIGMET, SIGMET (VA related) and Volcanic Activity Dissemination. The status of volcanic ash related deficiencies for Indonesia, Philippines and Papua New Guinea was given by VAAC Darwin. No updates were available for the provision of SIGMET for Lao PDR, Myanmar, Nepal and Cambodia.

4.18 The meeting was informed that the ICAO Technical Cooperation Project *Cooperative Agreement for Enhancement of the Meteorological Service for Aviation in the South Pacific (CAEMSA-SP)* has been initiated recently. The project will assist in resolving the MET deficiencies in the sub-region.

4.19 The updated List of Air Navigation Deficiencies in the MET field is in **Appendix D**- to the report on Agenda Item 4.

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AIR NAVIGATION DEFICIENCIES IN THE ATM/AIS/SAR FIELDS IN THE ASIA/PACIFIC REGION

(Changes agreed by APANPIRG/19 are shown in strikeout and underlining.) ***(last updated 5 September 2008)***

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date for completion**	**Priority for action****
ATS Routes								
Requirements of Part VIII, Table ATS 1 of the Air Navigation Plan	India/Nepal	A473 - Not implemented	16/3/99	A new proposal was submitted in mid 2003 by Nepal. This is being coordinated by AAI with defense authorities.	India/Nepal - ~~implement the route~~ propose to delete A473 from BANP. India submitted the proposal in March 2008. Nepal still to submit.	~~India/~~Nepal	Item captured in Chapter 2 of the Route Catalogue. ~~ATM/AIS/SAR/G/16 (June 2006)~~APANPIRG/19 (September 2008) updated re progress.	B
	China	B591 - Partially implemented	22/7/97		China will consider future imeplementation.	China	Reviewed by ARNR/TF. Item captured in Chapter 2 of the Route Catalogue ATM/AIS/SAR/G/16 (June 2006) updated - route implemented in Shanghai FIR, however implementation is not in accordance with BANP, further implementation TBD	B
	~~Cambodia/~~Philippines/ Thailand/Viet Nam	G473 - Partially implemented	24/11/93	Co-ordination is in progress among States and ICAO.	~~ICAO~~ Philippines/ Thailand/Viet Nam - propose deletion from BANP. States need to submit amendment proposal to Regional Office.	~~Cambodia /~~Philippines Thailand/Viet Nam~~/ICAO~~	Superceded by the re-structuring of the South China Sea (SCS) Route structure in 2001. Accordingly, SEACG/15 (May 2008, Bangkok) was informed that Thailand and States concerned agreed with the deletion of G473.	B

AIR NAVIGATION DEFICIENCIES IN THE ATM/AIS/SAR FIELDS IN THE ASIA/PACIFIC REGION

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date for completion**	**Priority for action****
	China/Kazakhstan	R216 - Not implemented	24/11/93	CAAC advises current route B215 KUQA A460 REVKI to Alma Ata meets the requirements for traffic from Urumqi to Alma Ata and requests deletion of R216 from BANP (14 Apr 03).	CAAC will coordinate with Kazakhstan to delete R216 from BANP.	China/Kazakhstan ICAO	Captured in Chapter 2 of the Route Catalogue.	B
	Cambodia/Lao PDR/Thailand	R345 - Not implemented. Under the coordination process.	24/11/93			Cambodia/Lao PDR/ Thailand need to submit joint amendment proposal to Regional Office	Item captured in Chapter 2 of the Route Catalogue.	B
	Indonesia	R459 - Implemented as W51 and W36	24/11/93	ICAO has requested Indonesia to implement as R459.	Indonesia, Singapore - consider implementation of the route with designator L504.	Indonesia/Singapore	To be implemented as L504. Target implementation date ~~TBD~~ 2008	B

AIR NAVIGATION DEFICIENCIES IN THE ATM/AIS/SAR FIELDS IN THE ASIA/PACIFIC REGION

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date for completion**	**Priority for action****
WGS-84								
Requirements of Paragraph 3.6.4 of Annex 15	Bhutan	WGS-84 - Not implemented	2/7/1999	Data conversion completed, but not published		Bhutan	TBD	A
	Cambodia	WGS-84 - Partially implemeted	28/6/2001	Cambodia reported to ATM/AIS/SAR/SG/18 in June 2008 that the WGS-84 coordinates had been implemented at international airports, airspace and international routing. Domestic airports and routes have not been implemented with WGS-84.		Cambodia	~~TBD~~2009/2010	A
	China	WGS-84 - Not implemented * implemented in the Sanya FIR as of 1 Nov 2001	2/7/1999	Differences to Annex 15 - *Aeronautical Information Services* are notified		China	China advised APANPIRG/19 that WGS-84 implementation is in progress and planned to be completed in 2010 for all existing airports. All new airports will use WGS84 immediately.	A
	Kiribati	WGS-84 - Not implemented				Kiribati	TBD	A
	Nauru	WGS-84 - Not implemented		Conferring with consultant		Nauru	TBD	A
	Solomon Islands	WGS-84 - Not implemented				Solomon Islands	1999	A

AIR NAVIGATION DEFICIENCIES IN THE ATM/AIS/SAR FIELDS IN THE ASIA/PACIFIC REGION

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date for completion**	**Priority for action****
	Vanuatu	WGS-84 - Implemented at main airports	2/7/1999			Vanuatu	1999	A

AIR NAVIGATION DEFICIENCIES IN THE ATM/AIS/SAR FIELDS IN THE ASIA/PACIFIC REGION

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date for completion**	**Priority for action****
Airspace Classification								
Requirements of Paragraph 2.6 of Annex 11	China	Airspace Classification - Not implemented	7/7/99		Difference to Annex 11 is published in AIP, China.	China	APANPIRG/19 informed that implementation planned by end 2010	A
	DPR Korea	Airspace Classification - Not implemented	7/7/99			DPR Korea	~~2005~~mid-2009	A
	Kiribati	Airspace Classifcation - Not implemented	7/7/99			Kiribati	TBD	A
	Nauru	Airspace Classification - Not implemented	7/7/99			Nauru	TBD	A
	Papua New Guinea	Airspace Classification - Not implemented	7/7/99			Papua New Guinea	Project in place	A
	Solomon Islands	Airspace Classification - Not implemented	7/7/99			Solomon Islands	TBD	A
	Viet Nam	Airspace Classification - Not implemented	7/7/99			Viet Nam	~~National Assembly adopted Civil Air Law on 29 June 2006, ATS regulations will be re-issued accordingly.~~ APANPIRG/19 informed for implementation first quarter 2009	A

AIR NAVIGATION DEFICIENCIES IN THE ATM/AIS/SAR FIELDS IN THE ASIA/PACIFIC REGION

Identification		**Deficiencies**			**Corrective Action**			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date for completion**	**Priority for action****
AIP Format								
Requirements of Chapter 4 of Annex 15	Cook Islands	AIP Format - Not implemented	7/7/99			Cook Islands	ATM/AIS/SAR/G/16 (June 2006) updated - AIP COOK ISLANDS in new format in progress with assistance of New Zealand, effective date ~~TBD~~ by the end of 2008	A
	Kiribati	AIP Format - Not implemented	7/7/99			Kiribati	ATM/AIS/SAR/SG/18 advised AIP in draft stage	A
	Nauru	AIP Format - Not implemented	7/7/99			Nauru	ATM/AIS/SAR/SG/18 advised work soon to start	A
	Papua New Guinea	AIP Format - Not implemented	7/7/99	under development		Papua New Guinea	TBA	A

AIR NAVIGATION DEFICIENCIES IN THE ATM/AIS/SAR FIELDS IN THE ASIA/PACIFIC REGION

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date for completion**	**Priority for action****
SAR capability								
Requirements of Annex 12	Cook Islands	Annex 12 requirements not implemented. No agreements with adjacent States.	31/1/95	SAR agreement with New Zealand completed 2007	Cook Islands - implement Annex 12 requirements and co-ordinate LOA with adjacent States ICAO - assist to develop SAR capability and to co-ordinate with adjacent States	Cook Islands	~~2004~~ 2009	U
	Maldives	Annex 12 requirements not implemented. No agreements with adjacent States.	24/4/97	SAR services and facilites provided (details to be confirmed). SAR agreements with neighbouring States under development	Maldives - implement Annex 12 requirements and co-ordinate LOA with adjacent States ICAO - assist to develop SAR capability and to co-ordinate with adjacent States	Maldives	~~2004~~ 2009	U

AIR NAVIGATION DEFICIENCIES IN THE ATM/AIS/SAR FIELDS IN THE ASIA/PACIFIC REGION

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date for completion**	**Priority for action****
Carriage of ACAS II								
Requirement of Chapter 6 of Annex 6	Bhutan	Annex 6 requirement not implemented.	26/8/05		Bhutan - implement Annex 6 as required.	Bhutan	TBD	U
	Cook Islands	Annex 6 requirement not implemented.	26/8/05		Cook Island - implement Annex 6 as required.	Cook Islands	TBD	U
	Kiribati	Annex 6 requirement not implemented.	26/8/05		Kiribati - implement Annex 6 as required.	Kiribati	TBD	U
	Marshall Islands	Annex 6 requirement not implemented.	26/8/05		Marshall Islands - implement Annex 6 as required.	Marshall Islands	TBD	U
	Micronesia	Annex 6 requirement not implemented.	26/8/05		Micronesia - implement Annex 6 as required.	Micronesia	TBD	U
	Nauru	Annex 6 requirement not implemented.	26/8/05		Nauru - implement Annex 6 as required.	Nauru	TBD	U
	Palau	Annex 6 requirement not implemented.	26/8/05		Palau - implement Annex 6 as required.	Palau	TBD	U
	Papua New Guinea	Annex 6 requirement not implemented.	26/8/05		Papua New Guinea - implement Annex 6 as required.	Papua New Guinea	TBD	U

AIR NAVIGATION DEFICIENCIES IN THE ATM/AIS/SAR FIELDS IN THE ASIA/PACIFIC REGION

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date for completion**	**Priority for action****
	~~Philippines~~	~~Annex 6 requirement not implemented.~~	~~26/8/05~~		~~Philippines - implement Annex 6 as required.~~	~~Philippines~~	~~Rules and regulations regarding carriage of ACAS II already incorporated in ATO Administrative Order no 121 series of 2001 under section 12.356(a) and (b) Completed~~	~~U~~
	Solomon Islands	Annex 6 requirement not implemented.	26/8/05		Solomon Islands - implement Annex 6 as required.	Solomon Islands	TBD	U
	Tonga	Annex 6 requirement not implemented.	26/8/05		Tonga - implement Annex 6 as required.	Tonga	TBD	U
	Vanuatu	Annex 6 requirement not implemented.	26/8/05	Pressure altitude reporting transponder required in all airspace since 1/1/00.	Vanuatu - implement Annex 6 as required.	Vanuatu	TBD	U

AIR NAVIGATION DEFICIENCIES IN THE ATM/AIS/SAR FIELDS IN THE ASIA/PACIFIC REGION

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date for completion**	**Priority for action****
Carriage of Pressure Altitude Reporting Transponder								
Requirement of Chapter 6 of Annex 6	Bhutan	Annex 6 requirement not implemented.	26/8/05		Bhutan - implement Annex 6 as required.	Bhutan	TBD	U
	~~Cambodia~~	~~Annex 6 requirement not implemented.~~	~~26/8/05~~	~~ACAS II required in all airspace within FIR since 1/1/03.~~	~~Cambodia - implement Annex 6 as required.~~	~~Cambodia~~	~~TBD Completed~~	U
	Cook Islands	Annex 6 requirement not implemented.	26/8/05		Cook Island - implement Annex 6 as required.	Cook Islands	TBD	U
	~~DPR Korea~~	~~Annex 6 requirement not implemented.~~	~~26/8/05~~	~~ACAS II required in all airspace within FIR since 1/1/01.~~	~~DPR Korea - implement Annex 6 as required.~~	~~DPR Korea~~	~~TBD Completed~~	U
	~~New Caledonia~~	~~Annex 6 requirement not implemented.~~	~~26/8/05~~	~~ACAS II required in all airspace within FIR since 23/1/03.~~	~~New Caledonia - implement Annex 6 as required.~~	~~New Caledonia~~	Completed	~~U~~
	Kiribati	Annex 6 requirement not implemented.	26/8/05		Kiribati - implement Annex 6 as required.	Kiribati	TBD	U
	~~Lao PDR~~	~~Annex 6 requirement not implemented.~~	~~26/8/05~~	~~ACAS II required in all airspace within FIR since 1/1/03.~~	~~Lao PDR - implement Annex 6 as required.~~	~~Lao PDR~~	~~Competed~~	~~U~~
	Marshall Islands	Annex 6 requirement not implemented.	26/8/05	ACAS II required.	Marshall Islands - implement Annex 6 as required.	Marshall Islands	TBD	U
	Micronesia	Annex 6 requirement not implemented.	26/8/05		Micronesia - implement Annex 6 as required.	Micronesia	TBD	U

AIR NAVIGATION DEFICIENCIES IN THE ATM/AIS/SAR FIELDS IN THE ASIA/PACIFIC REGION

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date for completion**	**Priority for action****
	Nauru	Annex 6 requirement not implemented.	26/8/05		Nauru - implement Annex 6 as required.	Nauru	TBD	U
	Palau	Annex 6 requirement not implemented.	26/8/05		Palau - implement Annex 6 as required.	Palau	TBD	U
	Papua New Guinea	Annex 6 requirement not implemented.	26/8/05		Papua New Guinea - implement Annex 6 as required.	Papua New Guinea	TBD	U
	~~Philippines~~	~~Annex 6 requirement not implemented. Implemented within TMA only.~~	~~26/8/05~~		~~Philippines - implement Annex 6 as required.~~	~~Philippines~~	~~TBD. Rules and regulations regarding carriage of pressure altitude reporting transponder already incorporated in ATO Administrative Order No 91, series of 2002 under section 91.215(a) & (b).~~ <u>Completed</u>	~~U~~
	Solomon Islands	Annex 6 requirement not implemented.	26/8/05		Solomon Islands - implement Annex 6 as required.	Solomon Islands	TBD	U
	Tonga	Annex 6 requirement not implemented.	26/8/05		Tonga - implement Annex 6 as required.	Tonga	TBD	U

AIR NAVIGATION DEFICIENCIES IN THE ATM/AIS/SAR FIELDS IN THE ASIA/PACIFIC REGION

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date for completion**	**Priority for action****
Non Provision of Safety-related Data								
Requirement of Paragraph 3.3.4.1 of Annex 11	~~Lao PDR~~	~~Annex 11 requirement not implemented.~~	~~21/8/06~~		~~Lao PDR - provide the safety-related data as required.~~	~~Lao PDR~~	~~TBD~~Completed	~~A~~
	Myanmar	Annex 11 requirement not implemented.	21/8/06		Myanmar - provide the safety-related data as required.	Mayanmar	TBD	U
	Papua New Guinea	Annex 11 requirement not implemented.	21/8/06		Papua New Guinea - provide the safety-related data as required.	Papua New Guinea	TBD	U
	~~Fiji~~	~~Annex 11 requirement not implemented.~~	~~21/8/06~~		~~Fiji - provide the safety-related data as required.~~	~~Fiji~~	~~TBD~~Completed	~~U~~
	~~Tahiti~~	~~Annex 11 requirement not implemented.~~	~~21/8/06~~		~~Tahiti - provide the safety-related data as required.~~	~~Tahiti~~	~~TBD~~Completed	~~U~~

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN AOP FIELD IN THE ASIA/PACIFIC REGION

- 1 -Identification		Deficiencies			Corrective Action			
Requirements	**State/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Date of completion**	**Priority for action**
Annex 14 Vol. I § 3.1.22	**Myanmar** Yangon/ Mingaladon	New runway surface slippery when wet**.**	2003	Surface of a paved runway shall be so constructed as to provide good friction characteristics when runway is wet.	RWY surface replaced; no new reports from airlines Final RWY layer still to be completed (update 2005)		On-going	“A”
Annex 14 Vol. I Amendment 6 *§ 10.1* *§ 10.2*				A maintenance programme should be established to maintain facilities in a condition which does not impair safety of air navigation.				“A”
Annex 14 Vol. I § 5.3.4		No approach Lighting RWY 03	1994	PAPI installed in 2002. Approach lights to be Installed when funds available.				
Annex 14 Vol. I § 4.2	**Nepal** Kathmandu	Top of temple infringes the transitional surface	2003	Airspace around aerodromes to be free from obstacles as defined by the obstacle limitation surfaces for safe aircraft operation.	Verbal negotiations with the stake holders for dismantling the temple subject to replacement to other place have been made. It is under the process of relocation to the suitable place.	CAAN	~~Apr. 2005~~ ~~Mid July 2008~~ December 2008	“U”

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN AOP FIELD IN THE ASIA/PACIFIC REGION

- 1 -Identification		Deficiencies			Corrective Action			
Requirements	**State/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Date of completion**	**Priority for action**
Annex 14 Vol. I § 3.4	New Zealand Wellington	Runway-end safety areas RWY 16/34 inadequate.	2000	RESA shall be provided and shall extend from the end of a runway strip for a distance of at least 90 m.	A 90 m RESA at the southern end of RWY ~~under construction – completion estimated April 2007.~~ Completed. A 90 m RESA at the northern end of RWY completed, CAA approval is awaited, expected by October 2008.	Civil Aviation Authority	~~2007~~ COMPLETED October 2008	"U"

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN AOP FIELD IN THE ASIA/PACIFIC REGION

- 1 -Identification		Deficiencies			Corrective Action			
Requirements	**State/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Date of completion**	**Priority for action**
	Philippines							
Annex 14 Vol. 1 Amendment 6 ***§ 9.10.1*** ***§ 9.10.2***	Manila	Airport security lax, allowing livestock to stray on to active runways.	2004	Improved airport perimeter fencing and general security within the perimeter of the airport required.	Currently projects are incessantly being pursued to further minimize wild life related incidents.			“A”

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE CNS FIELD IN THE ASIA/PACIFIC REGION

Identification		Deficiencies			Corrective Action			
Requirement	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date for completion**	**Priority for action**
Provision of ATIS as specified in FASID Table CNS 2 (Doc 9673)	Bangladesh	To broadcast current, routine terminal information to arriving and departing aircraft to ease congestion on the Tower and Approach channels affecting safety of aircraft operation.	May 2007	Provide aerodrome Terminal Information broadcast system to ease congestion on VHF and to reduce controllers work load	The ATIS equipment installed has been out of service due to maintenance problem and is beyond repair. It is required to provide a new equipment. New ATIS equipment had already been installed and put into trial operation on 14 May 2008. Effort is required to resolve the technical problem and provide ATIS for operational use within shortest possible time.	Civil Aviation Authority of Bangladesh	September 2008	A
Adequate and reliable VHF COM	Myanmar	Quality and reliability of RCAG VHF inadequate and unavailability of required coverage. Improvement has been observed and pilot reports continued to indicate occasional communication difficulties.	1998 Early 2008	Improvements in the quality of link to RCAG stations and power supply system are required.	Action should be taken to provide reliable links between the RCAG stations and Yangon ACC. High level ICAO mission was conducted. An action plan was developed to upgrade equipment at RCAG stations, provide VSAT link at all RCAG stations, to improve power supply system and to shift ACC to the new location. DCA Myanmar has replaced equipments at all 6 RCAG sites with digital VHF system and has provided VSAT links and solar power supply system at all sites. The facilities were formally implemented effective 9 June 2005 using new frequencies in place of old frequencies affected by interference. New HF transmitters were used to provide service to aircraft flying beyond VHF coverage in a small portion of Yangon FIR	DCA Myanmar	Revised target date is end of 2008 This deficiency will be removed from the list upon receipt of official report providing full details of action taken by Myanmar and confirmation by the users.	A

Identification		Deficiencies			Corrective Action			
Requirement	States/facilities	Description	Date first reported	Remarks	Description	Executing body	Target date for completion	Priority for action
~~Requirement for provision of ATIS as specified in FASID Table CNS2 (Doc. 9673 Vol.II)~~	~~Nepal~~	~~To broadcast current, routine terminal information to arriving and departing aircraft to ease congestion on the Tower and Approach channels affecting safety of aircraft operation.~~	~~April 2005~~	~~Provide aerodrome Terminal Information broadcast system to ease congestion on VHF and to reduce controllers work load~~	~~ATIS equipment provided in 2001 remained unusable due to technical problem which is still under investigation and rectification.~~ ~~On 14 March 2008, Nepal informed that ATIS TIA revived since 5 November 2007 on reduced range condition. It was under maintenance for normal operation. Nepal advised on 21 August 2008 that ATIS is functioning normal.~~	~~Civil Aviation Authority of Nepal~~	September 2008 Official notification of the normal operation of the ATIS and request for removal this deficiency from the deficiency list was received from Nepal on 29 August 2008.	A
Requirements for provision of AFS circuits between Hong Kong and Manila is specified in FASID Table CNS 1A and 1D (Doc.9673 Vol.II)	Philippines	Total disruption of the AFTN circuit between Manila and Hong Kong after Philippines Long Distance Telephone Company (PLDT) failed to provide communication link between Manila and Hong Kong. The AFTN circuit performance had experienced 14 times circuit outage in June 08 due to equipment failure at Manila. The ATS direct speech circuit between Manila and Hong Kong had 9 times of interruption in June 2008 and is unserviceable since then.	February 2007	It is urgently required to restore the normal operation of the AFTN circuit to meet the requirement for the exchange of safety messages between Manila and Hong Kong within the established transit time of 5 minutes. It is also required to restore the ATS direct ATS speech circuit as soon as possible.	Prolonged delay in rectification of problem experienced at Manila has resulted in diversion of message traffic for a long time via Taibei with alternate routing via Hong Kong/Fukuoka/Singapore/Manila causing traffic congestion as well as higher transit time of AFTN message. Remedial actions for improvement of the circuit performance was discussed at a side meeting among ICAO Secretariat, Hong Kong CAD and the Philippines ATO during 3rd meeting of the ATNICG of APANPIRG on 7th May 2008. It was agreed to establish 2 separate circuits for X.25 AFTN circuit and IASC operation to replace existing S+DX arrangement.	Civil Aviation Authority of the Philippines (CAAP)	By the end of September 2008 The circuit was resumed operational on 4 May 2008. However, the unstable and unreliable performance of the circuits is not acceptable. The Philippines is urged to implement the AFTN and ADS direct circuits without further delay.	U

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE MET FIELD IN THE ASIA/PAC REGION								
Identification		**Deficiencies**			**Corrective action**			
Requirements	**States/ facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date for completion**	**Priority for action ***
Meteorological observations and reports. (Annex 3, Chapter 4)	Solomon I.	Weather information is inadequate and not provided on a regular basis	1996 Confirmed 2006 SOA	Reported by airlines operating to Solomon I.	Equipment to be upgraded and arrangements to be made for regular observations	Ministry of Transport, Works and Aviation, Solomon I. *Note: OPMET/M TF to carry out survey* ICAO TC Project, CAEMSA-SP, for improving MET services in South Pacific began in August 2008. Project supported by WMO.	TBD	A
Meteorological observations and reports. (Annex 3, Chapter 4)	Kiribati	METAR from Kiribati not available on regular basis.	1998 Confirmed 2005 SIP	Reported by airlines	State's MET authority to consider urgent action to be taken for providing regular observations and reports	Directorate of Civil Aviation, Kiribati. *Note: OPMET/M TF to carry out survey* ICAO SIP conducted in 2005 ICAO TC Project, CAEMSA-SP, for improving MET services in South Pacific began in August 2008. Project supported by WMO.	TBD	A

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE MET FIELD IN THE ASIA/PAC REGION								
Identification		**Deficiencies**			**Corrective action**			
Requirements	**States/ facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date for completion**	**Priority for action ***
Reporting of information on volcanic eruptions to civil aviation units. (Annex 3 p. 4.14 (recom.))	Indonesia	Information on volcanic activity not provided regularly to ATS units and MWOs.	1995 Confirmed by ICAO SIP mission Dec 2003	Observed by States concerned. Reported at the WMO/ICAO Workshop on Volcanic Ash Hazards (Darwin, 1995)	Three-party LOA to be signed between the MGA, DGCA and DVGHM	DGCA, MGA Indonesia AusAID-funded project between ABM &CVGHM to improve monitoring of 15 volcanos near completion. Information exchange between CVGHM & ABA in draft form.	TBD *(no action plan submitted to RO)*	A
Reporting of information on volcanic eruptions to civil aviation units. (Annex 3 p. 4.14 (recom.))	Papua New Guinea	Information on volcanic activity not provided regularly to ATS units and MWOs.	1995 Confirmed by ICAO SIP mission Dec 2003	Observed by States concerned. Reported at the WMO/ICAO Workshop on Volcanic Ash Hazards (Darwin, 1995)	Procedures to be set up for exchange of data between NWS, ATS and Rabaul Volcano Observatory (RVO) and a LOA to be signed	NWS, ATS Papua New Guinea *Note: ICAO Regional Office to monitor* Discussion of an agreement between RVO & PNG CAA to provide volcanic information to aviation through cost recovery is underway.	TBD (no action plan submitted to RO)	A

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE MET FIELD IN THE ASIA/PAC REGION								
Identification		**Deficiencies**			**Corrective action**			
Requirements	**States/ facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date for completion**	**Priority for action ***
Provision of SIGMET for volcanic ash (Annex 3, Chapter 7; ASIA/PAC FASID Table MET 1B)	Indonesia Philippines Papua New Guinea	Requirements for issuance and proper dissemination of SIGMET, including SIGMET for volcanic ash, have not been fully implemented	ICAO SIP mission Dec 2003	a) Reported by airlines b) Noted by Volcanic Ash Advisory Centres	a) ICAO to carry out a Special Implementation Project (SIP) with the primary objective to improve implementation of SIGMET procedures, especially for VA. b) State to take urgent actions to implement the SIGMET procedures.	a) State's Met authorities b) ICAO to implement the SIP. c) ICAO Regional Office to co-ordinate and monitor. *Note: ICAO SIP carried out in 2003; progress in issuance of SIGMET for VA is noted; the outstanding problems to be resolved within 1-year time* *Progress reported by VAAC Darwin* LOA between ATO, PHIVOCS & PAGASA signed in 2004 to make reporting part of information dissemination practice. LOA is undergoing periodic review (ref. letter of PAGASA dated March 12, 2008). Darwin VAAC trained forecasters in PNG and Philippines to prepare VA SIGMETs	To be advised	U

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE MET FIELD IN THE ASIA/PAC REGION								
Identification		**Deficiencies**			**Corrective action**			
Requirements	**States/ facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date for completion**	**Priority for action ***
a) Service for operators and flight crew members. (Annex 3, Chapter 9). b) WAFS products for flight documentation. (ASIA/PAC FASID Table MET 1A).	Cambodia Myanmar	Briefing and flight documentation not provided as required. WAFS products not available	1999	Airlines do not receive the required flight documentation including WAFS forecasts.	States to consider urgent action for installation of SADIS VSAT for receiving WAFS products and OPMET information. Action plan proposed by ICAO MET mission 2003	State's MET authorities *A TC project proposal submitted to SSCA, Cambodia*	TBD	A
MWO for Phnom Penh FIR and SIGMET (Annex 3, Chapter 3 & 7; ASIA/PAC FASID Table MET 1B)	Cambodia	Requirements for meteorological watch office (MWO) to be established at Phnom-Penh international airport have not been met.		MWO not established due to lack of trained personnel and technical facilities. No SIGMET service for Phnom Penh FIR	Establishment of MWO currently not feasible. Urgent need for bi-lateral agreement for SIGMET service by a neighboring State.	SSCA, Cambodia *A TC project proposal submitted to SSCA, Cambodia*	TBD	U

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE MET FIELD IN THE ASIA/PAC REGION								
Identification		**Deficiencies**			**Corrective action**			
Requirements	**States/ facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date for completion**	**Priority for action ***
Provision of SIGMET information (Annex 3, Chapter 7; ASIA/PAC FASID Table MET 1B)	Lao PDR Myanmar Nepal Cambodia	Requirements for issuance and dissemination of SIGMET have not been fully implemented.	2000	SIGMET frequently not available Reported by airlines	State's MET authority to take urgent actions to implement the SIGMET procedures. ICAO issued new version of ASIA/PAC Regional SIGMET Guide in September 2003 *Note: ICAO Regional Office to enquire action plans with fixed target dates from the listed States*	State's MET authorities *In order to improve SIGMET availability, regional SIGMET tests have been conducted every year since 2005; however, these States did not participate in the 4th regional WS, WC, WV SIGMET tests in 2008.*	*(no action plan submitted to RO)*TBD	U
MWO for Pyongyang FIR and SIGMET (Annex 3, Chapter 3 & 7; ASIA/PAC FASID Table MET 1B)	DPR Korea	Requirements for meteorological watch office (MWO) to be established at Pyongyang international airport have not been met.	2008	MWO not established due to lack of trained personnel and lack of resources. No SIGMET service for Pyongyang FIR Reported by RO mission	Aerodrome MET Office in place can also serve as MWO in future. *ATMB/GACA Immediate consideration of action plan – establish MWO and provide required regular MET service for Pyongyang FIR.*	General Administration of Civil Aviation (GACA) DPR Korea	2009 DPR Korea plans to expand current MET service to include MWO in 2009	U

AGENDA ITEM 5: FUTURE WORK PROGRAMME

Agenda Item 5: Future Work Programme

<u>Schedule of Future meetings</u>

5.1 The meeting agreed that the tentative schedule of meetings for the rest of 2008, 2009 and 2010 should be as follows (*Notes: i) meetings of non-APANPIRG groups are indicated in italics, and ii) a decode of acronyms has been included in* ***Appendix A*** *to the Report on Agenda Item 5):*

2008 – outstanding meetings

ATN ICG WG/4	22-26 Sep	Bangkok
ATFM Workshop/Seminar	7-9 Oct	Fukuoka
WPAC/SCS RSG/5	14-16 Oct	Bangkok
SAR Seminar and SAREX	28-30 Oct	Hong Kong
RNP-SEA/TF/4	5-7 Nov	Singapore
SIP Seminar on D-FIS	*5-7 Nov*	*Bangkok*
RVSM/TF/ 34 (1 year review)	1-3 Dec	TBD
RASMAG/10	15-19 Dec	Bangkok
ATN ICG WG/5	15-19 Dec	Chennai
2009		
BBACG/20	*21-23 Jan*	*Male*
AIS Seminar & AAITF/4	*23-27 Feb*	*Tokyo*
PBN Seminar	*Mar*	*Kansai*
TRASAS/3	*Mar*	*Mexico*
OPMET/M TF/7	Mar	Bangkok
RNP-SEA/5	*Feb*	*Singapore*
ADS-B SITF/8	Apr	TBD
ATN IC G/4	4-8 May	Singapore
SEACG/16 & FIT-SEA/9	*May*	*Bangkok*
RASMAG/11	*8-12 Jun*	Bangkok
ATM/AIS/SAR/SG/19	22-26 Jun	Bangkok
Flt Inspection/validation Seminar	Jun	TBD
CNS/MET SG/13	20-24 Jul	Bangkok
APANPIRG/20	7 – 11 Sep	Bangkok
RASMAG/12	Dec	Bangkok
2010		
BBACG/21 & FIT-BOB/11	*Jan*	*Bangkok*
AAITF/5	*Apr*	*Bangkok*
ADS-B SITF/9	Apr	TBD
ATN IC G/5	May	TBD
SEACG/17 & FIT-SEA/10	*May*	*Bangkok*
ATM/AIS/SAR/SG/20	Jun	Bangkok
CNS/MET SG/14	Jul	Bangkok
APANPIRG/21	6-10 Sept	Bangkok

5.2 The meeting noted that the provisional agenda for APANPIRG/19 was prepared in line with Air Navigation Commission's proposal for a uniform approach to formulation of agenda for the PIRGs meetings. The provisional agenda for future APANPIRG meetings will be in this format.

Managing the Environmental Issues of Air Transportation

5.3 Recognizing the increased importance and benefits of CNS/ATM activities in the management of civil aviation's environmental impacts, and the need to assess the environmental impact of specific implementation plans and activities to promote these benefits, the meeting adopted the following Conclusion.

Conclusion 19/56 - Common methodology for environmental benefits

That, ICAO be invited to establish and maintain a simple and cost effective common methodology to assess and document environmental benefits to airspace and CNS/ATM planning initiatives.

Environmental Initiatives

5.4 The United States noted that, through the Asia and South Pacific Initiative to Reduce Emissions (ASPIRE) partnership, Asia/Pacific service providers are becoming increasingly involved in activities to reduce potentially adverse impacts from aviation activities on the environment. The meeting considered that APANPIRG has a long history of success in implementing airspace enhancements that result in direct reductions of environmental emissions. For example, these included the implementation of RVSM across virtually all airspaces of the Asia/Pacific region and continuous and widespread improvements in the efficiency of ATS route networks.

5.5 The meeting recognised that codifying and reporting environmental benefits was an important part of the work of ATM implementation. These activities require coordination and involvement between ICAO, States, ANSP's, aircraft operators and industry, and should be reported and discussed in regional forums. In this context, the meeting appointed the ATM/AIS/SAR Sub Group as the focal point for identifying and reporting to APANPIRG on environmental initiatives.

5.6 In amending the Sub Group's Terms of Reference (TOR) to include an environmental component, the meeting also recognised that, as the Global Air Navigation Safety Plan (GASP) was an integral part of ICAO's planning guidelines, provision for the GASP should also be included in the Sub Group's TOR. Accordingly, the meeting adopted the following Decision:

Decision 19/57 – Amendments to the Terms of Reference of the ATM/AIS/SAR SG

That, amendments to the Terms of Reference of the ATM/AIS/SAR Sub Group be adopted to enable consideration of the Global Air Navigation Safety Plan in planning processes and ensure environmental initiatives are identified and progressed, as presented in **Appendix B** to the APANPIRG/19 Report on Agenda Item 5.

Coordination meeting between Chairmen of Sub-Groups

5.7 The Chairmen of the APANPIRG Sub-Groups reported that they had met prior to APANPIRG and co-ordinate the activities of the Sub-groups. No issue was separately identified that need to be raised to APANPIRG with the matters common between the Subgroups adequately being dealt with through the reports already prepared for the meting.

5.8 The Chairmen reviewed the list of contributing bodies to APANPIRG and produced a revised listing.

5.9 The Key Priorities that guide the activities of the Subgroups was reviewed and the amendments proposed by the Subgroups were accepted and recommended to APANPIRG. It was noted that in future the Performance Framework may overtake the need for the Key Priorities and that the recommendation on the continued maintenance of the Key Priorities would be made at subsequent APANPIRG meetings.

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APPENDIX- A
ACRONYMS

ATFM	Air Traffic Flow Management
WPAC/SCS RSG	Western Pacific/South China Sea RVSM scrutiny working Group
SAREX	Search and Rescue Exercise
RNP-SEA/TF	South East Asia RNP Implementation Task Force
D-FIS	Data Link Flight Information Service
RVSM/TF	Reduced Vertical Separation Minima Implementation Task Force.
RASMAG	Regional Air Space Monitoring Advisory Group of APANPIRG
BBACG	Bay of Bengal ATS coordination Group
FIT-BOB	FANS 1/A Implementation Team, Bay of Bengal
AIS	Aeronautical Information Services
TRASAS	Trans-Regional Airspace and supporting ATM systems Steering Group
OPMET/M TF	Operational Meteorological Management Task Force.
ADS-B SITF/8	ADS-B Study and Implementation Task Force
ATN IC G/4	Aeronautical Telecommunication Network Implementation and Coordination Group
SEACG	South East Asia ATS coordination Group
FIT-SEA	FANS 1/A Implementation Team, South East Asia
ATM/AIS/SAR/SG	ATM/AIS/SAR Sub-Group of APANPIRG
CNS/MET SG	CNS/MET Sub- Group of APANPIRG
APANPIRG	Asia/Pacific Air Navigation Planning and Implementation Group.
AAITF	Aeronautical Information Services – Aeronautical Information Management Implementation Task Force

APPENDIX B
TERMS OF REFERENCE

AIR TRAFFIC MANAGEMENT/AERONAUTICAL INFORMATION SERVICES AND SEARCH AND RESCUE (ATM/AIS/SAR) SUB-GROUP OF APANPIRG

1. **Ensure the continuing and coherent development of the ASIA/PAC Regional Air Navigation Plan in the ATM/AIS/SAR fields in accordance with the Global Air Navigation Plan and the Global Aviation Safety Plan;**

2. Review and identify deficiencies that impede the implementation or provision of efficient ATM/AIS/SAR services in the Asia/Pacific region;

3. Monitor CNS/ATM systems research and development, trials and demonstrations in the fields of ATM/AIS/SAR and facilitate the transfer of this information and expertise between States;

4. Make specific recommendations aimed at improving ATM/AIS/SAR services by the use of existing procedures and facilities and/or through the evolutionary implementation of CNS/ATM systems;

5. Review and identify inter-regional co-ordination issues in the fields of ATM/AIS/SAR and recommend actions to address those issues; and

6. Ensure ATS environmental initiatives are consistently identified and progressed, and act as the Asia/Pacific regional focal point for the reporting of outcomes from ATS environmental initiatives.

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(Last updated APANPIRG/19, September 2008)

AGENDA ITEM 6:   ANY OTHER BUSINESS

Agenda Item 6: Any other business

State of the Industry

6.1 The meeting noted airline operators are facing a crisis in terms of operating costs due to rising fuel costs. To minimise the impact the meeting invited States to work with ICAO and industry stakeholders to deliver further operational efficiencies.

Effectiveness of PIRGs

6.2 On the effectiveness of PIRGs, the meeting noted that the Council, on 18 March 2008, considered a report submitted by the ANC on this subject and took the following actions: a) agreed that the Commission should present, on an annual basis, a consolidated report to the Council containing the Commission's analysis of regional air navigation developments and the status of the resolution of air navigation deficiencies, as well as an indication of the value added from the PIRGs' activities; b) while agreeing to retain, for the time being, the terms of reference of PIRGs, except those of the APIRG and the GREPECAS which should be amended to exclude security matters, requested that the Commission study the merits of the PIRGs; c) agreed that all ICAO Contracting States, who are service providers in an air navigation region and part of that region's ANP, should be included in the membership of that region's PIRG. Furthermore, user States are entitled to participate in any other PIRG meetings as a non-member. International organizations recognized by the Council may be invited as necessary to attend as observers to the PIRG meetings; and d) requested that the Commission present, in due course, a report to the Council on the outcome its study on merits of PIRGs and on the development of new structures to coordinate Business Plan implementation activities related to safety, security and environmental subjects.

6.3 Consequent to the Council decision above, the meeting noted the revised terms of reference of APANPIRG as shown in the **Appendix A** to the Report on Agenda Item 6 and agreed to include it in the APANPIRG Procedural Handbook accordingly. Also, the meeting was informed that the review of restructuring of PIRGs by the Air Navigation Commission in consultation with the Chairmen and Secretaries of PIRGs is in progress and a report will be submitted to the Council in due course.

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APPENDIX A

REVISED TERMS OF REFERENCE FOR THE ASIA/PACIFIC AIR NAVIGATION PLANNING AND IMPLEMENTATION REGIONAL GROUP (APANPIRG)
(C-WP/13135, C 183/9 on 18 March 2008 and PRES RK/1560 dated 20 June 2008)

1. Membership

All ICAO Contracting States, who are service providers in an air navigation region and part of that region's ANP, should be included in the membership of that region's PIRG. Furthermore, user States are entitled to participate in any other PIRG meetings as a non-member. International organizations recognized by the Council may be invited as necessary to attend PIRG meetings as observers.

2. **The Terms of Reference of the Group** are:

a) to ensure continuous and coherent development of the Asia/Pacific Regional Air Navigation Plan and other relevant regional documentation in a manner that is harmonized with adjacent regions, consistent with ICAO SARPs and Global Air Navigation Plan for CNS/ATM systems (Doc 9750) and reflecting global requirements;

b) to facilitate the implementation of air navigation systems and services as identified in the Asia/Pacific Regional Air Navigation Plan with due observance to the primacy of air safety, regularity and efficiency; and

c) to identify and address specific deficiencies in the air navigation field.

3. **In order to meet the Terms of Reference, the Group** shall:

a) review, and propose when necessary, the target dates for implementation of facilities, services and procedures to facilitate the coordinated development of the Air Navigation Systems in the Asia/Pacific Region;

b) assist the ICAO Asia/Pacific Regional Office in fostering the implementation of the Asia/Pacific Regional Air Navigation Plan;

c) in line with the Global Aviation Safety Plan (GASP), facilitate the conduct of any necessary systems performance monitoring, identify specific deficiencies in the air navigation field, especially in the context of safety, and propose corrective action;

d) facilitate the development and implementation of action plans by States to resolve identified deficiencies, where necessary;

e) develop amendment proposals to update the Asia/Pacific Regional Air Navigation Plan to reflect changes in the operational requirements;

f) monitor implementation of air navigation facilities and services and where necessary, ensure interregional harmonization, taking due account of organizational aspects, economic issues (including financial aspects, cost/benefit analyses and business case studies) and environmental matters;

Additions are shown as underlined

g) examine human resource planning and training issues and propose where necessary human resource development capabilities in the region that are compatible with the Asia/Pacific regional Air Navigation Plan;

h) review the Statement of Basic Operational Requirements and Planning Criteria and recommend to the Air Navigation Commission such changes as may be required in the light of new developments in the air navigation field;

i) request financial institutions, on a consultative basis as appropriate to provide advice in the planning process;

j) maintain close cooperation with relevant organizations and State grouping to optimize the use of available expertise and resources; and

k) conduct the above activities in the most efficient manner possible with a minimum of formality and documentation and call meetings of the APANPIRG when deemed necessary to do so.

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Nineteenth Meeting of the Asia/Pacific Air Navigation Planning and
Implementation Regional Group (APANPIRG/19)
Bangkok, Thailand, 1 - 5 September 2008

LIST OF INFORMATION AND WORKING PAPERS

Paper No.	Agenda Item	Title	Presented by
Information Papers			
IP/1	-	Meeting Bulletin	Secretariat
IP/2	3.1	Flexible Pavement Design- Revised alpha factor values for the computation of Aircraft Classification Number	Secretariat
IP/3	3.2	Report on Progress toward Data link harmonization	Secretariat
IP/4	2	Partnership for increasing efficiency and reducing greenhouse gas emissions in aviation.	Australia, New Zealand and USA
IP/5	3.4	Satellite Data Communications Performance	IATA
IP/6	3.2	Review of the ASIA AND PACIFIC ATS Route Catalogue	Secretariat
IP/7	3.6	Updates on Air Navigation activities in Vietnam	Viet Nam
IP/8	3.2	Aeronautical Information Services of the Republic of Korea Certified by ISO 9001:2000 / KSA 9001:2001	Republic of Korea
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IP/10	3.5	Review of ATS Coordination Activities	Secretariat
IP/11	3.2	ATM/AIS/SAR related activities of the Regional Office.	Secretariat
IP/12	3.3	Progress in establishing the Singapore Safety Monitoring Agency	Singapore
IP/13	3.2	Status of AIS/AIM Automation in India	India
IP/14	3.6	Introduction of Olympic Games and Paralympics games	China
IP/15	3.2	Availability of New ATS Routes to Operators in Kabul FIR through Karachi FIR.	Pakistan
IP/16	3.4	ATN/AMHS transition Plan of India.	India
IP/17	3.4	US Space- based positioning, navigation and timing (PNT) Policy	USA

Paper No.	Agenda Item	Title	Presented by
IP/18	2	US. Next generation Air Transportation system (NextGen)	USA
IP/19	3.2	Update of the Bobcat system	Thailand
IP/20	3.2	Commitments to the Work of ICAO	Japan
IP/21	3.2 & 3.4	An Update on CNS/ATM System Implementation in India	India
IP/22	3.4	An Update on PBN Implementation in India	India
IP/23	3.2	ADS/CPDLC Trial operation in Ujung Pandang FIR.	Indonesia

Paper No.	Agenda Item	Title	Presented by
Working Papers			
WP/1	-	Provisional Agenda	Secretariat
WP/2	1.1	Review of the actions of the Air Navigation Commission on the report of the eighteenth meeting of Asia/PAC Air Navigation Planning and Implementation regional Group (APANPIRG/18)	Secretariat
WP/3	1.2	Review of the Status of Implementation of APANPIRG/18 Conclusions and Decisions	Secretariat
WP/4	1.3	Review of the Status of Implementation of APANPIRG Outstanding Conclusions and Decisions	Secretariat
WP/5	2.1, 2.2	Overview of Global Air Navigation Plan (GANP) and Global Aviation Safety Plan (GASP).	Secretariat
WP/6	2	Implementation of a global ATM System- ICAO Technical Cooperation Project.	Secretariat
WP/7	2	Global Transition from AIS to AIM.	Secretariat
WP/8	3.1	Report on the implementation of Aerodrome Certification Requirements in Annex 14, Volume I.	Secretariat
WP/9	3.1	Report on Bird Hazard Control and Management	Secretariat
WP/10	3.1	Aerodrome emergency Planning- Overview in the Region	Secretariat
WP/11	3.2	Implementation of New ICAO Flight Plan	Secretariat
WP/12	3.2	AIS Update from the AIS-AIM implementation Task Force and the 18th meeting of the ATM/AIS/SAR Sub-Group.	Secretariat
WP/13	3.2	Report of the 18th Meeting of the APANPIRG ATM/AIS/SAR/ sub Group 18	Chairman
WP/14	3.2	Proposal for the Establishment of an Air Traffic Flow Management Task Force in North Asia.	ROK
WP/15	3.6	ATM User Expectations for Implementation of ICAO Performance Objectives 2008-2015	IATA
WP/16	3.2	Regional Contingency Plan for Asia Pacific to assist States to meet USOAP requirements**.**	Singapore
WP/17	3.4	PBN Implementation	Secretariat

Paper No.	Agenda Item	Title	Presented by
WP/18	3.3	Report on the Activities of RASMAG	Secretariat
WP/19	3.3	Asia/ Pacific RVSM Safety Assessments	Secretariat
WP/20	3.4	Report on the Twelth Meeting of CNS/MET Sub-Group.	Chairman
WP/21	3.4	Evolving satellite communication service provision and performance**.**	Secretariat
WP/22	3.4	Web-based Routine/Special Air Reports Notification	Republic of Korea
WP/23	3.6	Proposal for revising current SAR LOAs	Vietnam
WP/24	3.6	Managing the Environmental issues of Air Transportation	IATA
WP/25	4	Deficiencies in the Air Navigation Field	Secretariat
WP/26	3	Regional and national Approach to Implementation of a Global ATM System	Secretariat
WP/27	5	Future work program- APANPIRG Work Programme 2009+	Secretariat
WP/28	6	Increasing the effectiveness of Planning and Implementation Regional Groups (PIRGs)	Secretariat
WP/29	6	State of the Industry	IATA
WP/30	3.2	Preventive measures against runway incursions and Japan's offer to host a regional runway safety seminar/workshop	Japan
WP/31	3.2	Oceanic air traffic management (ATM) enhancement and environmental benefits	Japan
WP/32	3.3	China RMA's formal Application for the endorsement of APANPIRG RMA for the Chinese sovereign airspace.	China
WP/33	3.2	ATS route modification proposal	Mongolia
WP/34	5	Reporting of Environmental initiatives	USA
WP/35	5	Report of Coordination Meeting between Chairmen of Sub-groups	Chairmen of the ATM/ AIS/SAR SG, CNS/MET SG and RASMAG

Follow-up to APANPIRG/19 Conclusions/Decisions – Action Plan

Conclusion/ Decision No. --- Strategic Objective*	**Title of Conclusion/ Decision**	**Text of Conclusion/Decision**	**Follow-up Action**	**To be initiated by**	**Deliverable**	**Target date**
C 19/1 **D**	**Regional Performance Framework**	That, a regional performance framework be adopted on the basis of ICAO guidance material and aligned with the Global Air Navigation Plan and the Global ATM Operational Concept. The performance framework should include identification of regional performance objectives taking into consideration user expectations (to be mapped against current work) and completion of regional performance framework forms based on the sample shown in **Appendix A** to the Report on Agenda Item 3.	Develop performance framework	ICAO APAC Office Sub Groups APANPIRG	Regional Performance objectives; Performance Framework Forms	Jun 2009
C 19/2 **D**	**National Performance Framework**	That, States be invited to adopt a national performance framework on the basis of ICAO guidance material and aligned with the regional performance objectives, the regional air navigation plan and the Global ATM Operational Concept. The performance framework should include identification of national performance objectives taking into consideration user expectations (to be mapped against current work) and completion of national performance framework forms based on the sample shown in **Appendix A** to the Report on Agenda Item 3.	Notify States	ICAO APAC Office	State Letter	Feb 2009

Conclusion/ Decision No. --- Strategic Objective*	**Title of Conclusion/ Decision**	**Text of Conclusion/Decision**	**Follow-up Action**	**To be initiated by**	**Deliverable**	**Target date**
C 19/3 **A D**	**Assistance in South West Pacific Small Island States and Mongolia, Myanmar and Timor Leste in implementing the requirements of aerodrome certification and SMS**	That, in recognizing the importance on the implementation of Annex 14, Volume I provisions related to aerodrome certification and SMS in the South West Pacific Small Island States and Mongolia, Myanmar and Timor-Leste, ICAO considers providing assistance to these States in order to build their capacity to provide the required services in a sustainable and cost efficient manner. [*Note: An appropriate form of providing assistance could include establishment of an ICAO technical cooperation project with funding sought from donor agencies.]*	Assist in establishment of TC Project	ICAO HQ/ICAO APAC Office	appropriate assistance Project	2009/2010
D 19/4 **A D**	**Dissolution of the Regional Performance Framework Task Force (RPF/TF)**	That, recognizing the performance based planning process utilizing "Performance Framework Forms (PFF)" promulgated by ICAO during 2008 had overtaken the Terms of Reference of the Regional Performance Framework Task Force (RPF/TF), the RPF/TF be dissolved. .				Completed

Conclusion/ Decision No. --- Strategic Objective*	**Title of Conclusion/ Decision**	**Text of Conclusion/Decision**	**Follow-up Action**	**To be initiated by**	**Deliverable**	**Target date**
D 19/5 **A D**	**Dissolution of the RVSM/TF**	That, following the widespread and safe implementation of RVSM throughout the Asia/Pacific Regions over a 10 year period, the Asia/Pacific RVSM Implementation Task Force (RVSM/TF) be dissolved, with effect from the close of the RVSM/TF/34 meeting (one year review of China RVSM) in late 2008, and any residual work items be allocated to the ATM/AIS/SAR Sub-Group. ***Note:*** *In dissolving the RVSM/TF, APANPIRG places on the record its highest commendation and appreciation to all parties associated with the RVSM/TF for the continuous implementation of RVSM and the very positive and quantifiable beneficial effects on safety, efficiency and the environment that have resulted directly from the work of the RVSM/TF.*	Notify States	ICAO APAC Office	State Letter	Mar 2009

Conclusion/ Decision No. --- Strategic Objective*	**Title of Conclusion/ Decision**	**Text of Conclusion/Decision**	**Follow-up Action**	**To be initiated by**	**Deliverable**	**Target date**
D 19/6 **A, D, E**	**Establishment of an ICAO Flight Plan & ATS Message Implementation Task Force**	That, an Asia/Pacific ICAO Flight Plan & ATS Message Implementation Task Force (FPL&AM/TF), with terms of reference as outlined in **Appendix C** to the APANPIRG/19 Report on Agenda Item 3.2, be established to develop a regional transition strategy and procedures to ensure the streamlined implementation of the amended ICAO flight planning and associated ATS Message provisions.	Establish Task Force	ICAO APAC Office	Schedule first meeting	Second quarter 2009
C19/7 **A D**	**RNP 4 capability for operators**	That, recognizing the significant benefits expected from the implementation of 30 NM longitudinal separation based on RNP 4, operators of Pacific fleets be urged to equip with RNP 4 avionics for oceanic airspace operations and obtain approval from the States of Registry/Operators as early as possible, but no later than 2012.	Notify States and air space users	ICAO APAC Office	State Letter	Dec 2008

Conclusion/ Decision No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date
C 19/8 **A D**	**Conduct Regional Runway Safety Seminar/ Workshop**	That, noting the critical nature and persistent occurrence of runway incursions, the ICAO Asia/Pacific Regional Office, with assistance from States experienced in runway safety management and in conjunction with the COSCAPS of South Asia, South East Asia and North Asia, conduct a 3-day runway safety seminar/workshop during 2009.	Conduct Seminar/Workshop	ICAO APAC Office, COSCAPs	Seminar/Workshop	2009
C 19/9 **A D E**	**Support for Ad-Hoc GOLD Working Group**	That, recognizing the many benefits to be gained from the global application of harmonized FANS data link operational procedures, APANPIRG supports the work being undertaken under the auspices of the Ad-Hoc GOLD Working Group to produce a FANS Global Operational Data Link document (GOLD) and invites the Asia/Pacific Regional Office to act as the regional focal point for the Ad-Hoc GOLD Working Group.	Participation in the working group	ICAO APAC Office	Draft GOLD	Mar 2009

Conclusion/ Decision No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date
C 19/10 **A D**	**Future date-time for NOTAMC and NOTAMR**	Recognizing that the concerns raised in APANPIRG Conclusion 18/14 relating to use of future date-time in NOTAMC and NOTAMR have been included in the Air Navigation Commission work programme for formal resolution by 2010, States be encouraged to use relevant guidance material in the Aeronautical Information Services Manual (Doc 8126) and the Asia/Pacific Operating Procedures for AIS Dynamic Data (OPADD) in the application of Annex 15 SARPs.	Notify States	ICAO APAC Office	State Letter	Dec 2008
C 19/11 **A D**	**Update SAR Matrix including guidance material**	That, the updated format for the SAR Capability Matrix Table and explanatory text shown in **Appendix K** to the APANPIRG/19 Report on Agenda Item 3.2 be adopted and the explanatory text be included as a perpetual attachment to the SAR Capability Matrix, to serve as guidance to States when filling in the Matrix.	Publish on website	ICAO APAC Office	Published on website	Oct 2009

Conclusion/ Decision No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date
C19/12 **A D**	**Accelerated Data Link Implementation in the Manila Flight Information Region (FIR)**	That, to enable the early realization of the full benefit of data link operation and the implementation of reduced lateral and longitudinal separations throughout the South China Sea airspace, the Philippines be invited to expedite implementation of ADS-C and CPDLC data link services in the Manila FIR.	Notify Philippines	ICAO APAC Office	State letter	Dec 2008
D 19/13 **A D**	**ATM/AIS/SAR Task List**	That, the ATM/AIS/SAR Sub-Group Task List and attachments contained in Appendix A to the ATM/AIS/SAR/SG/18 Report on Agenda Item 9 be adopted as the current work programme for the ATM/AIS/SAR Sub-Group of APANPIRG.	Notify ATM/AIS/SAR/SG	ICAO APAC Office	ATM/AIS/SAR SG informed. Paper prepared	Jun 2009
C 19/14 **A D**	**Approval of China RMA as Asia Pacific RMA**	That, having met all requirements established by the Regional Airspace Safety Monitoring Advisory Group (RASMAG), the China RMA be approved as an APANPIRG Asia/Pacific RVSM Regional Monitoring Agency with responsibility for all sovereign RVSM airspaces in China.	Update RASMAG List of Competent Agencies Notify States	ICAO APAC Office ICAO APAC Office	List updated State Letter	Oct 2008 Dec 2008

Conclusion/ Decision No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date
C 19/15 **A D**	**Enhanced communications between States and RVSM RMAs**	That, noting the Annex 6 provisions for the global long term monitoring of airframes used in RVSM operations and the critical role of Asia/Pacific RVSM Regional Monitoring Agencies (RMAs) in monitoring the safety of RVSM operations, the Regional Office draw the attention of States to the Long Term Height Monitoring Actions promulgated by RASMAG. In particular, States are encouraged to immediately strengthen relationships with their respective RMAs to ensure that information in relation to RVSM approval status is continuously available to RMAs.	Notify States	ICAO APAC Office	State Letter	Mar 2009
D 19/16 **D**	**Revision to the Subject/Tasks List of ATNICG**	That, the Revised Subject/Tasks List of the ATNICG provided in **Appendix A** to the Report on Agenda Item 3.4 be adopted.	Notify ATNICG	ICAO APAC Office	ATNICG informed. Paper prepared.	May 2009
C 19/17 **D**	**Asia/Pacific Aeronautical Telecommunication Network System Security Policy**	That, the updated "Asia/Pacific Aeronautical Telecommunication Network System Integrity Policy" provided in **Appendix B** to the Report on Agenda Item 3.4 be adopted as "Asia/Pacific Aeronautical Telecommunication Network System Security Policy".	Publish on website	ICAO APAC Office	Published on website. States notified	Oct 2008

Conclusion/ Decision No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date
C 19/18 **A D**	**ATS Message Management Center (AMC) Software**	That, to facilitate implementation and management of ATN in Asia/Pacific Region, ICAO be urged to facilitate transfer of Eurocontrol AMC Software to Aerothai and to allow Aerothai to modify the Software to suit the requirements of Asia/Pacific Region.	Coordinate with parties concerned. Prepare Issue Form	ICAO HQ ICAO APAC Office	MOU signed and AMC software transferred. Sent to HQ	May 2009 Dec 2008
C 19/19 **A D**	**Implementation of AIDC in Asia and Pacific Regions**	That, States be urged to expedite implementation of AIDC between neighboring ATS facilities in accordance with the Regional Air Navigation Plan and the Asia/Pacific AIDC ICD.	Notify States	ICAO APAC Office	State Letter	Dec.2008
C 19/20 **D**	**Adoption of ATN over IPS in addition to ATN over OSI**	That, considering the inclusion of ATN over IPS SARPs in ICAO Annex 10, Volume 3 and to support global harmonization of ATN implementations, States hosting BBIS be urged to implement ATN over IPS in addition to ATN over OSI and complete this implementation of Dual Stack ATN (ATN/OSI and ATN/IPS) by 2011.	Notify States hosting BBIS.	ICAO APAC Office	State Letter	Dec.2008
C 19/21 **D**	**Amendment to Asia/Pacific Regional AMHS MTA Routing Policy**	That, the revised Asia/Pacific AMHS MTA Routing Policy placed at **Appendix C** to the Report on Agenda Item 3.4 be adopted.	Publish on website	ICAO APAC Office	Published on website	Mar. 2009

Conclusion/ Decision No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date
C 19/22 **D**	**Amendment to FASID Tables CNS – 1B and CNS – 1C**	That, FASID Tables CNS – 1B ATN Router Plan and Table CNS – 1C AMHS Routing Plan, be amended by replacing them with the Tables provided in **Appendices D and E** to the Report on Agenda Item 3.4 in accordance with the established procedure.	Prepare amendment proposal	ICAO APAC Office	Amendment proposal to HQ	Mar 2009
C 19/23 **D**	**Amendment to Asia/Pacific AMHS Manual.**	That, Annex E and Annex F provided in **Appendix F** to the Report on Agenda Item 3.4 be adopted as Annexes to the Guidance Document for AMHS Conformance Testing (AMHS Manual).	Publish on website	ICAO APAC Office	Published on website and States notified	Nov. 2008
C 19/24 **A D E**	**Satellite Communications Service Performance**	That, a) States and International Organizations be requested to liaise with satellite service providers to establish a mechanism to maintain and modernize the satellite communication infrastructure; and b) ICAO be invited to organize a meeting by the end 2008 for stakeholders to review the performance and provision of satellite data link communications in the Asia/Pacific Region and find a solution.	a) Notify States and Intl' Organizations b) To organize a meeting	ICAO APAC Office ICAO APAC Office	State Letter Meeting conducted	Feb 2009 Dec 2008

Conclusion/ Decision No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date
C 19/25 **D**	**ASIA/PAC PBN Implementation Plan**	That, the Asia/Pacific PBN Implementation Plan as provided in **Appendix G** to the Report on Agenda Item 3.4 be adopted and published as the interim Edition based on which, States be urged to developed their national PBN implementation plan and provide feedback to the ICAO Regional Office.	Notify States Publish on website	ICAO APAC Office	State letter. Published on website and States notified	Nov. 2008
C 19/26 **A D**	**Investigation DME based RNAV**	That, in the interest of efficiency, States with DME coverage extending beyond their FIRs be requested to consider allowing neighboring States to develop PBN procedures utilizing these DMEs.	Notify States with extended DME coverage	ICAO APAC Office	State Letter	Feb 2009
C 19/27 **D**	**Flight Procedure Design Office**	That, ICAO continues to develop the concept of a Flight Procedure Design Office taking into account proposals submitted by the States with emphasis on the role, responsibility and financial mechanisms.	Prepare Issue Form	ICAO APAC Office	Issue form sent to HQ	Dec 2008

Conclusion/ Decision No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date
C 19/28 **A D**	**Continuous Descent Final Approach (CDFA) and Baro-VNAV**	That, in order to reduce the likelihood of CFIT accidents, States be urged to a) review non-precision approach procedures with LNAV lines of minima to include CDFA profile; and b) include the Baro-VNAV design in the current and new RNP APCH approaches and consequent LNAV/VNAV approach minima.	Notify States	ICAO APAC Office	State Letter	Oct 2008
C 19/29 **D**	**Separation Standards for PBN**	That, ICAO be invited to expedite development and publication of separation standards for use in implementation of the PBN RNAV 5, RNAV 2, RNAV 1 and Basic-RNP 1 navigation specifications.	Prepare Issue Form	ICAO APAC Office	Issue Form sent to HQ	Dec 2008
D 19/30 **D**	**Revision to the Terms of Reference of the PBN Task Force**	That, the Revised Terms of Reference of the PBN Task Force provided in **Appendix I** to the Report on Agenda Item 3.4 be adopted.	Notify PBN Task Force	ICAO APAC Office	Paper prepared	Mar 2009
C 19/31 **D**	**Revision of the Strategy for the Provision of Navigation Services in the Asia/Pacific Region**	That, the revised Strategy for the provision of navigation services provided in **Appendix J** to the Report on Agenda Item 3.4 be adopted and provided to States	Publish on website	ICAO APAC Office	Published on Website and States notified	Feb 2009

Conclusion/ Decision No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date
C 19/32 **D**	**Testing of Navigation and Surveillance facilities Seminar**	That, ICAO be invited to organize a seminar on 'Testing of Navigation and Surveillance facilities' in 2009 to address issues related to ground and flight inspection/validation.	Organize a Seminar	ICAO APAC Office	Seminar	Sep 2009
D 19/33 **D**	**Subject/Tasks List of ADS-B Study and Implementation Task Force**	That, the Subject/Tasks List for ADS-B Study and Implementation Task Force provided in **Appendix L** to the Report on Agenda Item 3.4 be adopted.	Notify ADS-B Study and Implementation Task Force	ICAO APAC Office	ADS-B S & I TF informed and paper prepared.	Apr 2009
C 19/34 **D**	**Guidance Materials on Implementation of ADS-B**	That, the following Guidance Materials on implementation of ADS-B Out Services be adopted for use by States in the Asia and Pacific Regions: - Reporting Probability of ADS-B update as shown in **Appendix M;** - Reporting ADS-B Avionics fitment as shown in **Appendix N**; - the performance criteria for multi-sensor fusion as shown in the **Appendix O**.	Publish on website and inform States	ICAO APAC Office	Published on website and States notified	Jan 2009

Conclusion/ Decision No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date
C 19/35 **D**	**Guidelines for the development of ADS-B Implementation**	That, States be advised to use the following guidelines for the development of ADS-B implementation plan. a) minimize capital and operating costs of ADS-B data facilities; b) give priority to provide coverage over major traffic flows; c) provide ADS-B coverage in areas within 150 NM from FIR boundaries; d) suitable sites with power, shelter, access routes and data communication links shall be preferred; and e) overlapping of ADS-B coverage is preferred.	Notify States	ICAO APAC Office	State Letter	Feb 2009
C 19/36 **D**	**Sample Agreement for ADS-B Data Sharing**	That, the sample Agreement for ADS-B Data Sharing and the cost apportionment framework provided in the **Appendices P and Q** respectively to the Report on Agenda Item 3.4 be adopted as the regional guidance material.	Notify States	ICAO APAC Office	State Letter	Feb 2009

Conclusion/ Decision No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date
C 19/37 **D**	**Revised Mandate Regional ADS-B Out Implementation**	States intending to implement ADS-B based surveillance service, be urged to a) determine ADS-B OUT equipage mandates based upon the ability to provide ADS-B OUT separation services; b) expedite the implementation of ADS-B OUT in accordance with the Regional Air Navigation Plan and the provision of separation services based on ADS-B OUT; c) publish their equipage mandates as soon as possible, with a target publication date of no later than 2010 so that operators can plan ahead their forward purchasing and retrofit; d) choose a date after mid 2012 on which the ADS-B out equipage mandate will become effective in airspace served by ADS-B ground stations with sufficient transition period to enable fleet equipage. *Note: The implementation would require aircraft equipped with avionics compliant with either;* 1) Version 0 ES as specified in Annex 10, Volume IV, Chapter 3, Paragraph 3.1.2.8.6 (up to and including Amendment 82 to Annex 10) and Chapter 2 of the Technical Provisions for Mode S Services and Extended Squitter (ICAO Doc 9871) (Equivalent to	Notify States	ICAO APAC Office	State Letter	Nov 2008

Conclusion/ Decision No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date
		1) *Version 0 ES as specified in Annex 10, Volume IV, Chapter 3, Paragraph 3.1.2.8.6 (up to and including Amendment 82 to Annex 10) and Chapter 2 of the Technical Provisions for Mode S Services and Extended Squitter (ICAO Doc 9871) (Equivalent to DO260) to be used till at least 2020. or* 2) Version 1 ES as specified in Chapter 3 of the Technical Provisions for Mode S Services and Extended Squitter (ICAO Doc 9871) (Equivalent to DO260A)				

Conclusion/ Decision No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date
C 19/38 **A D**	**Support provision of VHF radio voice communication associated with ADS-B data sharing between adjacent States**	That, States be urged to consider following regional policy on supporting provision of direct controller pilot communication capability associated with ADS-B data sharing between adjacent FIRs of States. "In order to provide radar like separation services using ADS-B, it is necessary for the controllers to have direct controller pilot communication (DCPC). In some cases, to achieve radar like separation services it may be necessary for the States to provide VHF radio voice communication services for use by adjacent States. It is therefore recommended that States capable to do so support provision of VHF radio voice communication services to adjacent States when this is required to support the delivery of ADS-B based separation services. Cost of such service provision shall be agreed between the States concerned."	Notify States	ICAO APAC Office	State letter	Mar 2009
C 19/39 **D**	**Regional Surveillance Strategy for Asia/Pacific Region**	That, the revised Regional Surveillance Strategy for Asia/Pacific Region provided in the **Appendix R** to the Report on Agenda Item 3.4 be adopted.	Publish on the web site.	ICAO APAC Office	Published on website and States notified.	Jan 2009

Conclusion/ Decision No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date
C 19/40 **A D**	**Coordination for SSR Mode S Interrogator Identifier Code**	That, a) in view of low density of SSR interrogator installations in the region, only Interrogator Identifier (and not Surveillance Identifiers) codes be used for SSRs Mode S in areas of overlapping coverage b) while implementing SSR Mode S, States should take into account following issues while assigning Interrogator Identifier codes for these installations: - for planning the implementation of SSR Mode S interrogators, administrations should ensure that the interrogators with overlapping coverage are not operating with the same Interrogator Identifier (II) codes. - where, the coverage of the interrogator extends beyond the boundaries of the State, The II code and PRF should be worked out in coordination with the ICAO Asia and Pacific Office and the neighboring States, and - administrations should inform the ICAO Asia and Pacific Office about the assigned II codes and PRFs for these installations.	Notify States	ICAO APAC Office	State letter	Mar 2009

Conclusion/ Decision No. --- Strategic Objective*	**Title of Conclusion/ Decision**	**Text of Conclusion/Decision**	**Follow-up Action**	**To be initiated by**	**Deliverable**	**Target date**
C 19/41 **A D E**	**Contact Person for WRC-11 and active participation by the States in WRC-11 related national and regional activities**	That, States be urged to a) nominate a Contact Person responsible for the preparation for WRC-11 in their administration and inform ICAO Asia and Pacific Office about the contact details of the nominated Contact Person; and b) actively participate in all the national and regional level activities related to the preparation for WRC-11.	Notify States	ICAO APAC Office	State Letter	Jan 2009
C 19/42 **A D**	**Providing ASIA/PAC States with information on recent and forthcoming developments to WAFS**	That, in order to increase the regional awareness on the planned developments of the WAFS, SADIS and International Satellite Communication System (ISCS), the information provided by the WAFCs, as shown in **Appendix S** to the Report on Agenda Item 3.4 be circulated by the ICAO Regional Office to the States in the ASIA/PAC Region.	Notify States	ICAO APAC Office	State Letter	Oct 2008

Conclusion/ Decision No. **---** **Strategic Objective***	**Title of Conclusion/ Decision**	**Text of Conclusion/Decision**	**Follow-up Action**	**To be initiated by**	**Deliverable**	**Target date**
C 19/43 **D**	**Training for the new WAFS gridded forecasts**	That, in order to facilitate the implementation by the States of the new WAFS gridded forecasts, a) WAFC Provider States, in coordination with ICAO and WMO, be invited to organize training on the use of the new WAFS gridded forecasts for icing, turbulence and cumulonimbus clouds; and b) WAFSOPSG be invited to consider, in addition to the planned regional training seminars, developing alternative methods for provision of training to the States on the new gridded forecasts for icing, turbulence and cumulonimbus clouds in order to ensure that a maximum number of WAFS users in the States will have access to the training in the most efficient way. *Note: The alternative training methods include computer based training products distributed to States and web-based training.*	a) Organize training b) Develop training methods	ICAO HQ	conduct training programme conduct training	Apr 2009 Dec 2010

Conclusion/ Decision No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date
C 19/44 **D**	**Use of administrative messages for errors in the WAFS SIGWX forecasts**	That, a) WAFSOPSG be requested to develop as soon as possible the procedures for the issuance of administrative messages by the WAFCs drawing attention to errors identified in the current WAFS SIGWX forecasts (in the BUFR code and PNG chart forms); and b) ICAO be invited to develop guidance for the meteorological offices and aviation users on the use of the above administrative messages.	Prepare Issue Form	ICAO APAC Office	Issue Form sent to HQ	Dec 2008

Conclusion/ Decision No. --- Strategic Objective*	**Title of Conclusion/ Decision**	**Text of Conclusion/Decision**	**Follow-up Action**	**To be initiated by**	**Deliverable**	**Target date**
C 19/45 **A D**	**Transition to ISCS 3rd Generation**	That, in view of the plans by the ISCS Provider State to upgrade the ISCS broadcast to a new 3rd Generation service (ISCS 3G) by the end of 2009:				
		a) the ISCS Provider State be urged to provide timely information to the ISCS user States on the planned changes including specifications of the hardware and software changes, transition timeline and expected cost implications for the users if any; and	Provide specifications	ISCS provider State	Specification information available	Mar 2009
		b) the ISCS user States be urged to keep abreast of the planned developments through the established channels of communication with the ISCS Provider State and plan well in advance any resources required for the transition to the ISCS 3G;	Notify ISCS user States	ICAO APAC Office	State Letter	Apr 2009
		Notes: *1) The ISCS Provider State will use the established network of ISCS focal points as its basis for keeping States informed.* *2) The Secretariat will undertake the task to keep the list of ISCS focal points up-to-date to ensure efficient communication between the ISCS Provider State and the ISCS user States in the ASIA/PAC Region.* *3) All information on the planned transition will be available on: http://www.weather.gov/iscs*				

Conclusion/ Decision No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date
C 19/46 **D**	**Amendment proposal to TAF-related provisions in the ASIA/PAC Basic ANP and FASID (Doc 9673)**	That, a) the amendment proposal to the ASIA/PAC Basic ANP, as presented in **Appendix V** to the Report on Agenda Item 3.4 , be processed according to the established procedure; and	prepare amendment proposal	ICAO APAC Office	amendment proposal to HQ	Sep 2008
		b) the new format of FASID Table MET 1A, as presented in **Appendix U** to the Report on Agenda Item 3.4, be adopted and the ASIA/PAC States be invited to provide the necessary data to the Regional Office in order to issue an amendment proposal.	Notify States	ICAO APAC Office	State Letter	Nov 2008
C 19/47 **D**	**Regional preparedness for timely implementation of the new TAF provisions**	That, a) the Regional implementation plan for the new TAF provision presented in **Appendix W** to the Report on Agenda Item 3.4 be circulated to all ASIA/PAC States; and	Notify States	ICAO APAC Office	State Letter	Sep 2008
		b) States be informed that the new TAF format should be used for all TAFs issued after 00 UTC on 5 November 2008.	Notify States	ICAO APAC Office	State Letter	Sep 2008

Conclusion/ Decision No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date
C 19/48 **D**	**Test website for the transition to the new TAF format**	That, States in the ASIA/PAC Region be invited to use the special website established by the U.S. NWS to facilitate the transition to the new TAF format and test their procedures for issuance of 30-hour TAF. *Note: The 30-hour TAF test website is accessed on: http://www.weather.gov/os/aviation/taf_testbed.shtml*	Notify States	ICAO APAC Office	State Letter	Sep 2008
C 19/49 **D**	**Guidance on the period of validity of TAF included in the HF VOLMET broadcasts**	That, ICAO: a) be invited to urgently review the concerns expressed with regard to the non-suitability of 30-hour TAF for HF VOLMET broadcasts as described in detail in the report of CNS/MET SG/12 meeting; and b) provide urgent guidance to the States concerned taking into consideration the user requirements expressed by IATA and IFALPA, before the implementation date of the new TAF provisions.	Prepare Issue Form	ICAO APAC Office	Issue form sent to HQ	Dec 2008

Conclusion/ Decision No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date
C 19/50 **D**	**Issues related to TAF code**	That, ICAO, in coordination with WMO be invited to consider the following issues related to TAF: a) providing explicit definition of the geographical area that the TAF covers with consistency between this definition for the TAF and METAR; b) establishment of amendment criteria for the temperature group in the TAF; and c) establishment of provision for multiple occurrences of operationally significant maximum or minimum temperatures in a 30-hour TAF.	Prepare Issue Form	ICAO APAC Office	Issue Form sent to HQ	Dec 2008

Conclusion/ Decision No. --- Strategic Objective*	**Title of Conclusion/ Decision**	**Text of Conclusion/Decision**	**Follow-up Action**	**To be initiated by**	**Deliverable**	**Target date**
C 19/51 **D**	**Coordination and Implementation of the Volcanic Ash Notification for Aviation**	That States listed in FASID Table MET 3C be encouraged to implement the format VONA developed by the International Airways Volcano Watch Operations Group (IAVWOPSG) in order to: a) improve communication of information on volcanic activity to ACC, VAAC, and MWO; and b) provide feedback on the utility of the VONA and refinements that should be considered by the IAVWOPSG *VONA = Volcano Observatory Notice for Aviation*	Notify States	ICAO APAC Office	State Letter	Nov 2008
C 19/52 **D**	**Update of ASIA/PAC Regional SIGMET Guide**	That, the new SIGMET examples developed by Hong Kong, China and Australia given in **Appendix Y** to the Report on Agenda Item 3.4 be included in the new edition of the ASIA/PAC Regional SIGMET Guide.	Notify States	ICAO APAC Office	State Letter	Dec 2008

Conclusion/ Decision No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date
C 19/53 **D**	**Convening MET/ATM TF meeting and organizing MET/ATM seminar**	That, a meeting of MET/ATM Task Force be convened in 2009 to review and update the Work Programme of the group and prepare a programme for the second ASIA/PAC MET/ATM Seminar to be held in 2010. *Note: Coordination with the ATM/AIS/SAR Sub-group is essential for the planned meeting of the MET/ATM TF.*	Organize meeting	ICAO APAC Office	Meeting convened	Dec 2009
C 19/54 **D**	**Improvements to aeronautical climatological information provision**	That, ICAO, in coordination with WMO and IATA, be invited to: a) study the evolving user requirements for the provision of aeronautical climatological information, in view of the increasing importance of climatological data in the decision making process and strategic planning of airline operations; b) based on the results of the study, consider developing proposal for improvements to aeronautical climatological information provision.	Prepare Issue Form	ICAO APAC Office	Issue form sent to HQ	Dec 2008
D 19/55 **D**	**Updated Subject/Tasks List of the CNS/MET Sub-group**	That, the Subject/Tasks List of the CNS/MET Sub-group provided in Appendix A2 to the Report on Agenda Item 3.4 be adopted.	Notify CNS/MET SG	ICAO APAC Office	CNS/MET SG informed with paper prepared	Jul 2009

Conclusion/ Decision No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date
C 19/56 **C,D**	**Common methodology for environmental benefits**	That, ICAO be invited to establish and maintain a simple and cost effective common methodology to assess and document environmental benefits to airspace and CNS/ATM planning initiatives.	Prepare Issue Form	ICAO APAC Office	Issue Form sent to HQ	Dec 2008
D 19/57 **A, C, D**	**Amendments to the Terms of Reference of the ATM/AIS/SAR SG**	That, amendments to the Terms of Reference of the ATM/AIS/SAR Sub Group be adopted to enable consideration of the Global Air Navigation Safety Plan in planning processes and ensure environmental initiatives are identified and progressed, as presented in **Appendix B** to the APANPIRG/19 Report on Agenda Item 5.	Notify ATM/AIS/SAR/SG	ICAO APAC Office	ATM/AIS/SAR SG informed with paper prepared	Jun 2009

*** Note:** ICAO has established the following Strategic Objectives for the period 2005-2010:
A: Safety - *Enhance global civil aviation safety*; **B: Security** - *Enhance global civil aviation security*; **C: Environmental Protection** - *Minimize the adverse effect of global civil aviation on the environment*; **D: Efficiency** - *Enhance the efficiency of aviation operations*; **E: Continuity** - *Maintain the continuity of aviation operations;* **F: Rule of Law** - *Strengthen law governing international civil aviation.*