



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

REPORT

**OF THE TWELFTH MEETING OF
COMMUNICATIONS, NAVIGATION AND SURVEILLANCE/
METEOROLOGY SUB-GROUP (CNS/MET SG/12) OF APANPIRG**

BANGKOK, THAILAND 21-25 JULY 2008

The views expressed in this Report should be taken as those of the Sub-group and not for the Organization. This Report will be submitted to the APANPIRG/19 Meeting and any formal action taken will be published in due course as a Supplement to the Report of the APANPIRG Meeting.

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

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1. Introduction

1.1 The Twelfth Meeting of the Communications, Navigation and Surveillance/Meteorology Sub-group (CNS/MET SG/12) of Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG) was held at the ICAO Asia and Pacific Regional Office, Bangkok, Thailand, from 21 to 25 July 2008.

2. Attendance

2.1 The meeting was attended by 94 experts from 21 States, 3 International Organizations - IATA, IFALPA, WMO and SITA. A list of participants is at **Attachment 1**.

3. Opening of the Meeting

3.1 Mr. Mokhtar A. Awan, Regional Director, ICAO Asia and Pacific Office, while welcoming the participants, reminded the meeting about the requirements for the implementation of the ICAO SARPs, achieving the performance objectives and maintaining the transparency. He provided an overview of the various activities that had taken place in the CNS and MET fields since the Eleventh Meeting of the Sub-group. He emphasized the importance of the performance based approach adopted by ICAO. He requested States to continue their support in defending ICAO position for ITU WRC-2011. He also informed the meeting that this year, ICAO Regional Office will be celebrating the 60th anniversary of its establishment. Mr. Awan introduced Mr. Christopher Keohan, Regional Officer MET, ICAO Asia and Pacific Office, who has joined the organization recently.

3.2 Mr. Jeffrey Bollard, Chairman of the CNS/MET Sub-group, welcomed the participants and highlighted the challenging issues. He also stressed the importance of following the performance based approach and encouraged participants to actively participate in the deliberations during the meeting.

3.3 In his opening remarks, Mr. Jim Nagle, Chief CNS/AIRS Section of ICAO Headquarters highlighted the importance to transition to the performance based approach. He mentioned that in the past, we have been looking at planning more facilities and not taking into account the outcomes, but with the changed concept, expected performance outcome has become the planning parameter now. He emphasized the need to develop programmatic system approach to develop regional implementation projects and plans. He informed the meeting of the recent development in the CAR/SAM Region for a combined ATM/CNS Sub-group and action plan for implementation of PBN.

4. Officers and Secretariat

4.1 Mr. Jeffrey Bollard, Chairman of the Sub-group, presided over the meeting. The Vice Chairmen of the Group, Mr. Lo Weng Kee from Singapore and Mr. Shun Chi-ming, from Hong Kong, China chaired the separate meetings of CNS ad hoc Working Groups and the MET Working Group of the Sub-group.

4.2 Mr. Li Peng and Mr. Sujana Saraswati Regional Officers, CNS and Mr. Christopher Keohan, Regional Officer, MET, acted as the Secretaries of the meeting.

4.3 The meeting was also assisted by Mr. Jim Nagle, Chief of CNS/AIRS Section, Mr. David Van Ness, and Technical Officer, ANB ICAO Headquarters and Mr. Dimitar H. Ivanov, Regional Officer, Air Navigation Systems Implementation (MET), ICAO Paris Office.

5. Organization, Working Arrangement, Language and Documentation

5.1 The working language was English inclusive of all documentation and this report. The Sub-group met as a single body on 21, 24 and 25 July 2008 to deal with the subjects of common interest in both CNS and MET fields. On other days the CNS and MET Working Groups met separately to deal with specific tasks. Ad-hoc groups were established during the meeting to deal with aeronautical satellite data communication, navigation and surveillance related issues met on 22, 23 and 24 July 2008.

5.2 A list of Working Papers and Information Papers presented at the meeting is in **Attachment 2**.

6. Terms of Reference of the CNS/MET Sub-Group

- 1) Ensure the continuing and coherent development of the ASIA/PAC Regional Air Navigation Plan in the CNS/MET fields in accordance with the Global Air Navigation Plan.
- 2) Review and identify deficiencies that impede the implementation or provision of efficient CNS/MET services in the ASIA/PAC Region.
- 3) 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.
- 4) Make specific recommendations aimed at improving CNS/MET 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 CNS/MET and recommend actions to address those issues.

7. Conclusions and Decisions - Definition

7.1 The Sub-groups of APANPIRG record their actions in the form of Draft Conclusions, Draft Decisions and Decisions with the following significance:

- a) Draft Conclusions deal with matters, which, in accordance with the Sub-group's Terms of Reference, require the attention of States or actions by ICAO in accordance with establishment procedures;
- b) Draft Decisions relate solely to matters dealing with the internal working arrangements of APANPIRG and its contributory bodies; and
- c) Decisions relate solely to matters dealing with internal working arrangement of the Sub-group only.

List of Draft Decisions, Draft Conclusions and Decisions

<u>Reference No.</u>	<u>Title</u>	<u>Page</u>
<u>Draft Decision</u>		
12/1	Revision of Subject/Tasks List of ATNICG	6
12/15	Revision to the Terms of Reference of the PBN Task Force	16
12/18	Subject/Tasks List of ADS-B Study and Implementation Task Force	23
12/46	Updated Terms of Reference and Subject/Tasks List of the CNS/MET Sub-group	59
<u>Draft Conclusion</u>		
12/2	Asia/Pacific Aeronautical Telecommunication Network System Security Policy	6
12/3	ATS Message Management (AMC) Software	7
12/4	Implementation of AIDC in Asia and Pacific Regions	8
12/5	Adoption of ATN over IPS in addition to ATN over OSI	9
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12/7	Amendment to Asia/Pacific Regional AMHS MTA Routing Policy	10
12/8	Amendment to FASID Tables CNS – 1B and CNS –C	10
12/9	Amendment to Asia/Pacific AMHS Manual	11
12/10	Satellite Communications Infrastructure	13
12/11	Regional PBN Implementation Plan	14
12/12	Flight Procedure Office	15
12/13	Adoption of Constant Descent Final Approach (CDFA)	16
12/14	Separation Standards for PBN	
12/16	Revision of the Strategy for the Provision of Navigation Services in the Asia/Pacific Region	17
12/17	Testing of Navigation and Surveillance facilities seminar	18
12/19	Guidance Material on Reporting Probability of ADS-B update	23

<u>Reference No.</u>	<u>Title</u>	<u>Page</u>
12/20	Guidance material on ADS-B Avionics Fitment Reporting	24
12/21	Multi-sensor fusion issues and Performance	24
12/22	Guidelines for the development of Implementation Plan	24
12/23	Sample Agreement for ADS-B Data Sharing	25
12/24	Revised Mandate Regional ADS-B Out Implementation	26
12/25	Support provision of VHF radio voice communication associated with ADS-B data sharing between adjacent States	27
12/26	Regional Surveillance Strategy for Asia/Pacific Region	28
12/27	Use of SSR Mode 'S' Interrogator Identifier	30
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12/32	Use of administrative messages for errors in the WAFS SIGWX forecasts	34
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12/38	Regional preparedness for timely implementation of the new TAF provisions	42
12/39	Test bed for the transition to the new TAF format	42
12/40	Guidance on the period of validity of TAF included in the HF VOLMET broadcasts	44
12/41	Issues related to TAF code	45
12/42	Coordination and Implementation of the Volcanic Ash Notification for Aviation	47

List of Draft Decisions, Draft Conclusions and Decisions

<u>Reference No.</u>	<u>Title</u>	<u>Page</u>
12/43	Update of ASIA/PAC Regional SIGMET Guide	49
12/44	Convening MET/ATM TF meeting and organizing MET/ATM seminar	51
12/45	Improvements to aeronautical climatological information provision	52
<u>Decision</u>		
12/33	SADIS Strategic Assessment Tables	35
12/35	ASIA/PAC WAFS Implementation Plan and WAFS/I TF	38
12/36	Revised TOR and Work Programme of the OPMET/M Task Force	39

Agenda Item 1: Adoption of agenda

1.1 The agenda adopted by the meeting was as follows:

Agenda Item 1: Adoption of agenda

Agenda Item 2: Review:

- 1) follow-up action on reports of CNS/MET SG/11 and APANPIRG/18 Meetings
- 2) relevant action items of 44th DGCA Conference
- 3) outcome of meetings of other related groups of APANPIRG

Agenda Item 3: Aeronautical Fixed Service (AFS):

- 1) review report of the Third Meeting of the ATN Implementation Coordination Group (ATNICG/3)
- 2) discuss other AFS related issues

Agenda Item 4: Aeronautical Mobile Service (AMS):

- 1) implementation of Datalink Flight Information Service (DFIS) Applications
- 2) discuss other AMS related issues

Agenda Item 5: Navigation:

- 1) review report of the Performance Based Navigation (PBN) Task Force
- 2) review strategies for Provision of Navigation Service and GNSS Navigation Capability
- 3) discuss other radio navigation issues

Agenda Item 6: Surveillance:

- 1) review reports of the Seventh Meeting of ADS-B Study and Implementation Task Force and the Third Meeting of SEA ADS-B Working Group
- 2) review strategy for the surveillance systems
- 3) discuss other surveillance related issues

Agenda Item 7: Aeronautical electromagnetic spectrum utilization:

- 1) review preliminary ICAO position for WRC-2011
- 2) review result of the First APT Regional Preparatory Group Meeting

Agenda Item 8: Implementation of the World Area Forecast System (WAFS):

- 1) review the outcome of WAFSOPSG/4 and SADISOPSG/13 Meetings
- 2) review the status of implementation of ISCS and SADIS
- 3) review the status of implementation and utilization of the WAFS products

Agenda Item 9: Exchange of OPMET Information:

- 1) review report of OPMET/M TF/6 Meeting
- 2) review regional requirements for OPMET information (FASID Tables)
- 3) regional implementation plan for Amendment 74 to Annex 3 on the TAF VOLMET broadcasting
- 4)

Agenda Item 10: ICAO Advisory & Warning Systems:

- 1) review implementation of International Airways Volcano Watch (IAVW)
- 2) review implementation of Tropical Cyclone Advisories and Warnings
- 3) SIGMET related issues

Agenda Item 11: Other MET issues:

- 1) MET/ATM coordination
- 2) MET support for operations at aerodromes and terminal areas

Agenda Item 12: Review CNS/ATM systems planning and implementation:

- 1) Key Priorities for CNS/ATM Implementation
- 2) review and update CNS/ATM Implementation Planning Matrix
- 3) CNS related issues
- 4) MET related issues

Agenda Item 13: Review of deficiencies in the CNS and MET fields:

- 1) status of CNS deficiencies (APANPIRG Deficiency List)
- 2) status of MET deficiencies (APANPIRG Deficiency List)

Agenda Item 14: Future Work Programme**Agenda Item 15:** Any other business

Agenda Item 2: Review:

- 1) follow-up action on reports of CNS/MET SG/11 and APANPIRG/18 Meetings
- 2) relevant action items of 44th DGCA Conference
- 3) outcome of meetings of other related groups of APANPIRG

Report of the CNS/MET SG/11 and APANPIRG/18 Meetings

2.1 The meeting carried out a review of the actions taken by APANPIRG/18 on Decisions and Conclusions formulated by the Eleventh Meeting of the CNS/MET Sub-group held in Bangkok from 16 to 20 July 2007. The meeting noted with satisfaction actions taken and the significant progress achieved by the States and the Secretariat. It was noted that actions on 95% of the Conclusions and Decisions of the APANPIRG/18 were completed or closed. The status of the follow-up action as reviewed by the meeting is provided in **Appendix A** to the Report.

Action taken by Air Navigation Commission

2.2 The meeting noted the outcome and specific actions taken by the Air Navigation Commission (ANC) on the APANPIRG/18 Report with respect to the CNS/MET matters. ANC considered on 15 May the review of the APANPIRG/18 report, as presented by the ANC Working Group on Regional Plans (WG/RPL) in AN-WP/8316. It was further noted that in accordance with the revised established practice (C-DEC 177/14 dated 20 March 2006 refers) PIRG reports will not be presented to the Council unless the Commission deems it necessary for the Council to take action on any of the conclusions. In the case of APANPIRG/18 Report, as there were no specific items that required Council action, it was not submitted to the Council. ANC noted 15 Conclusions and took actions on 7 actions items adopted by the APANPIRG/18 meeting.

Outstanding Conclusions

2.3 The meeting reviewed a list of outstanding Conclusions up to APANPIRG/17 (2006), which is provided in **Appendix B** to the Report. The meeting noted that of the 6 outstanding Conclusions, actions on 5 Conclusions had been either implemented or closed. The remaining one on-going item would require further action, which is expected to be completed by the May 2009.

Relevant Action Items of the 44th DGCA Conference

2.4 The 44th Conference of Directors General of Civil Aviation (DGCAs), Asia and Pacific Regions (DGCA/44) was held at Xi'an, China in October 2007. 231 delegates from 35 States/administrations and 5 international organizations attended the Conference. The meeting noted the theme subjects for 44th and 45th DGCA Conference and the action items agreed by the Conference. Several Action Items relating to Work Programme of the CNS/MET Sub-group were as follows:

- Action Item 44/1 – Resolution of Deficiencies;
- Action Item 44/6 – Implementation of Performance Based Navigation (PBN);
- Action Item 44/8 – 2008 Olympic Games;
- Action Item 44/9 – Preparation for WRC-2011;
- Action Item 44/14 – Management of Aviation's Environmental Impacts; and
- Action Item 44/16 – Technical Cooperation Programme.

2.5 The meeting noted that Items 44/1, 44/6, 44/8, 44/9, 44/16 were already covered by the work of the CNS/MET Sub-group and APANPIRG. The meeting encouraged States to follow up the recommendations of the 44th DGCA Conference.

2.6 IATA stated that follow-up by ICAO on Action Item 44/6 for early development of separation standards with respect to PBN applications using navigation specifications was required.

Review outcome of the ATM/AIS/SAR/SG/18

2.7 The meeting noted the following outcome of ATM/AIS/SAR/SG/18 meeting which was held from 23 to 27 June 2008. .

- IATA's advice in relation to APANPIRG/18 Conclusion 18/35 and recommendation to review the use of the word "mandate" in the Conclusion by CNS/MET Sub group.
- Result of 31, 32 33 meetings of RVSM Task Force and recommendation to dissolve the task force.
- ADS-CPDLC implementation in the Ujung Pandang FIR.
- Support for Ad-Hoc GOLD Working Group.
- Implementation of 30NM and 50NM Longitudinal Separations based on ADS-C in the Fukuoka FIR.
- Work of FANS Satcom Implementation Team (FSIT) on Satellite Data Communication Performance.
- Comments on review of TRASAS meeting on data link harmonization strategy and recommendation for APANPIRG to support the draft Data Link harmonization Strategy.
- Brief Report on FIT/BOB and FIT/SEA.
- Amendment to ICAO Flight Plan and proposal to establish Flight Plan and ATS Message Implementation Task Force.
- Result of review of APANPIRG List of Key Priorities and recommendation for combinations of Key Priority No. 1 (PBN Implementation), No. 5 (GNSS Implementation) and No.8 (Implementation of APV Approaches).

2.8 The meeting took note of the comments from ATM/AIS/SAR Sub-group into considerations when dealing with related issues.

Review outcome of the RASMAG

2.9 The meeting noted following update on the activities of the Regional Airspace Safety Monitoring Advisory Group (RASMAG) presented by the Secretariat:

- consolidated summary report of eighth and ninth meetings of RASMAG.
- technical meeting of Asia/Pacific RMAs.
- the fourth meeting of the Western pacific/south China Sea (WPAC/SCS).
- Large Height Deviation and technical and operational risk.
- RVSM implementation in China.
- ATC-to-ATC coordination errors and automated messaging etc.

2.10 The meeting recognized the importance of using AIDC in reducing the human errors in associated with communications between ATCs.

Agenda Item 3: Aeronautical Fixed Service (AFS)

- 1) review report of the Third Meeting of the ATN Implementation Coordination Group (ATNICG/3)
- 2) discuss other AFS related issues

Review Report of Third Meeting of ATNICG

3.1 The Third Meeting of ATNICG, hosted by Airports Fiji Limited was held in Nadi, Fiji Islands from 5 to 9 May 2008. The Meeting was attended by 67 participants from 17 States and 2 industry partners. The Meeting considered eighteen working papers and sixteen information papers and formulated one draft Decision and six draft Conclusions.

3.2 The CNS/MET SG/12 reviewed the Terms of Reference of ATNICG and did not consider it necessary to amend that. The meeting recognized the requirement of developing guidance material on implementation of ATN over IPS and decided to include this requirement in the Tasks List for ATNICG. The meeting also reviewed the works done on the item 7 'Security' of the Subject/Tasks list and decided to recommend the inclusion of security related tasks also in the Tasks List.

3.3 Secretariat was of the opinion that Subject/Tasks List should be amended to include the requirements of communication support for Flight Plan Task Force envisaged in the paper presented on ATM/AIS/SAR Meeting Report. The meeting agreed to the proposal to add Task No. 8 in the list of Subject/Tasks. The meeting hence endorsed the following Draft Decision recommending adoption of the amended Subject/Tasks List.

Draft Decision 12/1 – Revision of Subject/Tasks List of ATNICG

That, the revised Subject/Tasks List of ATNICG provided in **Appendix C** to the Report be adopted.

System Security

3.4 The meeting reviewed the developments that have taken place in ensuring security for the network and discussed actions that are required to be taken on this matter. While reviewing the "Asia/Pacific Aeronautical Telecommunication Network System Integrated Policy", it was recommended that the document be renamed as "Asia/Pacific Aeronautical Telecommunication Network System Security Policy", replace the references to "System Integrity" with "System Security" and also recommended that references relevant to interoperability requirements be transferred to some other document for example Asia/Pacific - Guidance Document for AMHS Conformance Testing (AMHS Manual)". The Meeting agreed to recommend the following Draft Conclusion for the consideration of APANPIRG.

Draft Conclusion 12/2 - Asia/Pacific Aeronautical Telecommunication Network System Security Policy

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

3.5 Some participants were of the opinion, that Security is a global issue and hence there should be a global policy on security to maintain uniformity. It was also expressed that if the threat was perceived because of inclusion of ATN over IPS protocol and use of public network infrastructure, then guidance on this matter had already been published by ICAO. The concern expressed was appreciated and it was decided that the region should subscribe to the global security structure to the extent possible and if required the matter can be addressed to the Aeronautical Communication Panel.

3.6 The meeting developed a Check List based on the management, operational and technical controls listed in NIST 800-53. The meeting also proposed to develop a Contingency Plan and Incident Response Plan for Asia/Pacific Region and work out the format and contents of the Guidance Material. The meeting recommended expanding the current draft, which contains guidance on technical controls, to include management and operational controls also.

ATN/AMHS Implementation Status

3.7 ATN implementation status provided on ICAO Asia/Pacific website http://www.icao.or.th/apac_projects/atn/charts/atn_chart.asp has been updated to include recent significant developments. Some of the major ATN implementation related activities include starting of 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 starting of ATN/AMHS implementation in Beijing, China.

Directory Service, AMHS Address Management and AMC etc.

3.8 Proposed implementation strategy for ATN Directory Service for Asia/Pacific Region in two phases, first phase for the provision of Offline Directory Service and the second phase for the Online Directory Service was presented to the meeting. It was also proposed that the Off-line Directory Service will be provided by AMC being implemented by Aerothai and after sufficient experience has been gained, On-line Directory will be provided as per ATN Guidance Material (Doc 9730) and ICAO Doc 9705 Vol VII. Reviewing the status of receipt of AMC Software from Eurocontrol, the meeting came to a conclusion that availability of AMC Software was essential to ensure effective and efficient management of the network. The meeting decided to recommend following Draft Conclusion requesting ICAO to facilitate transfer of AMC Software from Eurocontrol to Aerothai along with their consent for modification of Software by Aerothai to meet the requirements of Asia/Pacific Region.

Draft Conclusion 12/3 - 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.

3.9 The meeting was also informed that representatives from Thailand, USA and The Philippines from the region attended the AMC user training conducted at Luxemburg. Though maintenance of AMHS Communication Centers are considered to be the local matters, yet to maintain high level of operational reliability, it was proposed that centralized process should provide a logical centralized network operation in a decentralized physical network structure.

3.10 The meeting was also presented Guidance on Operational Procedures to facilitate the States in developing ATN/AMHS operational procedures necessary for communication center operators to provide continuous high performance un-interrupted AMHS network services.

ATS Inter-facility Data Communication (AIDC)

3.11 The meeting recalled that APANPIRG/18 adopted version 3 of AIDC ICD and decided to dissolve the AIDC Task Force. As follow up action, ATNICG/3 meeting 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 keep it the in the Work Programme of ATN Implementation Coordination Group and CNS/MET Sub-Group. On this issue, 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.

3.12 It was proposed that AFTN/ATN Gateway Architecture to exchange AFTN/AIDC messages over ATN could be used for the purpose of implementing AIDC over ATN. The concept proposes a gateway application by limiting the conversion requirements. The gateway does not convert AFTN message to an AMHS message but encapsulates the message and sends it over the ATN. The meeting was also informed that concerns expressed by APANPIRG in its Eighteenth meeting can be addressed by implementing AFTN AIDC over ATN.

3.13 The meeting also reviewed the implementation status of AIDC and noted the updated planning and implementation information as contained in the updated FASID Table CNS – 1E which was approved in early 2008.

3.14 Japan proposed to add new requirement for AIDC connection between Fukuoka ATMC and Taipei ACC using AFTN and ICD Version 3.0 with target date of implementation as 2012. The Secretariat informed the meeting that the new requirement needs to be included in the next consolidated amendment proposal.

3.15 The meeting was of the opinion that introduction of AIDC between ATS facilities would significantly reduce the coordination errors across FIR boundaries which are the most crucial aspect of APAC regional RVSM operations. The meeting also noted that AIDC has been identified by RASMAG as an effective means for mitigating errors observed in controller to controller verbal communication.

3.16 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 formulated the following Draft Conclusion for consideration by APANPIRG/19.

Draft Conclusion 12/4 – 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

3.17 The meeting was reminded that as per Annex 10, Volume III, Part I, Paragraph 3.3.3, the implementation of ATN/IPS, including the protocol and service, shall take place on the basis of regional air navigation agreement between ICAO Contracting States. It is however envisaged that AFTN is likely to continue in the foreseeable future, though AMHS implementation will continue.

3.18 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 enable implementation of ATN based on the provision of Internet Protocol Suite (IPS) utilizing Internet Protocol Version 6 (IPv6). The manual considers implementation of IPv4 in ground-ground sub-network as a regional or local issue and hence this issue has not been addressed in the manual.

3.19 Discussing the outcome of inclusion of IPS SARPs in Annex 10, Volume 3 in March 2008 the meeting agreed that APANPIRG may study a common OSI/IPS network infrastructure that will support AMHS and other ATN/OSI applications while allowing introduction of new IPS applications and develop a transition plan and required documentation for its implementation. Discussing the adoption of ATN over IPS in addition to ATN over OSI for the BBIS in the strategy for implementation of ATN in Asia/Pacific Region, following Draft Conclusion was recommended for adoption by APANPIRG/19.

Draft Conclusion 12/5 - 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 implementation, States hosting BBIS be encouraged to implement ATN over IPS in addition to ATN over OSI under implementation in the Asia/Pacific Region as per the existing regional strategy.

3.19.1 It was recommended that the following implementation strategy for ATN be considered:

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 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.

3.20 A 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 of ATN over OSI be completed by all the BBIS States by 2010 and by 2011 for all the BBIS MTAs to support both ATN/OSI and ATN/IPS. USA, through their working paper recommended changes in the time schedule. The proposed time schedule was discussed in the meeting and it was decided to formulate Draft Conclusion as follows for recommendation to APANPIRG/19.

Draft Conclusion 12/6 - ATN Implementation Schedule

That, States hosting Backbone Boundary Intermediate System (BBIS) be urged to complete the implementation of ATN Dual Stack (ATN/OSI and ATN/IPS) as per the following schedule:

2011 – All backbone AMHS MTAs support OSI and ICAO – compliant IPS protocol.

3.21 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, in addition develop long, medium and short term plans for transitioning to ATN based on IPS.

Asia/Pacific Regional AMHS MTA Routing Policy

3.22 Realizing the operational difficulty of performing connectivity test between a new MTA and the other MTAs prior to commissioning, it was proposed that permitting the routing configuration of the new MTA to correspond to the AFTN routing table prior to commissioning may mitigate the problem and hence modification to the AMHS MTA Routing Policy was suggested. The proposed modification was considered by the meeting and following Draft Conclusion was endorsed for the consideration of APANPIRG/19.

Draft Conclusion 12/7 - Amendment to Asia/Pacific Regional AMHS MTA Routing Policy

That, the revised Asia/Pacific AMHS MTA Routing Policy placed at **Appendix E** to the Report be adopted.

Amendment to FASID Tables CNS-1B and CNS-1C

3.23 In view of the developments that have taken place lately in the implementation of ATN in the Region, it was felt that the ANP (Doc 9750) needs updating. FASID Tables 1B and 1C were hence reviewed and changes proposed by the States were recorded. The meeting recommended adoption of amended FASID Tables CNS -1 B for ATN Router Plan and Table CNS – 1C for AMHS Routing Plan and formulated following Draft Conclusion for the consideration of APANPIRG/19.

Draft Conclusion 12/8 - 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 F and G** to the Report in accordance with the established procedure.

Asia/Pacific AMHS Manual

3.24 A guidance document has been created to assist the 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. Meeting considered inclusion of two more annexes to this document 'Asia/Pacific AMHS Manual' on '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' and decided to recommend the Draft Conclusion formulated by ATNICG/3.

Draft Conclusion 12/9 – Amendment to Asia/Pacific AMHS Manual

That, Annex E and Annex F provided in **Appendix H** to the Report be adopted as appendices to the Guidance Document for AMHS Conformance Testing (AMHS Manual)

ATN/AMHS Implementation in the Middle East Region

3.25 The meeting was informed about the implementation status of ATN/AMHS in the Middle East Region. It was informed that MID AFS Task Force, in its meeting held in 2005 had recommended establishment of high speed digital link to facilitate implementation of ground to ground element of ATN, consider using AMHS over TCP/IP, use CAAS addressing scheme rather than XF Addressing Scheme. MIDANPIRG (2007) recommended that MID States implementing AMHS should have AFTN/AMHS gateway where needed to ensure the interoperability of AFTN and CIDIN stations and networks with ATN. It has also been adopted that the ATN in the MID Region will be based on and use the Internet Protocol Suite (IPS) as the default networking protocol and provide communication in accordance with the prescribed required communication performance (RCP). Implementation in Bahrain, UAE, Oman, Egypt and Saudi Arabia in MID Region has progressed to some extent.

Agenda Item 4: Aeronautical Mobile Service (AMS)

- 1) implementation of Data Link Flight Information Service (DFIS) Applications
- 2) discuss other AMS relates issue

ICAO Web-based aeronautical radio frequency planning

4.1 Secretariat presented an overview of a proposed frequency planning tool which is planned to be made available to all ICAO Regional Offices to assist States with frequency assignment planning for communication and navigation systems.

4.2 As part of this effort it is proposed to amend the designated operational coverage (DOC) area and separation distances as specified for VHF communication by the ASIA/PAC RAN meeting in 1993. The proposed DOC is also to be used for all ICAO regional offices based on provisions contained in the Annex 10.

4.3 Secretariat provided the following link as an example of a potential graphical interface for the tool <http://192.206.28.81/worldops/default.aspx>.

4.4 It was clarified that the Regional Office would continue to be the coordination point for frequency assignments and the contact point for the development effort. The Secretariat advised that an evaluation version of the tool is planned to be available by the end of 2008. It was also clarified that 25 kHz spacing in the aeronautical VHF communication bands would be used in the tool for the frequency assignments. When discussing the potential use of aeronautical communication bands by the defense, the meeting was of the view that all VHF frequency assignments in the aeronautical bands should be considered as part of the planning assignment and thus should be coordinated.

4.5 The meeting was supportive of this effort however before any conclusion could be reached the tool would need to be tested and evaluated.

Satellite Data Communications Performance

4.6 The United States presented a paper on satellite data communications performance and the work of the Immarsat instigated FANS Satcom Improvement Team (FANS SIT) to raise awareness of 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.

4.7 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. To address this issue, the meeting requested ICAO to prepare a paper summarizing current and evolving satellite service provision and performance for the upcoming APANPIRG meeting. Further more, in order to support development and implementation of performance based satellite data link services and advanced ATM procedures in the Asia/Pacific Region, the meeting formulated the following Draft Conclusion.

Draft Conclusion 12/10 – Satellite Communications Infrastructure

That,

- a) States and International Organizations be requested to liaise with satellite service providers to establish a mechanism to maintain and modernise the satellite communication infrastructure; and
- b) ICAO consider the need for a meeting before the end 2008 for stakeholders to review the performance and provision of satellite data link communications in the Asia/Pacific Region.

Data-link Flight Information Service (DFIS) Seminar

4.8 The meeting was informed about a Special Information 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. It was informed that the seminar is proposed to be conducted in the first week of November 2008 and it will be conducted jointly with SITA. On the first two days, applications of Data-Link for Flight Information Service will be reviewed and discussed and on the third day, information will be provided on issues related to data-link applications other than DFIS (like CPDLC, ADS-B etc.). Experts from those States, which have already implemented DFIS will be invited to share their experiences with others. The meeting was also informed that State letters had been issued to those States, which have implemented DFIS, requesting them to nominate experts from their organizations to share experience on implementation with others. Republic of Korea informed that they have already received the State Letter and confirmed that they will be nominating an expert from their organization. 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.

Agenda Item 5: Navigation:

- 1) review report of the Performance Based Navigation (PBN) Task Force
- 2) review strategies for Provision of Navigation Service and GNSS Navigation Capability
- 3) discuss other radio navigation issues

Performance Based Navigation (PBN)

5.1 APANPIRG Conclusion 18/52 in September 2007 stipulated the establishment of a Regional Performance Based Navigation Task Force (PBNTF) with Terms of Reference to develop a PBN Implementation Plan for the Asia/Pacific Region and address related regional PBN implementation issues. The meeting reviewed the results of the work accomplished by the PBNTF over the course of three meetings presented by the Chairman of the PBNTF. 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 by APANPIRG/19. That task was completed at the third meeting of the PBNTF and the resulting Asia Pacific Regional PBN Implementation Plan was submitted to this meeting for review and approval prior to forwarding to APANPIRG/19. The meeting reviewed the plan and thanked the Task Force for its hard work. It was noted that since States would be required to develop their State PBN implementation plans by APANPIRG/20 in 2009, the Regional Plan should be adopted without delay. It was also noted that the Regional PBN Implementation Plan could be revised in the future as necessary to address changes in the aviation environment. The meeting agreed to the following Draft Conclusion calling for the APANPIRG/19 meeting to adopt and publish the plan.

Draft Conclusion 12/11 – Regional PBN Implementation Plan

That, the Regional PBN Implementation Plan as provided in **Appendix I** to the Report be adopted and published for use in the Asia and Pacific Region.

5.1.1 States are urged to review the plan and use it as a basis for creating their individual State PBN Implementation Plans.

5.2 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 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 potentially a “show-stopper” in meeting the PBN implementation goals of ICAO Assembly Resolution A36-23. It was highlighted that as all PBN procedures are data-driven, quality assurance in the procedure design process has become increasingly important. The concept of operation, anticipated funding sources and requirements, staffing assumptions and goals for the FPO were discussed. The goals 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.

5.3 The PBNTF strongly supported the concept 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.

5.4 The responses to the State letter requesting feedback on interest in use of FPO services and in hosting or providing financial support for the FPO were very positive. 90% of the 13 States that responded 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 2nd quarter of 2009.

5.5 The PBNTF requested that the ICAO continue to develop the proposal taking into account State responses with emphasis on the role, responsibility and financial mechanisms. The meeting also considered that the publication of a Regional Catalogue of Procedure Design Services providers styled on the Regional Catalogue of Flight Inspection Organisation would be beneficial. The meeting reviewed the FPO proposal, supported the concept and agreed to the following Draft Conclusion calling for the APANPIRG/19 meeting to support the continued development by ICAO of the concept.

Draft Conclusion 12/12 – Flight Procedure Office

That, ICAO continue to develop the concept of a Flight Procedure Office taking into account proposals submitted by the States.

5.5.1 A report will be made to the APANPIRG concerning the progress on the FPO.

5.6 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 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 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 agreed to the following Draft Conclusion to address this important safety issue.

Draft Conclusion 12/13 – Adoption of Constant Descent Final Approach (CDFA)

That, as an interim measure, pending widespread availability of Baro-VNAV and APV approaches, to reduce the likelihood of CFIT accidents, States should ensure that

- a) all current non-precision approaches with LNAV lines of minima be reviewed to include a CDFA profile; and
- b) all current and new non-precision approaches should include the Baro-VNAV design and consequent LNAV/VNAV approach minima.

5.7. 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 Draft Conclusion to be forwarded for adoption by the APANPIRG/19 meeting.

Draft Conclusion 12/14 – 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.

5.8 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.

5.9 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.

5.10 The meeting reviewed and agreed to the revised terms of reference proposed by PBNTF and endorsed the following Draft Decision calling for the APANPIRG/19 meeting to agree to the revised terms of reference.

Draft Decision 12/15 – 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 J** to the Report be adopted.

5.11 Two additional meetings of the PBNTF were tentatively scheduled, 5-6 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 Provision of Navigation Service and GNSS Navigation Capability

5.12 The meeting considered a series of information papers detailing current development of navigation services and facilities.

5.13 The PBNTF had also considered the two strategies, Strategy for the Provision of Navigation Service and 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.

5.14 The meeting 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 group. The developed strategy incorporates the PBN concept as the prime focus and also accounts for the development and deployment of GNSS. The revised strategy is presented in **Appendix K** to the Report.

Draft Conclusion 12/16 - Revision of the Strategy for the Provision of Navigation Services in the Asia/Pacific Region

That, the updated Strategy for the provision of navigation services provided in **Appendix K** to the Report be adopted and provided to States.

APEC GIT/12

5.15 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.

5.16 Twelfth meeting of APEC GNSS Implementation Team addressed GNSS related activities of APEC Member Economies, GIT initiatives, progress of GNSS Testbed Project and other administrative matters. The meeting was informed that the scope of APEC GNSS Testbed project has been completed.

ILS DME

5.17 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.

5.18 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

5.19 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) 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.

5.20 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.

5.21 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. It is therefore proposed to organise a seminar on testing of radio navigation facilities (both ground and satellite based) and surveillance facilities, to facilitate exchange of information and sharing of experience gained by the States. The seminar will also provide information to the participants regarding various technological options available for meeting various flight inspection/validation requirements. Following Draft Conclusion hence is formulated for consideration by APANPIRG/19 meeting.

Draft Conclusion 12/17 – 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.

GBAS Update

5.22 The United States informed the meeting that the Local Area Augmentation System (LAAS) is an implementation of internationally accepted standards for Ground Based Augmentation System (GBAS) and has identified LAAS as an "enabler" for NextGen, as the all-weather landing aid for a satellite based navigation system for all phases of flight, and as an alternative technology to Instrument Landing System (ILS). The FAA is currently investigating the possibility of using single frequency GBAS architecture to support near term Category-III services. LAAS has the potential to allow for increased flexibility in the terminal area by eliminating the capacity constraints due to ILS critical areas and enabling more advanced future operations in all weather conditions.

5.23 The FAA is working with Honeywell International to complete the system design approval (SDA) of their Honeywell SLS-4000 design against a non-Federal specification (FAA-E-AJW44-2937A). The non-Federal approval consists of system design approval (FAA specification requirements are met and performance validated) and facility and service approval for a specific location and user. GBAS facility approval and service approval are expected to be completed at Memphis early 2009.

5.24 The FAA will continue to use the Memphis GBAS facility to validate operational applications, criteria, benefits, and procedures for GBAS users to reduce delays, enhance capacity, and reduce environmental impacts.

5.25 Internationally the FAA continues to co-chair, with EUROCONTROL, the International GBAS Working Group (IGWG) meetings with participation of many national navigation service providers, industry and air carriers. The next IGWG meeting is to be held in Chile. Memoranda of Cooperation (MOC) have been executed between the FAA and Australia, Germany and Spain to further the cooperation between service providers interested in implementing GBAS technology. 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.

5.26 The United States currently considers GBAS is the only known feasible service that will support GNSS based Category-III approach and landings. The FAA seeks to leverage Category-I research development and operational experience to gain Category-III operational approval based on upgraded Category-I LAAS equipment. The FAA and Boeing have cooperated to develop a feasible set of ground facility and aircraft requirements as an initial proposal. This proposal is now being reviewed by RTCA and ICAO.

5.27 Australia informed the meeting that it 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 early in 2009. Parallel activities to provide Cat I GBAS are also occurring 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

5.28 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.

5.29 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. Membership of the executive committee is from the various departments and agencies of the federal government. 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)

5.30 Japan reported on 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 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 two satellites and four GESs configuration.

5.31 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.

5.32 In the operational test and evaluation activities prior to the commissioning, MSAS demonstrated the predetermined performance in terms of accuracy, availability, integrity and continuity. Based on these results, MSAS was commissioned as air navigation system in last September. MSAS has been showing very stable performance since its commissioning. The horizontal accuracy is less than 1 meter in most parts of Japan. The challenge to the ionospheric disturbance is still ongoing since activity of ionosphere is very severe in this 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.

Agenda Item 6: Surveillance:

- 1) review reports of the Seventh Meeting of ADS-B Study and Implementation Task Force and the Third Meeting of SEA ADS-B Working Group
- 2) review strategy for the surveillance systems
- 3) discuss other surveillance related issues

Review Report of the Seventh Meeting of ADS-B Study and Implementation Task Force

6.1 The meeting reviewed the outcome of the Seventh Meeting of ADS-B Study and Implementation Task Force.

6.2 An ADS-B Seminar and the Seventh Meeting of Automatic Dependent Surveillance – Broadcast (ADS-B) Study and Implementation Task Force (ADS-B SITF/7), hosted by Air Traffic Management Bureau of the Civil Aviation Administration of China were held in Chengdu, China from 7 to 11 April 2008. The Seminar was attended by 140 participants and the Meeting was attended by 74 experts from 18 States, 2 international organizations, 1 data communications service provider and representatives from industries.

6.2.1 The report of both the meeting and the Seminar is posted at the following ICAO webpage:

http://www.bangkok.icao.int/meetings/2008/adsb_adsb_tf7/index.html

6.3 The ADS-B SITF/7 meeting formulated 1 draft Decision and 6 draft Conclusions. The meeting considered 16 Information Papers and 14 Working Papers. Twenty one presentations were made at the ADS-B Seminar.

6.4 The objective of the ADS-B Seminar was to provide information to the participants on ADS-B planning and implementation. The Seminar covered the following topics on the ADS-B and was well received by the participants:

- Basic ADS-B Concept Introduction
- APANPIRG and ADS-B SITF activities
- Introduction to Multilateration
- ATC Automation and ADS-B
- Airframe Manufacturers Plan
- Avionics products
- Ground stations and ADS-B service providers
- States and ANSP projects and deployment plans

6.5 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.

- the meeting reviewed the developments in relevant ICAO panels on ADS-B and surveillance and noted applicable provisions and guidance materials on ADS-B.
- proposed replacement of “ADS” reference in PANS ATM Doc 4444, Appendix 2 Flight Planning and Surveillance Equipment in the Item 10 with ‘ADS-C’.
- States and international organizations at the ADS-B SITF/7 meeting supported the concept of ADS-B data sharing (Paragraph 4.4 of the ADS-B SITF/7 report refers).

Using ADS-B surveillance service in the North Asia area

6.6 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 received at the meeting. This proposal was further discussed at the North Asia ad hoc Working Group during the meeting.

Examine the feasibility of using ADS-B derived data for height monitoring

6.7 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 concluded 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 how ADS-B derived data could be processed and used for height monitoring. Result of initial study by the Task Force is provided in the **Appendix L** to the Report.

6.7.1 The issue was further discussed by the meeting and the need for further study by technical experts in the field was noted. IATA recommended that APANPIRG seeks the assistance of an appropriate body to progress the issue.

Planning and Implementation Status provided by States

6.8 The planning and implementation status updated by States at the meeting is provided in the Task Force meeting report under Agenda Item 7.

Update of ICAO Panels on ADS-B Related issues

6.9 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).

6.10 The meeting noted that ASP WG and SWG meetings, hosted by Aerothai, were held in Bangkok from 14 to 23 May 2008. The meetings progressed following materials for presentation to the first meeting of ASP (ASP/1) which is scheduled from 24 to 28 November 2008:

- a) draft high-level SARPs for multilateration systems (MLAT);
- b) new provisions on required surveillance performance (RSP) and airborne surveillance applications (relating to the use of ADS-B reports onboard aircraft);
- c) report on RF pollution study relating to 1030/1090 MHz in light of increased traffic and new systems (e.g. MLAT); and
- d) consolidation of guidance material on surveillance in a new aeronautical surveillance manual.

6.11 The meeting noted that the ADS-B SITF did not identify the need to revise the TOR of the Task Force. The meeting reviewed the Subject/Tasks List updated by the ADS-B SITF and endorsed the following Draft Decision for adoption by APANPIRG/19.

Draft Decision 12/18 - 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 M** to the Report be adopted.

Guidance Material on Reporting ADS-B Probability of Update

6.12 The meeting noted the guidance material developed by the Task Force on ADS-B probability of detection. The proposed means to measure Probability of Detection, Pd is applicable to both for radar and ADS-B by measuring the screen updates presented to the controller and dividing by the number of possible screen updates e.g. in 100 screen updates. For example, ADS-B or radar positional data presented to the controller 90 times with maximum possible presentation of 100 times, will have the Pd of 90%. It was also proposed that if the ADS-B is to be used for enroute only function, the selected period of updates could be 5, 10 or 12 seconds.

Draft Conclusion 12/19 – Guidance Material on Reporting Probability of ADS-B update

That, the Guidance Material on Reporting Probability of ADS-B update as shown in **Appendix N** to the Report be adopted for use by States in the Asia and Pacific Regions.

Guidance Material on Reporting ADS-B Avionics fitment

6.13 The meeting noted a proposed way for the States to report ADS-B equipage. The key feature of the proposal was that the States should only consider aircraft equipped if they were capable of broadcasting ADS-B positional data with associated integrity indicators suitable for meeting the requirements of 5 nautical mile separation services. In addition the ADS-B Task Force agreed that the States report equipage by number of airframes as well as by numbers of flights. Accordingly, the meeting endorsed the following Draft Conclusion formulated by the Task Force.

Draft Conclusion 12/20 - Guidance material on ADS-B Avionics Fitment Reporting

That, the Guidance Material on Reporting ADS-B Avionics fitment as shown in **Appendix O** to the Report be adopted.

Advisory Material on ADS-B Security

6.14 The meeting noted that the 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 Nav aids 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.

6.15 It was noted that legislation and enforcement of legislation was an important part of reducing risk exercises for all these technologies. The meeting 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 (not posted) and recommended to publish it in the restricted page on the ICAO APAC Website. A delegate from USA 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.

Multisensor fusion processing

6.16 The meeting reviewed a draft Guidance Material on performance criteria and issues to be considered when introducing ADS-B into an Air Traffic Control multi-sensor fusion processor developed by the Task Force. It was noted that modern air traffic control systems use multi-sensor fusion processes to improve the quality of surveillance track data provided to air traffic controllers. Accordingly, the meeting endorsed the following Draft Conclusion.

Draft Conclusion 12/21 – Multi-sensor fusion issues and Performance

That, the Guidance Material on the performance criteria for multi-sensor fusion provided in the **Appendix P** to the Report be adopted for consideration by States when integrating ADS-B into an Air Traffic Control multi-sensor fusion processes.

Guidelines for the development of Implementation

6.17 Considering that the guidelines developed by the SEA ADS-B working group would be useful for other States in developing similar sub-regional or national implementation plan, the meeting endorsed the following Draft Conclusion for consideration by APANPIRG/19.

Draft Conclusion 12/22 - Guidelines for the development of Implementation Plan

That, States be advised to use the following guidelines for the development of 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

6.18 The meeting reviewed and endorsed the sample agreement for ADS-B Data Sharing and cost apportionment developed by the SEA ADS-B working group with comments by ADS-B SITF. Accordingly, the meeting adopted the following Draft Conclusion.

Draft Conclusion 12/23 – 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 Q and R** respectively to the Report, be adopted as regional guidance material.

Requirements for ADS-B Out Avionics

6.19 IATA presented a paper proposing to develop a draft Conclusion regarding ADS-B OUT Avionics Equipage Requirements to supersede APANPIRG Conclusion 18/35. The paper recalled that APANPIRG/18 identified the need and benefits of a mandate for aircraft to be equipped with ADS-B OUT. It was also recalled that 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.

6.20 IATA stated that there is some confusion about the intent of the conclusion 18/35 with regards 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 recommended that with many states progressing with their plans to implement ADS-B surveillance, it is vital that some guidelines be finalized without delay to ensure that the operational benefits from ADS-B are realized.

6.21 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 the CNS/MET Sub-Group to review the use of the word “mandate” with the objective of raising a replacement Conclusion for consideration by APANPIRG/19.

6.22 However, in their working paper, IATA still supports the term “Mandate” as being appropriate as originally agreed by APANPIRG/18 with revised target dates. In view of the foregoing, the meeting developed the following Draft Conclusion based on the proposal from IATA for Consideration by APANPIRG/19. This Conclusion once adopted by APANPIRG will supersede the APANPIRG Conclusion 18/35.

Draft Conclusion 12/24 –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 Airlines 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 draft 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 draft 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

6.23
times:

The South East Asia ADS-B Working Group established by APANIRG/18 met three

- 1st meeting was held on 15 and 16 November 2007 in Singapore. The meeting report is available at: http://www.icao.or.th/meetings/2007/seaadsb_wg1rpt.pdf

- 2nd meeting was held from 27 to 29 February 2008 in Bali, Indonesia. The meeting report is available at:
http://www.bangkok.icao.int/meetings/2008/sea_adsb_wg2rpt.pdf.

- 3rd meeting was held on 2 and 3 July 2008 in Putrajaya, Malaysia. The meeting report is available at:
http://www.bangkok.icao.int/meetings/2008/seaadsb_wg3rpt.pdf

6.24

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.

6.25 The working group recognized that to enable radar like separation, ADS-B based surveillance service must be complemented by Direct Control 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 endorsed the draft regional policy to support associated DCPC capability and the following Draft Conclusion was formulated by the Working Group.

Draft Conclusion 12/25 - Support provision of VHF radio voice communication associated with ADS-B data sharing between adjacent States

That, States are 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 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

6.26 The meeting appreciated the efforts and progress made by the ADS-B SITF and the SEA ADS-B WG.

6.27 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

6.28 An ADS-B Study and Implementation Task Force Working Group meeting is scheduled to be held in end of 2008 or early 2009 and the next meeting of ADS-B Study and Implementation Task Force is scheduled to be held in April 2009.

Regional Surveillance Strategy for Asia/Pacific Region

6.29 The meeting reviewed the surveillance strategy for Asia and Pacific Regions developed by the CNS/MET Sub-group and adopted by APANPIRG/18. The meeting noted that the strategy was considered as living document which is regularly updated based on the developments.

6.30 The meeting noted comments from ADS-B SITF/7 that the ADS-B In was not considered mature enough to be included in the strategy at this stage for the following reasons;

- very low equipage of ADS-B In till 2015;
- lack of regulatory requirements;
- lack of equipage standard; and
- no procedure and separation standard have been developed.

6.31 The meeting established an ad hoc working group to review the strategy. The meeting endorsed the amended Strategy and formulated the following Draft Conclusion.

Draft Conclusion 12/26 – Regional Surveillance Strategy for Asia/Pacific Region

That, the revised Regional Surveillance Strategy for Asia/Pacific Region provided in the **Appendix S** to the Report be adopted.

Multilateration applications in Malaysia

6.32 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. The system design comprises of 22 remote ground sites with sensors comprising of:

- i) 20 receivers;
- ii) 7 transmitters; and
- iii) 2 reference transponders

Certification of Multilateration Systems

6.33 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.

6.33.1 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.

6.33.2 The meeting was informed that ICAO headquarters has also worked on the standard based on the EUROCAE for the multilateration standard.

ADS-B Update in USA

6.34 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.

6.34.1 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.

6.34.2 It was also informed that at the first meeting of the GREPECAS ATM/CNS Sub-group – CNS Committee, Surveillance Task Force in June 2007, several members 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

6.35 The meeting was informed that France has been involved in ADS-B technology for many years and has started the deployment of ADS-B ground stations in Corsica and La Réunion Islands since 2007.

6.35.1 A decision to implement the ground stations in New Caledonia was also 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

6.36 The 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 by the SSRs. ICAO SARPs provided for a 4 bit Interrogator Identifier (II) code, which permitted 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 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. In view of the foregoing, the meeting agreed to formulate following Draft Conclusion for consideration by APANPIRG.

Draft Conclusion 12/27 - Use of SSR Mode S Interrogator Identifier

That, in view of low density of SSR interrogator installations in the Asia/Pacific Regions, only Interrogator Identifiers (and not Surveillance Identifiers) codes be used for SSRs Mode S in areas of overlapping coverage.

6.36.1 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.

6.37 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 formulated following Draft Conclusion.

Draft Conclusion 12/28 - Coordination for SSR Mode S Interrogator Identifier Code

That, States be advised that

- a) for planning the implementation of SSR Mode S interrogators, administrations ensure that the interrogators with overlapping coverage are not operating with the same Interrogator Identifier (II) codes.
- b) 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
- c) Administrations inform the ICAO Asia and Pacific Office about their assigned II codes and PRFs.

6.37.1 The USA informed meeting that in the European Region, Interrogator Identifier (II) code '0' is reserved for use by the mobile/temporary installations.

Agenda Item 7: Aeronautical electromagnetic spectrum utilization

- 1) review preliminary ICAO position for WRC-2011
- 2) review result of the First APT Regional Preparatory Group Meeting

7.1 The meeting was informed by the Secretariat that in the report submitted to Air Navigation Commission through Working Paper AN – WP/8284, it had been concluded that the WRC – 07 results generally conformed to the ICAO position. Brief overview of the results in a tabular form, indicating the Conference results on each agenda item related to aviation and comments on their conformance with ICAO position on those agenda items was also presented to the meeting. Out of the seventeen agenda items, results for sixteen agenda items were in conformance with the ICAO position, for the seventeenth agenda item, the result partially complied with ICAO position.

7.2 ACP – WG/F in its Eighteenth meeting also agreed that the outcome of WRC-07 had been generally successful for the aeronautical community in satisfying both the WRC-07 agenda items and obtaining WRC-11 future agenda items. The meeting divided WRC-11 agenda items into three main groups: Important aviation issues, Direct threats to aviation and Potential threats. Agenda Items included in these three groups along with the list of Agenda Items which do not pose any threat to aviation were presented to the meeting.

7.3 The meeting was informed that preliminary ICAO position is likely to be available by mid 2009 and 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 the position developed by APG. Based on above, following Draft Conclusion was formulated by the meeting.

Draft Conclusion 12/29 – 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 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.

7.4 The meeting was also informed about the outcome of the First Meeting of the Asia Pacific Telecommunity Conference Preparatory Group (APG) for WRC-11 and was presented the distribution of Agenda Items between different Working Parties.

Agenda Item 8: Implementation of the World Area Forecast System (WAFS)

- 1) review the outcome of WAFSOPSG/4 and SADISOPSG/13 meetings
- 2) review the status of implementation of ISCS and SADIS
- 3) review the status of implementation and utilization of the WAFS products

8.1 Review the outcome of WAFSOPSG/4 and SADISOPSG/13 meetings

8.1.1 The meeting noted the executive summaries of the 4th Meeting of the WAFSOPSG held at the ICAO Regional Office, Cairo, Egypt from 26 to 28 February 2008 (full report is available on the WAFSOPSG website <http://www.icao.int/anb/wafsopsg>), and the 13th meeting of the SADISOPSG held in Dakar, Senegal from 27 to 29 May 2008 (full report available on SADISOPSG website <http://www.icao.int/anb/sadisopsg>).

WAFS developments

8.1.2 The expert from the WAFS London presented detailed information on the developments to the WAFS and SADIS since the 11th meeting of the CNS/MET Sub-Group. The information contained suggested actions on those developments that may have direct impact on the end users. The following developments have been highlighted:

8.1.2.1 Recent Developments

- Adoption of Standards and Recommended Practices of Amendment 74 to ICAO Annex 3 related to the WAFS
- Earlier issuance time of WAFS SIGWX forecasts
- Provision of PNG formatted SIGWX charts
- BUFR encoded WAFS SIGWX forecasts and BUFR guideline documentation
- SADIS FTP Service developments and documentation
- WMO Trust Fund in support of LDC members to access WAFS products
- Enhancements to the provision of SADIS Administrative Messages

8.1.2.2 Future Developments

- Migration from GRIB 1 to GRIB 2 WAFS upper-air forecasts
- Improved WAFS forecasts for icing, turbulence and cumulonimbus clouds in the GRIB 2 code form
- Establishment of a web-based distribution of WAFS forecasts
- Use of concatenated WAFS forecasts for long-haul flights
- Further development of WAFS Performance Indicators
- Corrections to WAFS SIGWX forecasts
- Cessation of SADIS 1G satellite broadcast system
- Enhancements to the SADIS FTP service

8.1.3 The meeting noted with appreciation the comprehensive information presented by WAFS London which was supplemented by information from the WAFS Washington. In view of the importance of the recent and future WAFS developments for all WAFS users, the meeting agreed that the information provided by the WAFSs should be reproduced in full as **Appendix T** to the Report. The meeting also requested the Regional Office to circulate this information under a State letter to all States in the ASIA/PAC Region in order to increase the awareness of the recent and forthcoming important changes to the WAFS. The meeting formulated the following Draft Conclusion.

Draft Conclusion 12/30 – 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 ISCS, the information provided by the WAFCs, as shown in **Appendix T** to the Report, be circulated by the ICAO Regional Office to the States in the ASIA/PAC Region.

Training for the new WAFS gridded forecasts

8.1.4 The meeting discussed further the States' need for training to be provided by the WAFCs on the new WAFS gridded forecasts for icing, turbulence and cumulonimbus clouds. It was noted that the WAFS Long-term Plan adopted by the WAFSOPSG/4 meeting included a milestone on regional training seminars on the WAFS gridded forecasts of icing, turbulence and cumulonimbus clouds to be conducted in 2010.

8.1.5 The meeting also noted the conclusion by the WAFSOPSG/4 meeting to convene a workshop involving the WAFS Provider States, ICAO, WMO, and WAFS user States and users (in particular, IATA and IFALPA) in order to facilitate the implementation of the new gridded WAFS forecasts of cumulonimbus clouds, icing and turbulence, and in particular their visualization. The workshop would be held back-to-back with the WAFSOPSG/5 meeting in September 2009 at the ICAO EUR/NAT Regional Office, Paris.

8.1.6 The meeting agreed that the training for the new WAFS products was essential and that this training should be conducted in the most efficient way. In this regard, the meeting was of the opinion that the use of 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, which could be costly and with limited participation from the States. It was noted that WAFS Washington had already offered computer based training to the ISCS user States in the CAR/SAM Region.

8.1.7 Noting that the content of the training on the new WAFS forecasts was yet to be developed by the WAFCs and agreed by the WAFSOPSG, the meeting decided to draw the attention of the WAFSOPSG to the need to evaluate alternative ways of the provision of training in order to ensure that a maximum number of WAFS users in the States would have access to the training. The meeting agreed on the following Draft Conclusion.

Draft Conclusion 12/31 – Training for the new WAFS gridded forecasts

That, in order to facilitate the implementation by the States of the new WAFS gridded forecasts,

- a) WAFS 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.

Notification on errors in WAFS SIGWX forecasts through administrative message

8.1.8 The meeting noted the concerns expressed by some experts with regard to the elimination of the corrections to the WAFS SIGWX forecasts in Amendment 74 to Annex 3. This was regarded as inconsistent with the general Annex 3 requirements for quality management of the products supplied to the users. In particular, the expert from China proposed that the corrections to the WAFS SIGWX forecasts should be re-instated.

8.1.9 The meeting noted that Decision 4/5, *Corrections to the WAFS SIGWX forecasts*, of WAFSOPSG/4 envisaged that in case of identified errors in a SIGWX forecasts that had been issued, instead of issuing the corrections, the WAFC concerned should issue an administrative message drawing the attention of the users to the identified error. While the meeting agreed not to pursue the proposal by China at this stage in view of this new mechanism, the meeting expressed concern that the related operational procedures for the issuance and distribution of the above messages have not yet been developed. In addition, States and aviation users should receive guidance from ICAO on the use of the WAFS SIGWX forecasts when administrative messages were received from the WAFCs indicating that errors in the SIGWX forecasts have been identified.

8.1.10 In view of the foregoing, the meeting agreed that WAFSOPSG should expedite the development of the procedure for the issuance of administrative messages to notify errors in the SIGWX forecasts and that ICAO should develop the related guidance on the use of these messages and formulated the following Draft Conclusion.

Draft Conclusion 12/32 - 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.

8.2 Review the status of implementation of SADIS and ISCS

SADIS Strategic Assessment Tables

8.2.1 The meeting reviewed the draft SADIS Strategic Assessment Tables for Asia, 2008-2012 prepared by the SADIS Strategic Assessment Team. The meeting noted that the projected figures for the OPMET FC, FT and SP bulletins were likely to change with the implementation of the new TAF and SPECI provisions from November 2008. The expected data volumes for FC, FT and SP bulletins have been adjusted and the meeting agreed to forward the tables to the SADISOPSG by adopting the following Decision.

Decision 12/33 – SADIS Strategic Assessment Tables

That, the Asia SADIS Strategic Assessment Tables, as given in **Appendix U** to the Report, be adopted and forwarded to the SADISOPSG for planning the future SADIS bandwidth requirements.

Harmonization of OPMET data broadcast on ISCS and SADIS

8.2.2 The meeting noted the information on the harmonization of the OPMET bulletins format on the ISCS broadcast. Annexes 2 and 3 to the *ISCS User Guide* have been completed and the U.S. National Weather Service (NWS) was in process of validating the information in these Annexes to bring them in line, where possible, with Annexes 2 and 3 to the *SADIS User Guide*. In Annexes 2 and 3 to the *ISCS User Guide*, the international bulletins will, in the future, be provided in a form that matches the SADIS procedure.

8.2.3 The meeting was informed that the transition to harmonize the ISCS broadcast with SADIS will be a turn-key action. The ISCS users will have to update the database of allowable products in their WAFC workstations; otherwise, the data will be discarded by the system. Furthermore, the existing service vendor support for maintenance of the WAFS workstations should enable vendors to provide the necessary support to update any changes to the database management program. The meeting agreed to a transition date on 31 August 2008; however, the Provider State informed the secretariat of a minor date change due to a national Holiday. Subsequently, the new transition date is 29 August 2008 at 0000Z.

8.2.4 The ISCS Provider State has already informed the users on the forthcoming change in accordance with the NWS protocol. According to this protocol, an implementation notice is issued at least 120 days before introducing any changes to products or data that are provided via the National Weather Service Telecommunication Gateway (NWSTG) which is the source of data for the ISCS satellite broadcast. Information on the changes is also posted on the ISCS web page (<http://www.weather.gov/iscs>).

8.2.5 In addition to the notification already provided to the ISCS user community by WAFC Washington, the meeting felt that, in order to ensure continuation of reception of OPMET bulletins broadcast on the ISCS after the introduction of the new OPMET bulletin structure on 29 August 2008 at 0000Z, the ASIA/PAC ISCS user States should receive the information on the forthcoming changes provided to the meeting and requested the Secretariat to undertake the following actions, in coordination with the ISCS Provider State:

- 1) Circulate to ISCS user States in the ASIA/PAC Region the information on the changes to the OPMET bulletins on the ISCS broadcast as soon as possible; the Regional Office should also coordinate the matter with the ISCS focal points in the States;
- 2) Urge the ISCS user States in the ASIA/PAC Region to check with the workstation vendors the actions needed to update their workstations OPMET database configuration in order to continue receiving the OPMET bulletins after the planned switch over to the new format; and
- 3) Inform the ISCS user States that they may choose to exercise the existing maintenance service contract for their WAFS workstations, which should provide the necessary support to update the ingest database management programme.

Introduction of 3rd Generation ISCS Service

8.2.6 The meeting was informed that the NWS existing contract with Verizon (MCI) to provide the ISCS satellite broadcast services would expire on 31 December 2009. The NWS is in the process of transitioning to ISCS-Generation 3 (G3) with a new service contract. There are no plans to continue a dual broadcast service of G2 and G3 once G3 has been satisfactorily implemented. This will be a turn-key action and all users of WAFS workstations under the ISCS footprint will be required, by 31 December 2009, to receive information using G3.

8.2.7 The meeting was also informed that the NWS was planning to award a contract for ISCS-G3 by early 2009. The ISCS-G3 will provide improved performance compared to that of the current system. After award of the contract for ISCS-G3, a detailed transition schedule will be posted on the ISCS web page (<http://www.weather.gov/iscs>). In addition, advisory bulletins will be posted on this web page to keep ISCS users advised on the progress of the transition.

8.2.8 The meeting however noted that it was not sure if the necessary upgrades to the hardware and software would be fully funded by the ISCS Provider State similar to the previous upgrade to TCP/IP, or if the ISCS user States would need to bear some of the costs for the transition and to upgrade their workstations. Furthermore, no information on the specifications of the hardware/software changes and the transition timeline is available due to contractual considerations. In this connection, in view of the very tight time schedule to complete the transition, the meeting formulated the following Draft Conclusion.

Draft Conclusion 12/34 – 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 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>

8.3 Review the status of implementation and utilization of the WAFS products

WAFS gridded forecasts of icing, turbulence and cumulonimbus clouds

8.3.1 The meeting noted that the trial gridded forecasts of icing, turbulence and cumulonimbus clouds produced by WAFS London had been made available on the SADIS FTP service and those produced by WAFS Washington had been made available on the NOAA FTP site ([ftp.ncep.noaa.gov](http://ftp.ncep.noaa.gov/pub/data/nccf/com/gfs/para/gfs.<yyyymmddHH>), in the directory `pub/data/nccf/com/gfs/para/gfs.<yyyymmddHH>`, where `yyyymmdd` is the date and `HH` is model run time: 00, 06, 12 and 18Z). Pictorial representations of the WAFS Washington forecasts are also available on the Internet at: <http://aviationweather.gov/testbed/globalgrids>. Examples of pictorial representations of forecasts from both WAFS London and WAFS Washington are available at: <http://www.emc.ncep.noaa.gov/mmb/gtrojan/WAFAVN/gifs/>.

8.3.2 The expert from Hong Kong, China presented some observations on the WAFS trial gridded forecasts on icing, turbulence and cumulonimbus clouds. Comparisons between the corresponding forecasts of the two WAFSs (extracted in **Appendix V** to the Report) indicated many apparent differences which might be related to the scaling (range of values), thresholds for depicting SIGWX features and the extent of SIGWX coverage. In particular:

- 8.3.2.1 “CB horizontal extent”: CB coverage is more extensive with generally larger forecast values in the UK forecast compared with that of US. Furthermore, small values of CB horizontal extent are given almost everywhere in the UK forecast;
- 8.3.2.2 “ICAO height at CB top”: the UK forecast generally gives more extensive but lower heights of CB top (generally below 37kft) compared with that of US (above 43 kft);
- 8.3.2.3 “Mean in-cloud turbulence potential”: the UK forecast generally gives wider range and higher turbulence potential values compared with that of US. On the other hand, small values of mean in-cloud turbulence potential are given almost everywhere in the US forecast;
- 8.3.2.4 “Maximum icing potential” at FL180: significant differences are observed in the spatial coverage over the tropical and higher latitude regions with the US forecast giving generally higher icing potential over the tropical region and the UK forecast giving generally higher icing potential over the higher latitude regions;
- 8.3.2.5 “Maximum CAT potential” at FL340: the UK forecast generally gives much less extensive CAT areas compared with that of US.

Furthermore, some inconsistencies were noted between the WAFS SIGWX forecasts and the gridded forecasts which might cause confusion to users, especially if both sets of forecasts were made available for operational use. Comparisons with actual observations of satellite and aircraft also indicated that the UK gridded forecasts generally gave more extensive but lower heights of CB top and occasionally gave unrealistically high CAT potential over certain areas in East Asia.

WAFS performance indicators

8.3.3 The meeting was informed that the necessary development work to produce the WAFS performance indicators for wind and temperature for the WMO defined verification area covering Australia and New Zealand was being undertaken and it was anticipated that these new performance indicators would be available on the WAFSs websites shortly after this meeting.

Regional progress

8.3.4 The meeting noted the latest status of States' implementation of SADIS 2G, based on the SADIS operational efficacy survey results in March 2008 and subsequent updates received from States, only 8 out of 16 SADIS user States/Territories (50%) had implemented 2G (**Appendix W**). This is less than the 70% global implementation level. The meeting was advised that the SADIS FTP service could be used as a contingency measure in the event that States had difficulties in completing the transition on time.

WAFS implementation plan

8.3.5 In the light of the above discussions, in particular noting the significant number of WAFS developments in the next few years, the meeting updated the ASIA/PAC WAFS Implementation Plan and Procedures, Work Programme and composition of the WAFS/I TF. The meeting formulated the following Decision.

Decision 12/35 – ASIA/PAC WAFS Implementation Plan and WAFS/I TF

That the ASIA/PAC WAFS Implementation Plan and Procedures, Work Programme and composition of the WAFS/I TF be amended as shown in **Appendices X and Y** respectively to the Report.

Agenda Item 9: Exchange of OPMET Information:

- 1) review report of OPMET/M TF/6 Meeting
- 2) review regional requirements for OPMET information (FASID Tables)
- 3) regional planning for BUFR coded OPMET information

9.1 Sixth Meeting of the OPMET Management Task Force (OPMET/M TF/6)

9.1.1 The Sixth Meeting of the ASIA/PAC OPMET Management Task Force (OPMET/M TF/6) of the CNS/MET Sub-group of APANPIRG was held in Bangkok, Thailand, from 26 to 28 March 2008. The meeting was attended by 24 experts from Australia, China, Hong Kong, China, Fiji Islands, India, Japan, Malaysia, Singapore, Thailand, Viet Nam and IATA. The full meeting report is available on the ICAO Asia/Pacific web site at http://www.bangkok.icao.int/meetings/2008/opmet_tf6/index.html

Review of Terms of Reference (TOR)

9.1.2 The meeting reviewed the Terms of Reference (TOR) of the group which was last adopted by the CNS/MET SG/11 meeting (July 2007). In view of Amendment 74 to Annex 3 and status of BUFR code, consequential amendments to the TORs and Work Programme were considered necessary.

Decision 12/36 – Revised TOR and Work Programme of the OPMET/M TF

That the revised TOR and Work Programme for the OPMET/M TF as shown in the **Appendix Z** to the Report under Agenda Item 9 be adopted.

Current status of OPMET exchange in the Region

9.1.3 Main issues identified are as follows:

9.1.3.1 OPMET information from the South Pacific. The planned improvement of the availability of the METAR and TAF bulletins from the South Pacific Island States has still not been completed. The new procedures for collecting METAR bulletins by Nadi RODB through e-mail have been tested; however the operational implementation has been delayed, with Singapore RODB not having received any bulletins since October 2006. Some bulletins were received by ISCS but under a different header FTPA32 KWBC.

9.1.3.2 OPMET information from Indonesia. The deficiency related to the availability of OPMET data from Indonesia at Singapore ROBEX Centre was noted, especially the infrequent reception of TAF messages for Biak (WABB) and Ujung Pandang (WAAA).

Status report of Regional OPMET Data Banks

9.1.4 The group was informed of the outcome of the second RODB Coordination Meeting hosted by the Japan Meteorological Agency (JMA) from 31 January to 1 February 2008. The RODB coordination meeting reviewed the operation of data banks, measures to resolve existing deficiencies related to the availability of OPMET data, harmonization of the OPMET data on SADIS and ISCS broadcasts, further development of methods for monitoring the OPMET exchange at the RODBs.

9.1.5 The RODB's provided details of development work being carried out on retrieval of OPMET information via web-based OPMET data bases. At this stage several of the data bases were available to users via registered access, with the others still in test mode.

Other OPMET-related issues

9.1.6 The OPMET/M TF/6 meeting reviewed also the implementation issues related to the introduction of the TAF with 30 hours period of validity and the inclusion of these TAFs in VOLMET. The ongoing quality control and monitoring activities have been reviewed and the continuous improvement of the availability of the OPMET data from the ASIA/PAC Region has been noted.

9.2 Regional coordination for the implementation of the new TAF provisions in Amendment 74 to Annex 3*User requirements for 30-hour TAF*

9.2.1 The meeting was informed that IATA has identified airports within the ASIA/PAC Region for which TAFs with 30-hour validity were required to support ultra long-haul flights as listed in **Appendix A1** to the Report. There was no current operational requirement to produce TAFs with a validity of 30 hours for other airports. For all other aerodromes in the ASIA/PAC region not explicitly mentioned in **Appendix A1**, IATA requests the issuance of TAFs with 24-hour validity.

9.2.2 The user requirements presented by IATA indicated that the period of validity of TAF for all ASIA/PAC aerodromes listed in FASID Table MET 1A and MET 2A was either 24 or 30 hours. IATA stressed that a TAF with a validity of 24/30 hours was a strategic planning tool to provide long-range weather forecasting for long-haul flights. However, the forecasts included in the VOLMET broadcasts were intended for the in-flight tactical use for operations closer to the destination aerodrome as well as for en-route diversions. Therefore, a TAF with a validity of 9 hours, broadcast over the VOLMET, would provide a more clearly short-term picture to the flight crew.

9.2.3 With regard to the lead-time for the issuance of TAF, the user requirement stated by IATA was “one hour before the beginning of the period of validity”.

9.2.4 The meeting expressed concern that starting from December 2007, IATA had changed the list of aerodromes for which TAF with a validity of 24/30 hours was required several times which created serious difficulties in the planning for the implementation of the new provisions. In response, IATA assured the meeting that the list presented in **Appendix A1** was thoroughly coordinated with the airline users within the region and should be considered as the current valid requirements.

Amendment proposal to the Basic ANP and FASID to accommodate the TAF changes

9.2.5 The meeting reviewed proposal for amendment to the ASIA/PAC Basic ANP as presented in **Appendix A2** to the Report. The proposal was based on the stated user requirements for the period of validity of TAF and the lead time for issuance of TAF.

9.2.6 The meeting also reviewed the proposed new format of FASID Table MET 1A, *Meteorological service required at aerodromes*, which incorporates information for the TAF with period of validity of 24 or 30 hours and a new column to indicate the hours of the day during which OPMET information for the aerodrome is provided, as shown in **Appendix A3** to the Report.

9.2.7 Some experts informed that their current national plans for issuance of TAF were different from the user requirements to be included in FASID Table MET 1A. In particular, the expert from Japan informed that, due to the limitations of the numerical model providing guidance for issuance of TAF for the Japanese aerodromes, the period of validity of TAF for the time being will be 27 hours. The Secretariat advised in this regard that the Regional ANP would indicate the user

requirements and it was not expected that all States would fulfil these requirements from the very beginning. However, if a State was currently not in the position to implement the requirements, a national plan should be developed to achieve compliance as soon as possible. With this understanding, the meeting agreed on the following Draft Conclusion.

Draft Conclusion 12/37 – 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 A2** to the Report, be processed according to the established procedure; and
- b) the new format of FASID Table MET 1A, as presented in **Appendix A3** to the Report, 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.

9.2.8 The meeting noted the work done by the OPMET/M TF to amend the ROBEX tables for TAF and that the final version of these tables would be prepared for inclusion in the *ROBEX Handbook* after the amendment proposal for the related FASID Tables is approved.

Timetable for regional implementation of the new TAF provisions including the 30-hour TAF

9.2.9 The meeting reviewed the plan for the implementation of the 30-hour TAF in the ASIA/PAC Region prepared by the OPMET/M Task Force, as presented in the **Appendix A4** to the Report. It was recognized that the change of the validity period and the new requirement for only one TAF valid for the aerodrome at any time were serious and would affect the current ROBEX bulletins and related procedures. Therefore, the meeting supported the plan and requested that it should be sent to all ASIA/PAC States to facilitate the implementation.

9.2.10 The meeting recognized that some States were still not aware that the WMO TAF code has been changed regardless 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 as from 5 November 2008. It was recalled that States have already been notified on the changes through the APANPIRG Conclusion 18/44 and respective follow up actions. It was felt that the awareness campaign should continue and States should be reminded for the forthcoming implementation date and invited to make sure that the changes would be implemented in a synchronized manner throughout the region. In particular, the meeting was reminded to make reference to the consolidated version of Annex 3 incorporating all the provisions applicable on 5 November 2008, as well as the relevant WMO documents on the changes to the TAF and METAR code forms which would also become effective on the same day.

9.2.11 With regard to the exact implementation date and time, it was agreed that the new TAF format should be implemented at 00 UTC on 5 November 2008.

9.2.12 In view of the foregoing, the meeting agreed on the following Draft Conclusion.

Draft Conclusion 12/38 – Regional preparedness for timely implementation of the new TAF provisions

That,

- a) the Regional implementation plan for the new TAF provision presented in **Appendix A5** to the Report 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.

Test bed for 30-hour TAF

9.2.13 The meeting noted the information provided by the expert from the U.S. on the established website to allow all users to become familiar with the new TAF code format. The web page could be accessed by the vendors and users providing an opportunity to test their systems appropriately.

9.2.14 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. This website is updated with ideas and suggestions from contributing States. The participants were invited to forward sample 30-hour TAFs from their State for inclusion to this site. In addition to the 30-hour TAF, any ideas for training and/or improvement to the website could be sent to Michael Graf (National Weather Service) at: michael.graf@noaa.gov. The meeting agreed to formulate the following Draft Conclusion.

Draft Conclusion 12/39 – Test bed for the transition to the new TAF format

That, States in the ASIA/PAC Region be invited to use the special web site 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 bed is accessed on:
http://www.weather.gov/os/aviation/taf_testbed.shtml

9.2.15 The expert from Hong Kong, China pointed out that in some of the 30-hour TAF examples given on the 30-hour TAF test bed, the optional temperature group was given at the end of the message, i.e. after the change groups. This was not consistent with Amendment 74 to Annex 3 and the forthcoming changes to the TAF code form promulgated by WMO in which the optional temperature group, if given, should be placed before the change groups. The meeting was reminded to consult the relevant ICAO and WMO documents for the correct TAF code form effective 5 November 2008.

9.3 Issues related to the inclusion of TAF in VOLMET broadcasts

9.3.1 The meeting was informed of the concerns of the OPMET Management Task Force with regard to the implications that the new TAF provisions in Amendment 74 to Annex 3 might have on the HF VOLMET broadcasts. It has been identified that most ASIA/PAC aerodromes for which TAF are broadcast on HF VOLMET will be required to issue 30-hour TAF. The new provision in Amendment 74 to Annex 3 for only one TAF to be issued will not allow the issuance of a 9-hour TAF for VOLMET which was the operational practice so far. Thus, the 30-hour TAF will have to be included in VOLMET.

9.3.2 It was expected that the lengthy messages containing the 30-hour TAF would create problems due to the limited time (5 minutes) of the scheduled VOLMET transmissions. Trials have been conducted by States where it was found that using a detailed 30-hour TAF along with METAR reports with TREND, and SIGMET, as required by the FASID Table ATS 2, in some cases caused the VOLMET information to be truncated leaving valid information not reported.

9.3.3 Attempts to extract a shorter TAF from a long 30-hour TAF automatically showed that this was not always possible with the current TAF code.

9.3.4 In order to overcome the problem, options, such as excluding the TAF from the VOLMET broadcasts with the assumption that the TREND forecast could satisfy the user's needs, were discussed. To validate such options, a regional survey has been conducted with the assistance of IATA and IFALPA.

9.3.5 The meeting was presented with the results of the survey, which are presented in **Appendix A6** to the Report. The results indicated an overwhelming response for the continuing requirement of TAF in HF VOLMET. The responses from pilots and airlines in the Region, in particular, the detailed letter by Captain Stu Julian, Executive Vice President of IFALPA for Asia and Pacific, provided very important insight on the use of the meteorological information provided through the VOLMET broadcasts. The meeting expressed appreciation to IATA and IFALPA for their valuable inputs.

9.3.6 Both IATA and IFALPA experts indicated that the 30-hour TAF was intended primarily for use in the flight planning for the Ultra Long Range (ULR) flights which by definition are greater than 16 hours flight time. VOLMET is used as an in-flight MET product with a typical mission time of up to 12 hours providing relevant meteorological information for en-route alternates, destination alternate and the destination.

9.3.7 The most important results of the regional survey can be summarized as follows:

- a) HF VOLMET is and will be required as an important in-flight service for a number of years;
- b) D-VOLMET currently cannot replace the HF VOLMET due to relatively low number of aircraft equipped to access D-VOLMET; even the equipped aircraft would need the HF VOLMET as back-up;
- c) TAF is required for HF VOLMET;
- d) 30-hour TAF is intended for pre-flight planning; while the forecast in VOLMET is used for tactical in-flight re-planning; in particular, in case of diversions the TAF in VOLMET is safety critical information; therefore, a suitable period of validity for TAF in VOLMET is estimated to be up to 12 hours; and
- e) 30-hour TAF in HF VOLMET would be in contradiction with human factor principles, since pilots would have difficulties to extract the needed information from a lengthy and complex message received via voice communication.

9.3.8 The meeting considered possible options to resolve the issue, such as:

- a) extraction of 9-h forecast from the long TAF for VOLMET (however automatic extraction is not always feasible);

- b) provision of a “split” TAF, with the first part being a 9-h TAF for VOLMET and the second part being a 15-h/21-h TAF to make up a total of 24-h/30-h forecast period for the long TAF;
- c) provision of an extended TREND type landing forecast for VOLMET; and
- d) use of additional frequencies for VOLMET broadcast.

9.3.9 None of the above options was found to be a straightforward solution. Moreover, in view of the short time left to the implementation date for the new TAF provisions, the meeting felt that the meteorological authorities of the States providing information for HF VOLMET were facing a difficult choice:

- a) either to follow strictly Annex 3 and include the 30-hr in VOLMET with all negative implications, such as, not satisfying the user requirements, imposing the risk of cutting valid parts of the VOLMET information due to the lengthy TAF messages; not complying with the requirements for human factors;
- b) or, to decide to issue a separate TAF for VOLMET (or continue issuance of such a TAF) with a period of validity of 9 or 12 hours. The negative implications here were non-compliance with Annex 3 and need to file a difference and the need to implement measures to ensure that the overlapping TAFs are fully identical.

9.3.10 In view of the foregoing, the meeting felt that the States concerned would need urgent guidance from ICAO on the operational practice to be followed. It was considered that the AMOF Study Group of the ANC had the necessary expertise to provide such guidance. In view of the forthcoming meeting of the AMOF SG in September 2008, IFALPA was invited to submit a study note to AMOF SG through the IFALPA expert on the group. Participants from States represented on the AMOF SG were also encouraged to brief their experts in order to facilitate the discussions on the subject and provide a suitable recommendation before the implementation date of the new TAF provisions.

9.3.11 The meeting placed high priority on the issue of providing suitable solution for the provision of TAF to HF VOLMET and agreed on the following Draft Conclusion.

Draft Conclusion 12/40 – 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 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.

Note: Due to the urgency of the matter, the secretariat should follow up this Draft Conclusion using fast track procedures before endorsement by APANPIRG/19.

9.3.12 The expert from Hong Kong, China informed the meeting that, in view of the overwhelming ATS requirement for 9-h TAF in support of operational decision-making and planning, the Hong Kong Observatory (HKO) will continue to issue 9-h TAF after 5 November 2008 for local dissemination. The meeting noted that this local practice would be fully in line with paragraph 1.1 in Appendix 9 to Annex 3 which specifies that the aerodrome meteorological office may supply any additional meteorological information to the aerodrome control tower and approach control unit. The meeting also noted that the expedient development of a new terminal forecast by an expert team of WMO was expected to address the specific requirements for aerodrome terminal forecasts by the ATM user.

9.4 Other issues related to TAF code

9.4.1 The meeting discussed the need for clarification and eventual amendment to some TAF provisions and agreed on the following Draft Conclusion.

Draft Conclusion 12/41 – 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.

Agenda Item 10: ICAO Advisory & Warning Systems:

- 1) review implementation of International Airways Volcano Watch (IAVW)
- 2) review implementation of Tropical Cyclone Advisories and Warnings
- 3) SIGMET related issues

10.1 Review implementation of International Airways Volcano Watch (IAVW)*Information on the operations of VAAC Darwin*

10.1.1 The meeting noted that a total of 326 Volcanic Ash Advisories (VAAs) were issued by the Darwin VAAC over the 12 months July 2007 – June 2008. Two high-level eruptions occurred at Sopotan volcano during the year resulting in a significant impact to aviation. A lack of SIGMET issuance and forwarding of AIREPs to the VAAC were cited.

Information on operational and technical changes

10.1.2 The meeting was informed about operational and technical changes. An upgrade to the Volcanic Ash Warning Preparation System (VAWS) software allows for the creation of VA SIGMETs using information extracted from the VAA. VAAC forecasters will soon be able to issue back-up advisories for Wellington and Tokyo VAACs using VAWS. MODIS and other X-band imagery in real-time is expected to be available using an X-band receiver near Darwin. A volcanic activity status product of volcanoes in the region is being tested at the Darwin VAAC.

Information on the training and guidance

10.1.3 The meeting was informed about the Darwin VAAC contributions in training and guidance by providing the following

- Giving a presentation at the Asia Pacific region SIGMET Seminar on VA SIGMETs;
- Producing a VA SIGMET poster in cooperation with New Zealand;
- Training forecasters in PNG and the Philippines in the preparation of VA SIGMETs;
- Discussed volcano monitoring issues at the Rabaul Volcano Observatory (RVO); and
- Discussed pilot reporting of volcanic eruptions in PNG

10.1.4 The meeting was informed about implementation issues and outlined as follows:

- Discussion of an agreement between RVO and the PNG Civil Aviation Authority to provide volcanological information to aviation through cost recovery arrangements is underway. An agreement and an upgrade to communications would improve the real-time notification of eruptions of volcanoes such as Manam and Karkar;

- The AusAID-funded project between the Australian Bureau of Meteorology and the Indonesian Centre for Volcanology and Geological Hazard Mitigation (CVGHM) to improve the monitoring of 15 volcanoes is near completion. Information exchange between CVGHM and the Bureau of Meteorology is in draft form; and
- A project to derive SO₂ images from High Resolution Infrared Sounder data is almost operational.

Implementation of a volcano observatory notice for aviation

10.1.5 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, had been included in Doc 9766, *Handbook on the International Airways Volcano Watch (IAVW) – Operational Procedures and Contact List*.

10.1.6 The VONA incorporates a volcanic alert level system for aviation that uses color codes to succinctly describe conditions at or near a volcano, which has been incorporated 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 inclusion of the selected volcano observatories in the FASID means that their importance for the international air navigation has been recognized and the services provided for aviation could be cost recovered through the air navigation service charges.

10.1.7 The meeting noted that some States in the Region had in place their own systems for the provision of information from the volcano observatories to the other stakeholders in the IAVW. Nevertheless, it was found appropriate to encourage the States concerned to use the VONA as an internationally agreed standard format for dissemination from the VO to the associated MWO, ACC and VAAC. The meeting formulated the following Draft Conclusion.

Draft Conclusion 12/42 — Coordination and Implementation of the Volcanic Ash Notification for Aviation

That States listed in FASID Table MET 3C are encouraged to implement the format VONA developed by the 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 International Airways Volcano Watch Operations Group.

10.2 SIGMET related issues

SIGMET tests for volcanic ash and tropical cyclones

10.2.1 The Rapporteur of the Task Force on the Implementation of Volcanic Ash and Tropical Cyclone advisories and warnings (VA/TC/I TF) informed of the on-going activities on monitoring the issuance of VA and TC SIGMET in the ASIA/PAC States. A TC SIGMET test was

conducted on 15 January and a VA SIGMET test on 22 January 2008. The meeting noted that the level of participation in these tests was slightly improved compared to previous years.

10.2.2 The meeting noted the list of non-participating States in the VA and TC SIGMET tests and requested the Secretariat to contact these States and find out the reasons for their non-participation. It was recalled that the systematic non-participation in the SIGMET tests was considered a deficiency and such States should be added to the APANPIRG List of deficiencies.

10.2.3 The meeting noted that volcanic ash tests in the ASIA/PAC Region currently do not include ATM and the airlines. The group was informed of on-going similar tests in the EUR/NAT region where the tests involve simulation of volcanic ash occurrences and the objective is to test the response of the ATM, MET, flight management (the CFMU of Eurocontrol) and the airline operators, according to a regional ATM Contingency Plan for Volcanic Ash.

10.2.4 The meeting was informed that the simulation exercises of regional scale were very useful but required intensive coordination and planning. It was suggested that the VA/TC/I TF in coordination with the OPMET/M TF and VAACs should work on developing procedures to conduct such tests in the ASIA/PAC region. The Work Programmes of these groups were amended accordingly.

Volcanic eruption exercise in an urban area

10.2.5 The meeting was informed of a volcanic eruption exercise presented by the New Zealand expert. The exercise was conducted in the summer of 2007 and 2008 with a volcanic eruption in the city of Auckland to test the local authority response systems in an urban environment. Coordination and interaction between the CAA, MetService, Airways Corporation, the Institute of Geological and Nuclear Sciences and the CDEM participants was positive and resulted in a successful test.

Regional WS SIGMET tests

10.2.6 The meeting was informed of the results of the third regional WS SIGMET test conducted on January 2008 by the OPMET Management Task Force in coordination with the Regional Office. The test results maintained the trend of gradual improvement of the availability of test SIGMET by the MWOs in the Region; however, the established performance objective of 95% of all MWOs has not yet been achieved.

10.2.7 The meeting noted the information provided by some participants that the information about the SIGMET tests was not received in their organization which was the reason for their non-participation. The meeting requested the Secretariat to check and amend the contact information for these States in order to ensure that the notifications about the SIGMET tests are addressed correctly.

10.2.8 The meeting agreed on the recommendation for changing the regional SIGMET tests procedures presented by Rapporteur of the OPMET/M Task Force which will be incorporated in the Regional SIGMET Guide.

New SIGMET examples for incorporation in the Regional SIGMET Guide

10.2.9 The meeting considered the examples proposed by Hong Kong, China for updating the ASIA/PAC Regional SIGMET Guide. These examples include SIGMETs for turbulence and SIGMETs for tropical cyclones and are intended to encompass more “difficult” cases as requested by participants of the ASIA/PAC SIGMET Seminar (July 2007).

10.2.9.1 The meeting also considered procedures recommended by Australia in issuing VA SIGMET when multiple layers exists or when multiple eruptions produce multiple clouds at the same level within the FIR and agreed that VA SIGMET examples for more “difficult” cases should similarly be developed for inclusion in the SIGMET Guide. In view of the above discussions, the meeting formulated the following Draft Conclusion.

Draft Conclusion 12/43 — Update of ASIA/PAC Regional SIGMET Guide

That, the new SIGMET examples developed by Hong Kong, China and Australia given in **Appendix A7** to the Report be included in the new edition of the ASIA/PAC Regional SIGMET Guide.

SIGMET and windshear posters

10.2.10 The experts from Australia and Hong Kong, China informed the meeting that, with assistance of New Zealand, the VA and TC SIGMET posters have been produced and a number of copies are made available for participants of the meeting. The meeting noted that the WS SIGMET poster is being finalized after clarification sought from ICAO regarding an issue with the format of an example. The SIGMET posters will be distributed to States in coordination with the Regional Office.

10.2.11 The expert from Hong Kong, China informed the meeting that a set of three windshear posters have been produced jointly by the Hong Kong Observatory, IFALPA, WMO and ICAO, and have been distributed to States by Hong Kong, China on behalf of ICAO. A number of copies of the posters are made available for participants of the meeting.

Issuance of SIGMET using graphical interface

10.2.12 The meeting was informed by the expert from Singapore of the issuance of SIGMET for Singapore’s FIR via a graphical interface. The interface has been designed to comply with all ICAO Annex 3 requirements for issuance of a SIGMET. Quality checking capabilities such as SIGMET sequence number and validity period checks have been incorporated to reduce both human and technical errors.

Agenda Item 11: Other MET issues:

- 1) MET/ATM coordination
- 2) MET support for operations at aerodromes and terminal areas

11.1 MET/ATM coordination

Report of MET/ATM Task Force and preparation of a regional survey on ATM requirements for MET

11.1.1 The MET/ATM Task Force Chairman provided a working paper recapping the task force activity since July 2007. The Task Force main effort was conducting a regional survey to help establish the requirements for meteorological information and services in support of air traffic management. The survey was conducted and the following conclusions made:

- The traditional suite of Annex 3 MET products remain the basis for input of MET information into ATM decision making;
- Most States have developed additional information or services to supplement ATM;
- Greater investigation and liaison is required to identify any common requirements with regard to specific products or services;
- Visibility, surface wind/gust and thunderstorms are the three MET elements of greatest concern for ATM; and
- The importance of a greater aviation and ATM focus for MET information and services.

The full results of the survey are in **Appendix A8** to the Report.

11.1.2 The meeting noted the proposed future Work Programme of the task force including the following main tasks:

- Continue work on the survey of ATM requirements including follow-up with non-responding States, and collection of more specific details regarding MET developments and deficiencies;
- Planning and coordinating a 2nd regional MET/ATM seminar for 2009 or 2010 in line with recommendations from the previous seminar.

11.1.3 The meeting agreed that a 2nd MET/ATM seminar was essential in order to improve the communication between the MET and ATM partners and identify the emerging new requirements in line with the ICAO Global ATM Operational Concept and the Global Air Navigation Plan. It was suggested in this regard that, in order to ensure proper preparation of such an event, the MET/ATM Task Force, which has never conducted a meeting since its establishment, should convene a meeting in 2009. The meeting should review the Work Programme of the Task Force with the global MET/ATM developments and develop a programme for the regional seminar to be conducted in 2010. It was emphasized that the ATM community should be better represented on the Task Force. The meeting agreed on the following Draft Conclusion.

Draft Conclusion 12/44 - Convening MET/ATM TF meeting and organizing MET/ATM seminar

That, a meeting of MET/ATM Task Force should 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.

11.1.4 The meeting noted with appreciation the work done by Mr. Ted Williams, Australia as the chairman of the MET/ATM TF since its establishment and encouraged Australia to continue with its leading role in the field of MET/ATM coordination.

11.1.5 The meeting noted the views expressed by the expert from New Zealand on the need to ensure that the inputs to ICAO developments and considerations by organizations, such as IATA, IFALPA, IUGG, etc., were robust and well informed. This was seen as very important as these organizations provide an invaluable window on the operations of international air navigation. New Zealand also noted that there was an increasing need to ensure that private flight planning companies should also be consulted on meteorological matters.

11.2 MET support for operations at aerodromes and terminal areas

Visibility reporting issues

11.2.1 The expert from Hong Kong, China informed the meeting that significant discrepancies between the reported visibility values in the local routine and special report and the slant visual range (SVR) estimated by ATC, making reference to aircraft on approach, were found under inhomogeneous visibility conditions from time to time. After discussion between MET and ATM, and noting that SVR might be the ideal representation of the pilot's visual range from the cockpit of aircraft on approach down to the ground and that emerging technologies such as the LIDAR and video cameras hold promise for SVR observation, Hong Kong, China brought up proposals to the meeting about the provision of the prevailing visibility in the local routine and special reports, subject to local agreement with the appropriate ATS units and operators concerned, and the provision of the slant visual range representative of the conditions on the approach or take-off paths.

11.2.2 In respect of the above proposals, the meeting was advised that in the current provisions of Annex 3, prevailing visibility should be reported in the METAR/SPECI and the proposed inclusion in the local routine and special report would not be appropriate. Furthermore, the above-mentioned discrepancy does not appear to be a widespread issue in the region and thus the meeting agreed not to take the matter forward.

11.2.3 In respect of the proposal for SVR observations, the meeting recalled that currently SVR was not a MET element required by the SARPs and there were no operational procedures relating to SVR. The expert from IFALPA welcomed the research and development of techniques for observation of SVR but cautioned that there might be differences between SVR observed from the ground and that observed from the aircraft cockpit. Thus, if Hong Kong, China wished to pursue this issue, they could approach the AMOF SG.

Aeronautical climatological information provision

11.2.4 The expert from IATA presented to the meeting new requirements from the airline users for improved provision of aeronautical climatological information. The climatological information was now considered important for long term planning and also for 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.

11.2.5 The views expressed by IATA were supported by the observer from the WMO. The meeting agreed on the rationale behind the proposal by the expert from IATA and formulated the following Draft Conclusion to invite ICAO, in coordination with WMO and IATA, to initiate study on the improvement of the provision of aeronautical climatological services.

Draft Conclusion 12/45 - 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.

Dual LIDAR system

11.2.6 The expert from Hong Kong, China presented the implementation of dual Light Detection and Ranging (LIDAR) Windshear Alerting System at the Hong Kong International Airport (HKIA) since March 2008. The dual LIDAR system entails deployment of one dedicated LIDAR for each runway. While the performance of the dual LIDAR system has been satisfactory (POD reaching 86% with heavy rain cases not considered), efforts are ongoing to further develop the windshear detection algorithm for departing flights and to find the most appropriate “length scale” of headwind changes to be considered in order to optimize the performance of the windshear detection algorithm compared with pilot reports.

Thunderstorm nowcasting in support of ATM

11.2.7 The expert from Hong Kong, China presented the implementation of the Airport Thunderstorm and Lightning Alerting System (ATLAS) developed by the Hong Kong Observatory for operational use at the HKIA. Building on the work of ATLAS, HKO has extended the nowcasting techniques to develop thunderstorm nowcasting products to support more efficient airline and ATM operations in the terminal area of HKIA. A prototype system has been demonstrated to the users with positive feedback and it is planned to set up a dedicated computer system to provide the prototype products in real-time for trial operation and evaluation.

Developments in Australia

11.2.8 The meeting noted the information about the improved fog forecasting in Australia through a forecast decision supporting system (FDSS) and a Bayesian Objective Fog Forecast Information Network (BOFFIN).

11.2.9 It was informed that in December 2007 the Australian Bureau of Meteorology's Aviation Weather Service, in line with Annex 3 recommendations, achieved certification of compliance of its quality management system under the AS/NZS ISO 9001:2000 Quality Management Standard.

Thunderstorm forecasting in Japan

11.2.10 The meeting noted the information that the Japan Meteorological Agency (JMA) issues the information for aviation using forecast guidance calculated from the output of numerical weather prediction. JMA has made the guidance of the probability of thunderstorm (TS) by logistic regression since May 2007. JMA improved the skill of the guidance by using time-lagged ensemble called LAF (Lagged Average Forecast) in May 2008.

Agenda Item 12: Review CNS/ATM systems planning and implementation:

- 1) Key Priorities for CNS/ATM Implementation;
- 2) review and update CNS/ATM Implementation Planning Matrix;
- 3) CNS related issues; and
- 4) MET related issues

Overview of proposed electronic air navigation plan (eANP) framework

12.1 Secretariat presented an overview of a 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.

12.2 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).

12.3 To support the above objectives, the following deliverables will be produced:

- i) Easy-to-use planning templates that would contain the relevant elements, specifically, 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 organisations through a user-friendly interface.

12.4. 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.

12.5 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/eganzp/>

12.6 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.

12.7 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.

12.8 The meeting was supportive of this effort but requested the methodology that 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 propose any required process changes relating to Air Navigation Plans to the ICAO Assembly for adoption.

Review of CNS/ATM Implementation and Planning Matrix

12.9 Secretariat presented the matrix reflecting implementation status of new 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.

12.10 The meeting discussed and agreed with the proposal to rename the column of “GNSS” into “Navigation” with creation of three sub-columns: En-route, Terminal and Approach under the column heading “Navigation”. 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 verified by the States through correspondence or at the future meetings. The meeting reviewed and updated the Matrix. The updated Matrix is provided in **Appendix 9** to the Report.

Key Priorities and performance objective

12.11 The meeting reviewed the List of Key Priorities for the CNS/ATM Implementation in the Asia/Pacific Region updated by the Eleventh Meeting of CNS/MET Sub-group and 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.

12.12 The meeting agreed to merge Key Priority No. 1 and No.5 as suggested by the ATM/AIS/SAR/SG/18, but keeping the Key Priority No. 8 as a separate item.

12.13 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 at **Appendix A10** to the Report.

IATA 2015 Vision

12.14 IATA presented a paper on their “2015 Vision”. It was developed in accordance with ICAOs Global ATM Operational Concept and Air Navigation Plan as a statement of user expectations for operational improvements in the Asia and Pacific regions. The work focuses on 6 primary traffic flows in addition to work on PBN and Airport operations. It was informed that the proposed vision is in alignment with the Global Plan Initiatives as well as the Performance Based Navigation Manual. IATA informed the meeting that they would submit this vision to APANPIRG/19 as a statement of user expectations in the form of a working paper. In the meantime they will be sharing this vision at ICAO forums, with ANSPs, Regulators and other stakeholders as a means for the ATM community to review.

Vision of the Next Generation Air Transportation System

12.15 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 further information regarding NextGen including ConOps and EA is provided at <http://www.jpdo.gov>.

Network enabled operations (NEO) in weather

12.16 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.

Agenda Item 13: Review of deficiencies in the CNS and MET fields:

- 1) Status of CNS deficiencies (APANPIRG Deficiency List)
- 2) Status of MET deficiencies (APANPIRG Deficiency List)

13.1 The meeting noted that APANPIRG/18 had accorded highest priority to the resolution of safety related deficiencies and adopted four Conclusions on the subject. It was stressed that the States listed in the APANPIRG List of deficiencies should establish action plan with fixed target dates for the resolution of safety related deficiencies. The on-line Air Navigation database has also been established and linked to the ICAO APAC website.

13.2 The meeting reviewed status of the existing deficiencies in the CNS and MET fields. The Secretariat has updated the list based on information received from States and other sources.

Deficiencies in the CNS fields

13.3 The VHF systems within the Yangon FIR were upgraded using 6 RCAG sites supported by VSAT links to Yangon ACC in 2005. IATA regularly provided monitoring reports on the air/ground communications status within Yangon FIR. These reports 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 of the poor communications as highlighted in ICAO mission reports for urgent attention by the Administration.

13.4 The ATIS function has not been implemented in Dhaka and Kathmandu for a long time due to equipment problem. These deficiencies have adversely affected the quality of VHF communication. Channel congestions during peak hours had been caused on 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 identified at both the locations need to be corrected as soon as possible by implementing ATIS. ICAO follow-up letters and reminders were sent to the Administrations concerned in 2007 and early 2008. Bangladesh informed the ICAO Regional Office that new ATIS equipment had already reached Dhaka and was expected to be installed by April 2008. No further information on the progress of commissioning of ATIS has been received, although a reminder has sent to Bangladesh on 6 June 2008. Nepal informed the ICAO Regional Office on 14 March 2008 that Tribhuvan International Airport (TIA) ATIS revived since 5 November 2007 on reduced range condition. It was expected to be given for normal operational by 17 March 2008. The delegate from Nepal reconfirmed that the ATIS is still operating on reduced range condition. Information on the improvement will be provided to ICAO Regional Office in two weeks.

Hong Kong – Manila AFS circuits

13.5 It was informed that the prolonged outage was caused by problems at the service provider–Philippines Long Distance Telephone Co. (PLDT)”. The service provider has been changed to “Eastern telecommunications (ETPI) in early 2008. Manila-Hong Kong AFTN circuit resumed operation on 4 May 2008. An official notification from Air transportation Office on the Restoration was received on 13 May 2008.

13.5.1 In the side meeting among ICAO Secretariat, Hong Kong China and the Philippines ATO during third meeting of the ATNICG on 7 May 2008, it was agreed as a remedial action if restored circuit could not sustain reliable operations, two separate circuits shall be established for X.25 AFTN circuit and IASC operation to replace the existing S+DX arrangement.

13.5.2 However, the operational status of the circuits were still found unreliable. The unstable and unreliable performance of the circuit is not acceptable for exchanging safety related ATS messages. The circuit performance had experienced 14 times circuit outage in June 2008 due to equipment failure at Manila. The status of the circuit and alternate routing diversion could not meet the requirement for timely exchange of AFTN messages between Manila and Hong Kong within the established transit time of 5 minutes. It was also reported that the International ATS direct speech circuit between Manila and Hong Kong China was unstable and unserviceable. There were 9 times of interruptions in June 2008.

13.5.3 Hong Kong China expressed deep concern on this deficiency and confirmed that both ATS Direct Speech and AFTN circuits between Hong Kong and Manila were out-of-service since June 2008 which is not acceptable. The Philippines was urged to take urgent action to restore the circuits.

13.5.4 The Philippines indicated that urgent action is being taken in accordance with agreement achieved with Hong Kong China during the side meeting. The circuits can be restored to full operation by the end of September 2008 following the local procurement law.

Deficiencies in the MET fields

13.6 The group was informed of the status of MET deficiencies in the APANPIRG list of deficiencies. There were 15 items filed 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 as shown in **Appendix A11** to this report. No updates were available for the provision of SIGMET for Lao PDR, Myanmar, Nepal and Cambodia.

13.7 With regard to the deficiencies identified for the States in the South-West Pacific, the meeting noted 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. It was expected that the project would assist in resolving the MET deficiencies in the sub-region.

13.8 A new deficiency for DPR Korea was proposed for inclusion in the list due to the lack of MWO established for the Pyongyang FIR.

13.9 The updated list of deficiencies in CNS and MET fields is in **Appendix A11** to the Report.

Agenda Item 14: Future Work Programme

TOR and Subject/Tasks List of CNS/MET Sub-group

14.1 The Eighteenth Meeting of APANPIRG held in September 2007 reviewed the Subject/Tasks List of the CNS/MET Sub-Group. The meeting in its Decision 18/51 adopted the updated Subject/Tasks List as the Work Programme for CNS/MET Sub-Group.

14.2 The meeting reviewed and updated the Subject/Tasks List. The new tasks included in the list include comprehensive updating the FASID tables 1B and 1C. Preparations for ITU WRC-2011 are added in the Subject Task List. Additional action items on the some MET Tasks were added. The status of on-going tasks was also updated as necessary.

14.3 The meeting did not identify the need to amend the Terms of Reference and formulated the following Draft Decision on the Subject/Tasks List.

Draft Decision 12/46 - Updated Terms of Reference and Subject/Tasks List of the CNS/MET Sub-group

That, the Subject/Tasks List of the CNS/MET Sub-group provided in **Appendix A12** to the Report be adopted.

Next Meeting

14.4 It was agreed that the Thirteenth Meeting of the CNS/MET Sub Group should be scheduled tentatively for 20 to 24 July 2009 at the Regional Office, Bangkok. The dates are to be confirmed by the APANPIRG/19 meeting.

Agenda Item 15: Any other business

15.1 The meeting was informed that Mr. Rick Houghton, the Rapporteur of the OPMET Management Task Force who was the key coordinator for the tasks assigned by the CNS/MET Sub-group and who had chaired the previous six meetings of the group would retire by early 2009. The meeting expressed its appreciation and gratitude to the Rapporteur for his effort and contribution to the significant progress achieved in the provision of OPMET data in the Region. The meeting also hoped that Australia, as a provider State of one of the Regional OPMET data banks, will continue its leading role in the work of the OPMET/M Task Force.

Change in the Secretariat

15.2 The meeting also noted that Mr. Christopher Keohan, a new member of the Secretariat team joined ICAO recently as a Regional Officer, MET from the FAA, USA.

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

Concl/ Dec No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date	Status as on 9 June 08
D 18/9 (DC11/8) 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 18/22 (DC11/1) 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.

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Concl/ Dec No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date	Status as on 9 June 08
C 18/26 (DC11/5) 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 (DC11/6) 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 (DC11/7) 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 (DC11/9) 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

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Concl/ Dec No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date	Status as on 9 June 08
C 18/19 (DC11/10) 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	CLOSED State Letter AP102/07 (ATM) dated 10 October 2007
C 18/30 (DC11/14, 15) 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 was issued. Strategies posted on APAC web site.
D 18/31 (DD11/16) 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.

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Concl/ Dec No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date	Status as on 9 June 08
C 18/32 (DC11/18) 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 the GM posted on APAC web site.
C 18/33 (DC11/19) 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 updated AIGD posted on APAC web site.
C 18/34 (DC11/20) 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 APAC web site.

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Concl/ Dec No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date	Status as on 9 June 08
<p>C 18/35 (DC11/21)</p> <p style="text-align: center;">D</p>	<p>Mandate Regional ADS-B Out Implementation</p>	<p>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</p> <p><i>Note: The implementation would require aircraft equipped with avionics compliant with either</i></p> <p>a) <i>Version OES 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</i></p> <p>b) <i>Version IES as specified in Chapter 3 of draft Technical Provision for Mode S Services and Extended Squitter (ICAO Doc 9871) (Equivalent to DO260A)</i></p>	<p>Urge the States to implement requirements for ADS-B Out avionics with target date of 2010</p>	<p>ICAO APAC Office</p>	<p>State Letter</p>	<p>December 2007</p> <p>Target date revised to April 2008</p>	<p>State letter issued on 16 April 08.</p> <p>-To be superseded.</p> <p>CLOSED</p>
<p>C 18/36 (DC11/22)</p> <p style="text-align: center;">D</p>	<p>Concept of Use for Multilateration</p>	<p>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.</p>	<p>Advise the States on the availability of Guidance Material</p>	<p>ICAO APAC Office</p>	<p>Publish the Guidelines on ICAO APAC Region Website</p>	<p>January 2008</p>	<p>COMPLETED. Posted on APAC web site and States were informed on 14 Dec. 07</p>

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Concl/ Dec No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date	Status as on 9 June 08
C 18/37 (DC11/23) 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 (Proposal at APANPIR G/18) 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 2 nd meeting on 2 & 3 July 08 in KL, Malaysia.
C 18/39 (DC11/25) 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	COMPLETED a) State letter was Issued. Replies received and the list updated. b) Provider States urged to maintain the updated list.

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Concl/ Dec No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date	Status as on 9 June 08
C 18/40 (DC11/26) 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 (DC11/28) 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 (DC11/29) 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.

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Concl/ Dec No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date	Status as on 9 June 08
C 18/43 (DC11/30) 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 (DC11/31) 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: 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	Conduct a Study to identify the States' plans for implementation of Amendment 74 to Annex 3 and Request IATA to provide new user requirements	OPMET Management Task Force ICAO APAC Office	Study Results Identification of user requirements	2008 December 2007	COMPLETED OPMETMTF/6 adopted a decision to conduct a survey on the use of TAF information in VOLMET by airlines. Survey conducted. COMPLETED

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Concl/ Dec No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date	Status as on 9 June 08
C 18/45 (DC11/32) 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 (DC11/33) 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

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Concl/ Dec No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date	Status as on 9 June 08
C 18/49 (DC11/36) D	Developing guidance on the ATM requirements for MET services and facilities	That, ICAO be invited to extend the guidance material in Doc 9377, <i>Manual on Coordination between Air Traffic Services, Aeronautical Information Services and Aeronautical Meteorological Services</i> , 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 Regional survey was conducted and the results consolidated and submitted to ICAO HQ. HQ will amend the work programme in the IKSIN accordingly.
C 18/50 (DC11/37) 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 (DD11/38) 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 will be notified of the updated Terms of Reference and Subject/Tasks List

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Concl/ Dec No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date	Status as on 9 June 08
C 18/52 (DC11/12 and para) 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 scheduled for 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	2008	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

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Concl/ Dec No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date	Status as on 9 June 08
C 18/55 (DC11/13) 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.
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

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Concl/ Dec No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date	Status as on 9 June 08
C 18/60	Implementation aspects of the Regional Supplement to the Uniform Methodology for resolution of deficiencies.	<p>That,</p> <p>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:</p> <ul style="list-style-type: none"> • 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	<p>COMPLETED. State letter issued on 1 October 2007.</p> <p>10 States (China, HK, Fiji, Japan, Malaysia, Maldives, NZ, Singapore, and Thailand & ROK) have designated their contact person.</p>
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.

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Concl/ Dec No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Target date	Status as on 9 June 08
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.

STATUS OF OUTSTANDING CONCLUSIONS/DECISIONS TILL APANPIRG/17 (2006)

Concl/Dec No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Status Dated June 08
<p style="text-align: center;">C 15/15 D</p>	<p>Asia/Pacific Regional ATN Implementation System Management Operational Procedures</p>	<p>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</p>	<p>Asia/Pacific Regional ATN Implementation System Management Operational Procedures containing initial direction and guidance was published in August 2004. Some updates to the GM done in May 2008. New edition is expected to be updated by May 2009.</p>	<p>ATNICG</p>	<p>Updated guidance material on the management operational procedures.</p>	<p>ON-GOING <i>The basic guidance material on procedures was developed in 2004. Further updates are expected by ATNICG based on sufficient experience gained in 2009.</i></p>

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Concl/Dec No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Status Dated June 08
C16/47 D	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.	CNS/MET Sub-group and States concerned	Posters for WS, tropical cyclone and Volcanic ash SIGMET.	COMPLETED Design and publication of VA, TC and WS SIGMET poster has been completed and distribution of the three posters is being processed.

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Concl/Dec No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Status Dated June 08
<p>D 17/10</p> <p>D</p>	<p>Establish APANPIRG Regional Performance Framework Task Force</p>	<p>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.</p>	<p>Establishment of the RPF/TF.</p> <p>Followed up work programme established based on the TORs</p> <p>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.</p>	<p>APANPIRG</p> <p>TF</p> <p>TF</p>	<p>TOR</p> <p>TF Report</p> <p>Regional performance framework</p> <p>Report to – ATM/AIS/SAR/17 – CNS/MET/11 – APANPIRG/18</p>	<p>CLOSED</p> <p>Further actions to be deferred until the outcome of two activities being taken by ICAO HQ are known.</p> <p>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.</p> <p>2. Development by ICAO HQ of an Air Navigation integrated air navigation work programme to include appropriate regional office activities.</p>
<p>C 17/38</p> <p>A , D</p>	<p>Amendment to ASIA/PAC FASID Table MET 1A, Meteorological services required at aerodromes</p>	<p>That, the ASIA/PAC FASID Table MET 1A be amended as shown in Appendix I to the Report on Agenda Item 2.2.</p>	<p>Process amendment proposal for FASID Table MET 1A</p>	<p>Regional Office</p>	<p>Amendment proposal</p>	<p>COMPLETED</p> <p>The amendment proposal has been processed in accordance with established procedures.</p>

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Concl/Dec No. --- Strategic Objective*	Title of Conclusion/ Decision	Text of Conclusion/Decision	Follow-up Action	To be initiated by	Deliverable	Status Dated June 08
C 17/43 D	Development of provisions on MET/ATM coordination	<p>That, in recognizing the importance of the meteorological support for the air traffic management,</p> <p>a) ICAO Regional Office conduct a survey of the evolving requirements for meteorological information and services in support of air traffic management; and</p> <p>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.</p>	<p>Conduct survey</p> <p>Develop SARPs</p>	<p>MET/ATM TF, Regional Office</p> <p>ICAO HQ</p>	<p>Questionnaire for the survey</p> <p>Survey Report to be presented to - ATM/AIS/ SAR/17 - CNS/MET/11</p> <p>Appropriate provisions</p>	<p>CLOSED</p> <p>Survey Report presented to - ATM/AIS/ SAR/17 - CNS/MET/11</p> <p>And</p> <p>Results of survey presented to -CNS/MET/12. Result is also forwarded to ICAO HQ.</p>
C 17/44 A , D	Development of new windshear posters	<p>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.</p>	<p>Develop wind shear posters</p>	<p>Hong Kong, China, ICAO HQ, WMO, IFALPA</p>	<p>Posters</p>	<p>COMPLETED</p>

* **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.

No.	PERFORMANCE OBJECTIVE	ICAO Strategic 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/Se mi-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 Strategic 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 Strategic 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 conducted	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 Strategic 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)			

No.	PERFORMANCE OBJECTIVE	ICAO Strategic Objective	Associated GPI	Tasks/Strategy	Benefits	Deliverables	Target Date	Leader	Supporting Members	ATNICG/3 Update
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 implementation 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) Identify 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		

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 global 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

July 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).



International Civil Aviation Organization
Asia and Pacific Office

Asia/Pacific Regional AMHS MTA Routing Policy

First Edition

MAY 2008

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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:

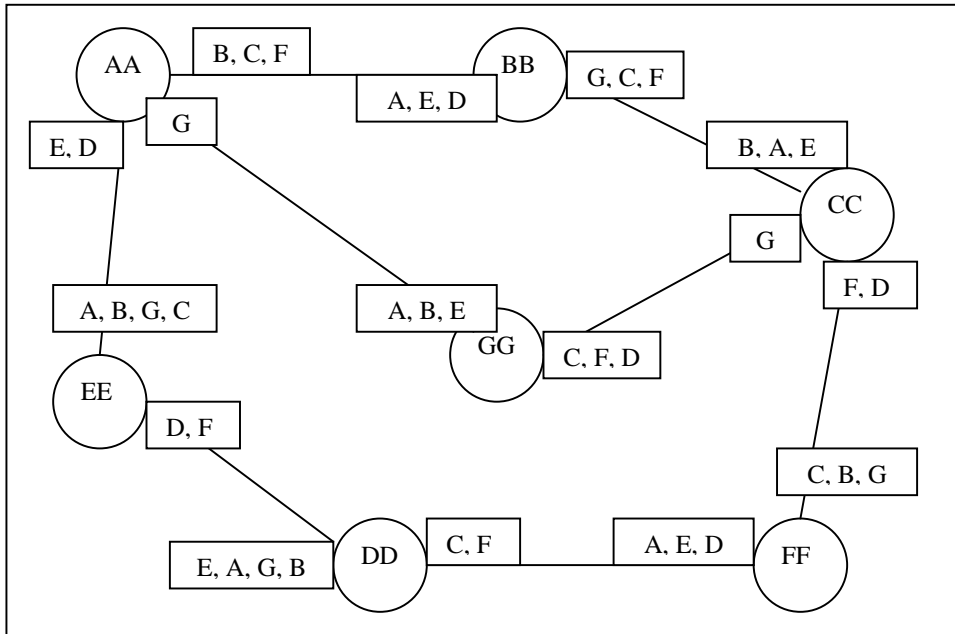


Figure 1 Example of configuration with all organization using AFTN

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 through this connection.

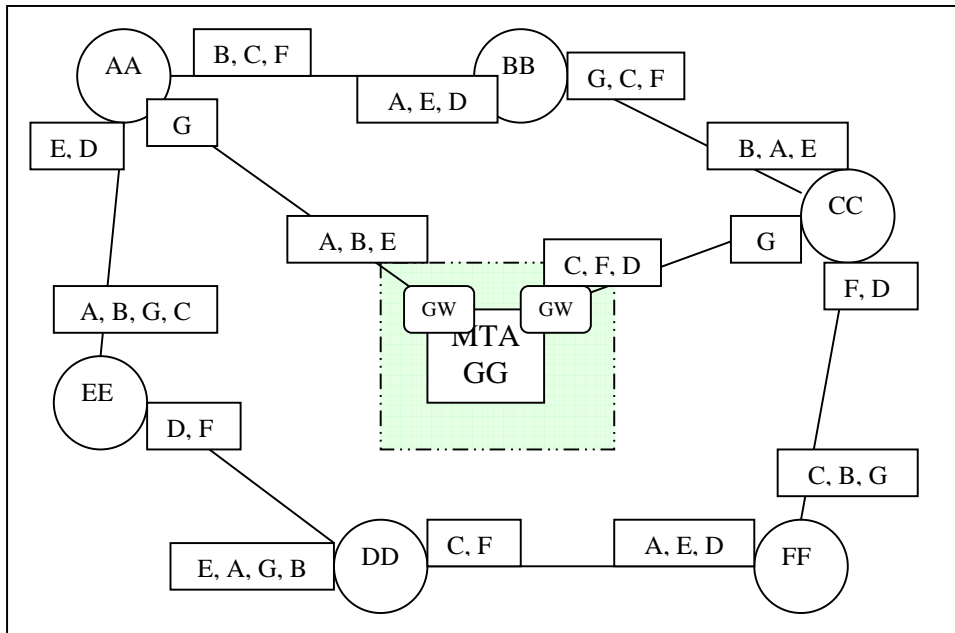


Figure 2 Example of configuration with only one MTA presented among AFTN nodes

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.

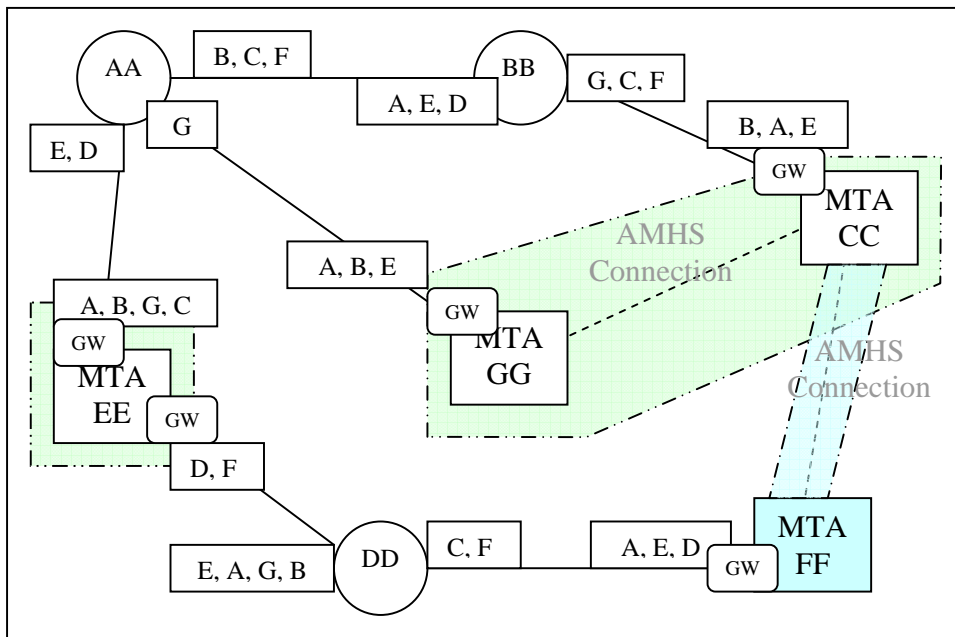


Figure 3 Example configuration with more than one MTAs

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.

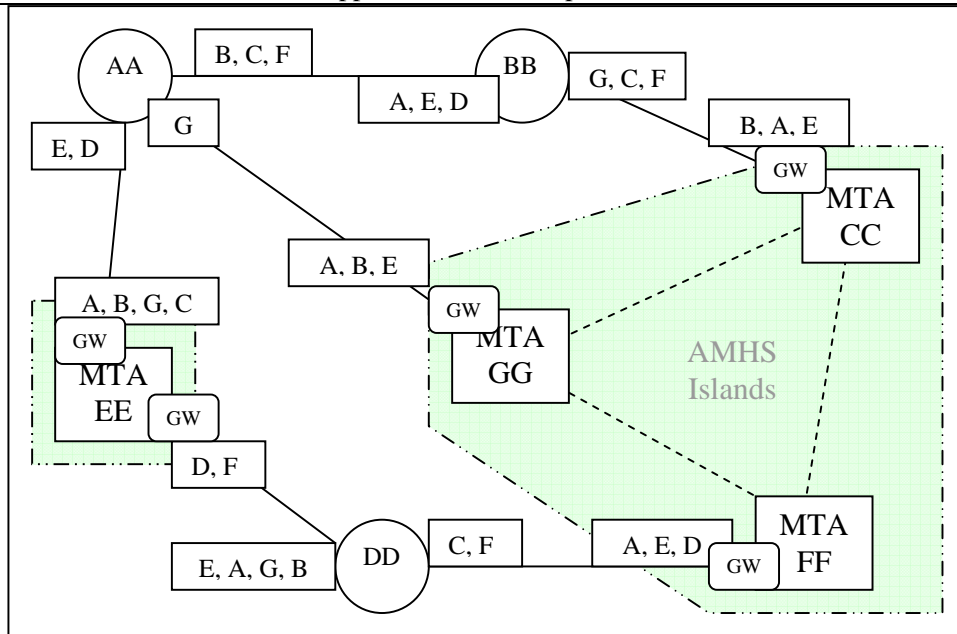


Figure 4 Example configuration with more than one MTAs presented

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.

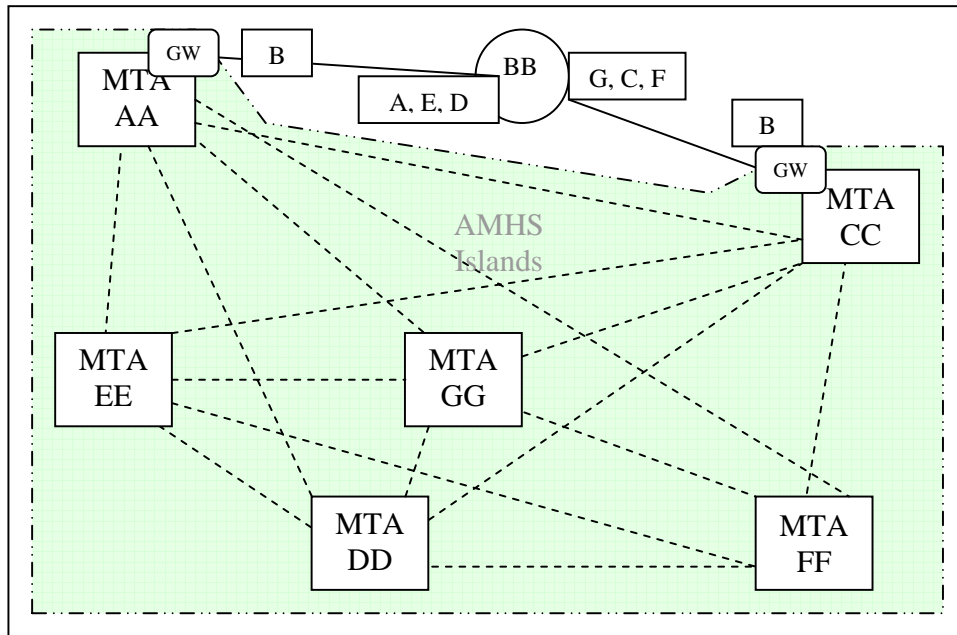


Figure 5 displays the situation when more organizations have implemented AMHS than AFTN. All MTAs will from AMHS islands and have logical 'direct MTA-to-MTA'² connection between them. At the edge of the island, MTAs will connect with AFTN using AFTN/AMHS gateway functions. From the figure, however, only 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 Region⁴

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)	

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Appendix F to the Report

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	

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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	Taipei	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	

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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	

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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

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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		

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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	64000 bps	X.25	2007	Circuit Implemented
				American Samoa				Intra-domain

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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.

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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
	Taipei	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	

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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

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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 of AMHS Manual

ANNEX E

AMHS Inter-Operability Tests

ANNEX E

of

AMHS Manual

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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

IT x nn where:

IT is an acronym for Interoperability Test, x is a number identifying the test group; 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.

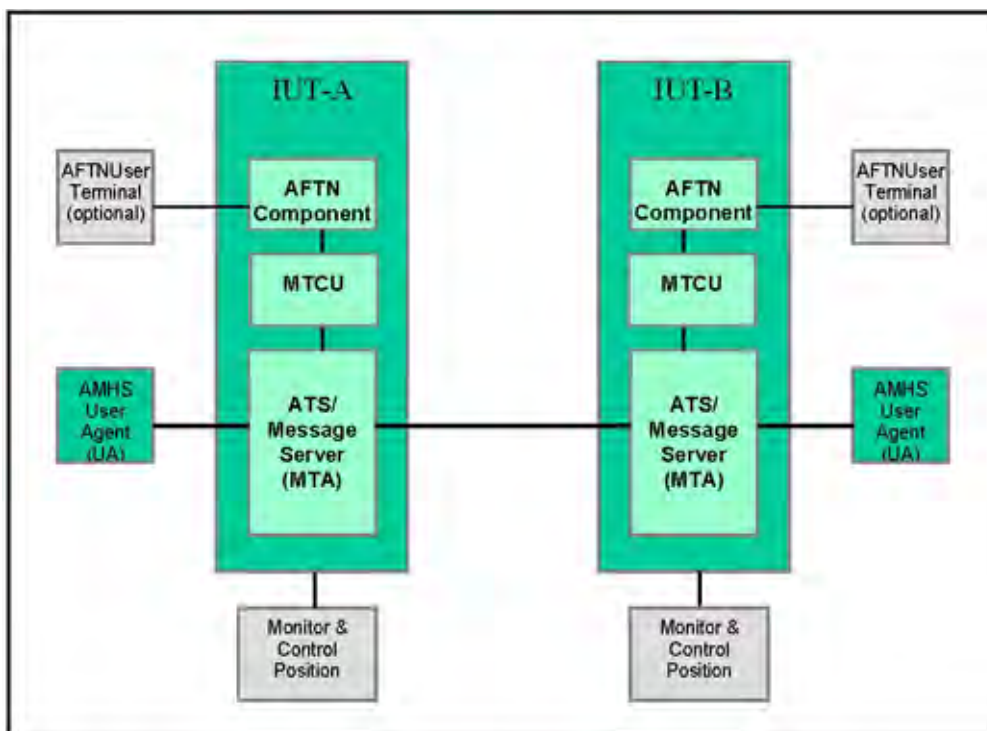


Figure E- 1: AMHS Inter-operability Test Environment

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

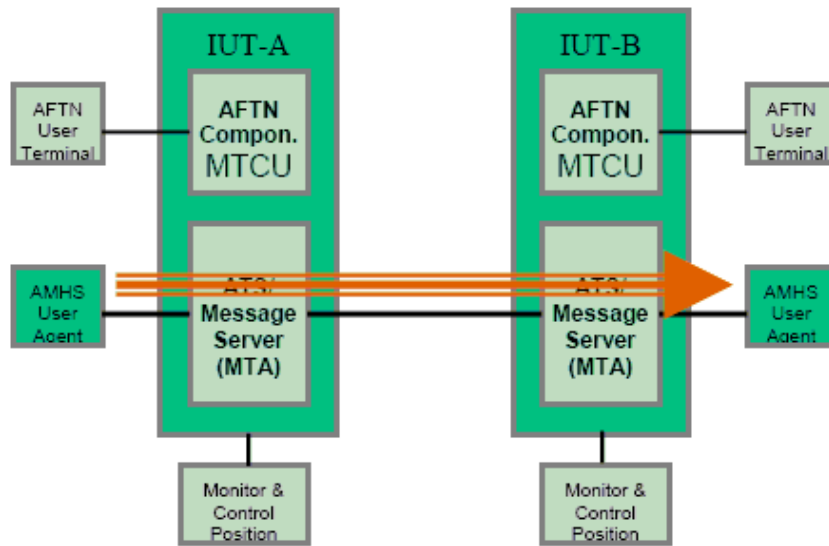


Figure E- 2: UA to UA (IUT-A to IUT-B)

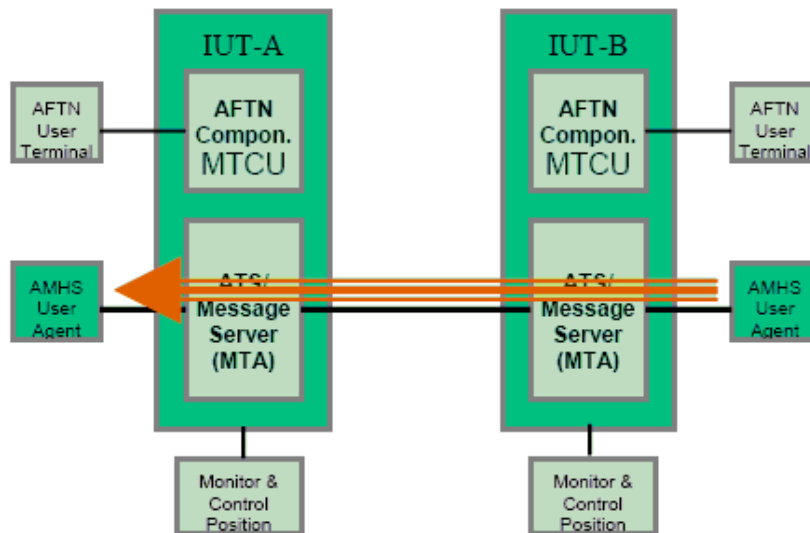


Figure E- 3: UA to UA (IUT-B to IUT-A)

AMHS / AFTN gateway tests (AFTN => AMHS) (x=2):
 AFTN Terminal => Gateway and ATS Message Server => UA

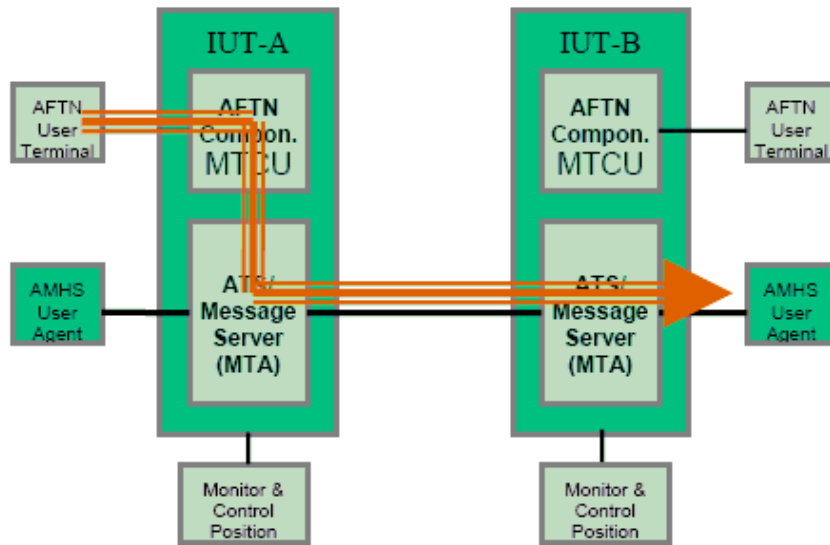


Figure E- 4: AFTN Terminal to UA (IUT-A to IUT-B)

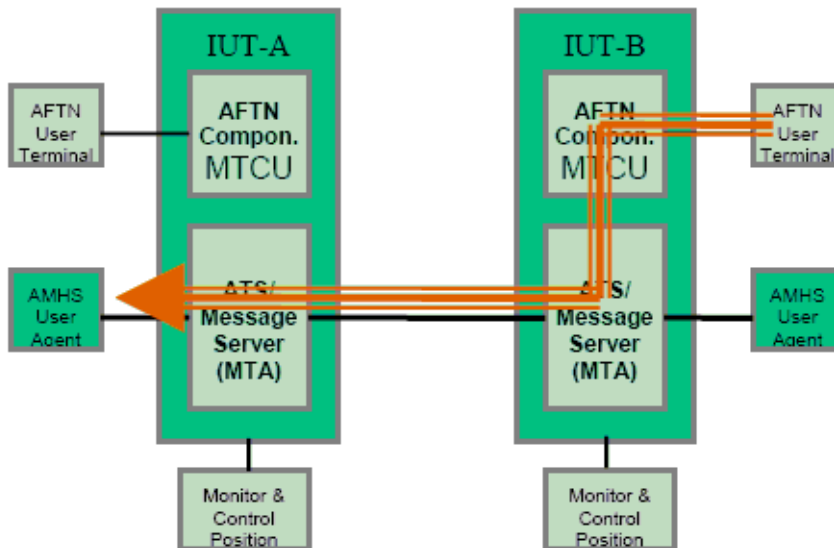


Figure E- 5: AFTN Terminal to UA (IUT-B to IUT-A)

AMHS / AFTN gateway tests (AMHS => AFTN) (x=3):
 UA => ATS Message Server and Gateway => AFTN Terminal

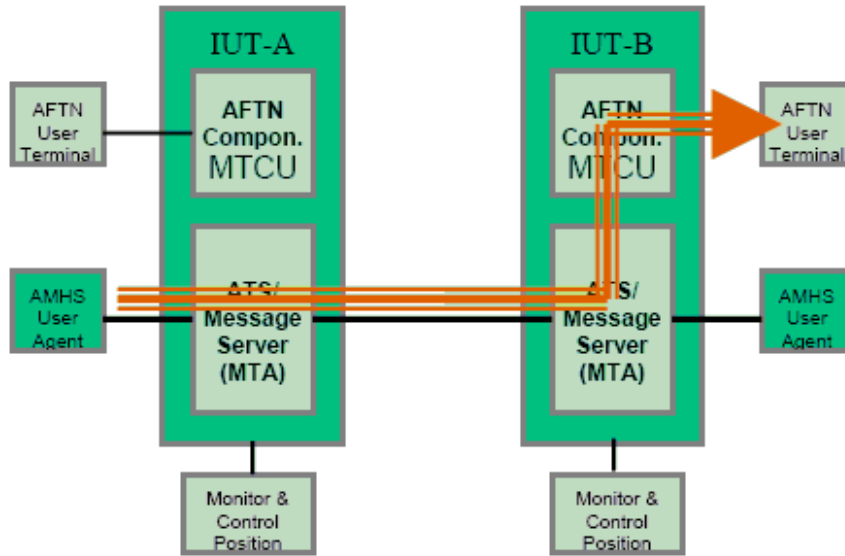


Figure E- 6: UA to AFTN Terminal (IUT-A to IUT-B)

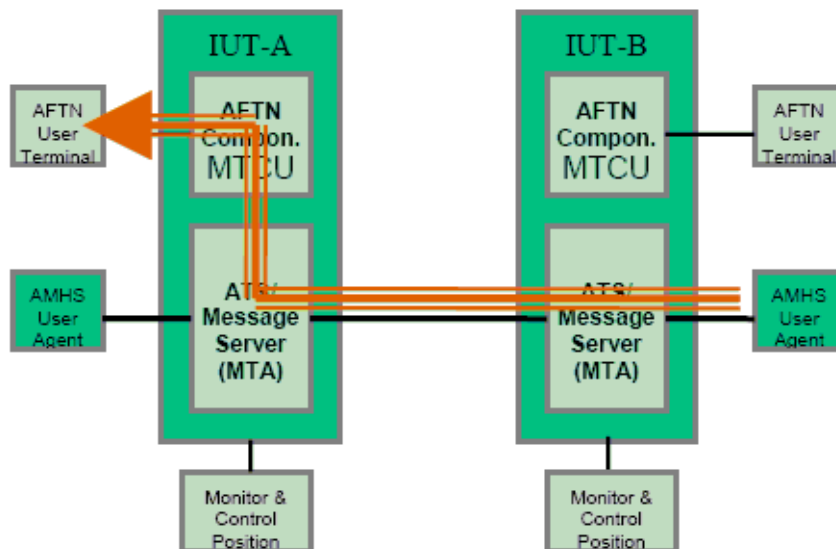


Figure E- 7: UA to AFTN Terminal (IUT-B to IUT-A)

AMHS / AFTN gateway tests (AFTN => AMHS => AFTN) (x=4):

AFTN Terminal => Gateway => ATS Message Servers => Gateway => AFTN Terminal

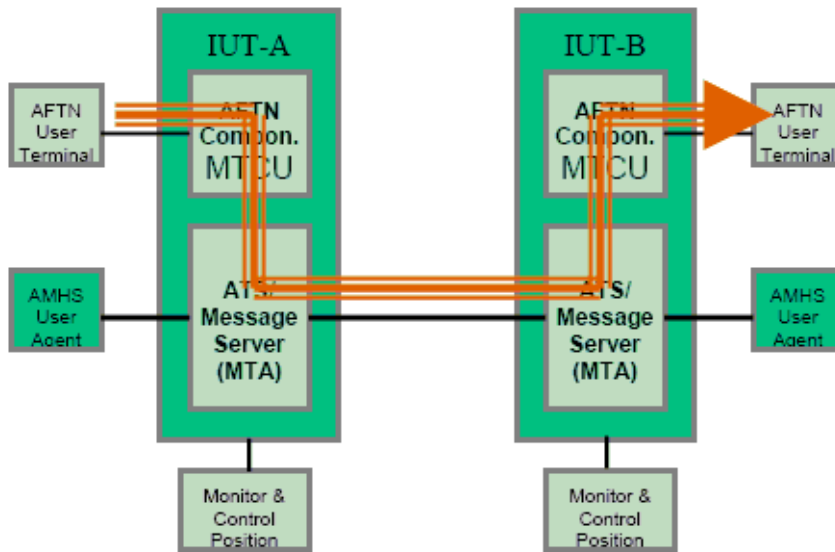


Figure E- 8: AFTN Terminal to AFTN Terminal (IUT-A to IUT-B)

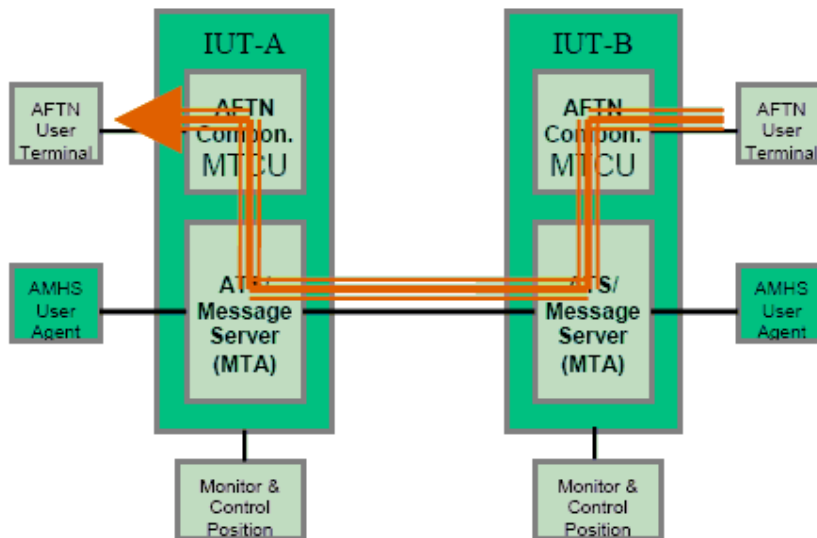


Figure E- 9: AFTN Terminal to AFTN Terminal (IUT-B to IUT-A)

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

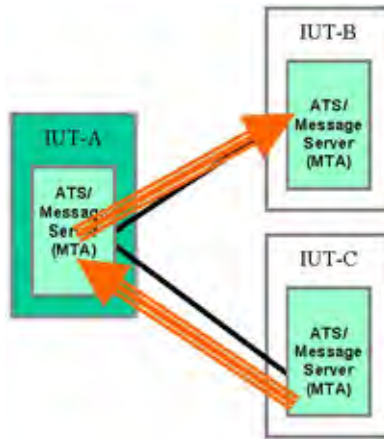


Figure E- 10: "Relay" operation tests

Testing of special situations (x=8) – (optional - additional test partner required – IUT-C and – additional connectivity required IUT-B - IUT-C)

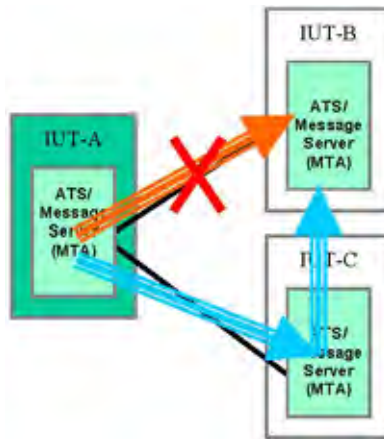


Figure E- 11: Alternate MTA routing

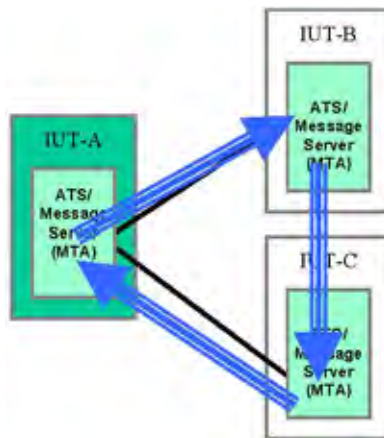


Figure E- 12: Traffic loop test

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.

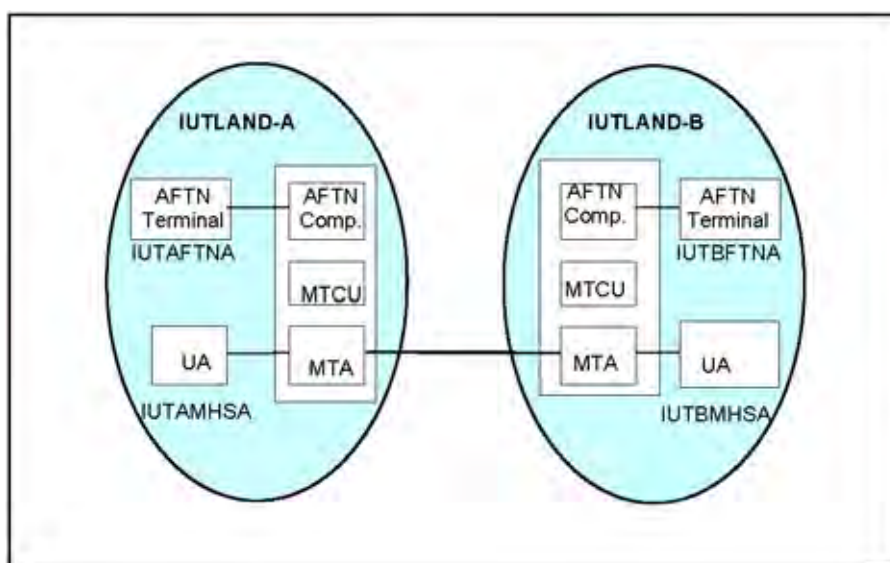


Figure E- 13: Addressing Plan

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

CAAS (preferred) – single "O"	CAAS – multiple "O"	XF
C = XX ADMD = ICAO PRMD = IUTLAND-C O = C-REGION OU1 = IUTC CN = IUTCFTNA ... IUTCMHSA	C = XX ADMD = ICAO PRMD = IUTLAND-C O = B-REGION1 OU1 = IUTC CN = IUTCFTNA ... IUTCMHSA O = B-REGION2 OU1 = IUCC CN = IUCCFTNA ... IUCCMHSA	C = XX ADMD = ICAO PRMD = IUTLAND-C O = AFTN OU1 = IUTCFTNA ... IUTCMHSA

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/ <i>Note. – This address has to be unknown and not defined in IUT-A</i>
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/ <i>Note. – This address has to be unknown and not defined in IUT-B</i>
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/ <i>Note. – This address has to be unknown and not defined in IUT-A</i>
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/ <i>Note. – This address has to be unknown and not defined in IUT-B</i>
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	<p>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.</p> <ul style="list-style-type: none"> • 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. <p>Each message shall have different ATS-filing-time and ATS-message-text. The <i>optional-heading-information</i> element shall be empty.</p> <p>Verify the messages received by the remote UA.</p> <p>In particular, verify:</p> <ul style="list-style-type: none"> • 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	<p>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.</p> <ul style="list-style-type: none"> • 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. <p>Each message shall have different ATS-filing-time and ATS-message-text. The <i>optional-heading-information</i> element shall be empty.</p> <p>Verify the messages received by the remote UA.</p> <p>In particular, verify:</p> <ul style="list-style-type: none"> • 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	<p>From the sending IUT send a sequence of AFTN messages addressing a remote AMHS user, consisting of five messages:</p> <ul style="list-style-type: none"> • 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. <p>The filing time shall be different in each message and the OHI field of each message shall be empty.</p> <p>Check the IPMs that the AMHS user receives in the receiving IUT.</p> <p>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:</p> <ul style="list-style-type: none"> • 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	<p>From the sending IUT send a sequence of AFTN messages addressing a remote AMHS user, consisting of five messages:</p> <ul style="list-style-type: none"> • 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. <p>The filing time shall be different in each message and the OHI field of each message shall be empty.</p> <p>Check the IPMs that the AMHS user receives in the receiving IUT.</p> <p>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:</p> <ul style="list-style-type: none"> • 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	<p>Send from IUT-A (UA) a sequence of ATS messages (IPMs) to the IUT-B, addressing an AFTN terminal.</p> <ul style="list-style-type: none"> • 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. <p>Each message shall have different ATS-filing-time and ATS-message-text. The <i>optional-heading-information</i> element shall be empty.</p> <p>The implicit-conversion-prohibited attribute of the AMHS message must be set to “false”.</p> <p>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.</p>
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	<p>From IUT-A send a sequence of AFTN messages addressing a remote AFTN user in IUT-B, consisting of five messages:</p> <ul style="list-style-type: none"> • 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. <p>The filing time shall be different in each message and the OHI field of each message shall be empty.</p> <p>Check the AFTN message received by the AFTN user in the IUT-B.</p> <ul style="list-style-type: none"> • 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	<p>From IUT-B send a sequence of AFTN messages addressing a remote AFTN user in IUT-A, consisting of five messages:</p> <ul style="list-style-type: none"> • 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. <p>The filing time shall be different in each message and the OHI field of each message shall be empty.</p> <p>Check the AFTN message received by the AFTN user in the IUT-A.</p> <ul style="list-style-type: none"> • 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	<p>From the sending IUT send an ATS message (IPM), addressing both AMHS and AFTN users, at the receiving IUT.</p> <p>The IPM Heading of the message shall contain two primary recipients, which are one AMHS and one AFTN user.</p> <p>The IPM Heading of the next message shall contain additionally, two copy recipients, which are also one AMHS and one AFTN user.</p> <p>Finally the IPM Heading of the last message shall contain additionally two blind copy recipients, which are also one AMHS and one AFTN user.</p> <p>Verify that all the users, whose addresses have been included in the IPM, receive the message correctly.</p>
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 <i>dl-expansion-prohibited</i> 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	<p>From the sending IUT send an ATS message (IPM) containing ATS-message-text of 4500 characters to an AFTN recipient of the receiving IUT.</p> <p><u>If case a is implemented:</u> 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:</p> <ul style="list-style-type: none"> • “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. <p><u>If case b is implemented:</u> 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 <i>ATS-message-text</i> 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].</p> <p><u>If case c is implemented:</u> 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 <i>ATS-message-text</i> provided in the original IPM.</p>
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	<p>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.</p> <p><i>Note. – PDR M4050004 (Title: AMHS - Too Many Recipients) is resolved. Therefore the message shall be split into several messages.</i></p>
Scenario description	<p>From the sending IUT send an ATS message (IPM) to the receiving IUT. The message shall address 50 (primary) recipients.</p> <p>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</p> <ul style="list-style-type: none"> • 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	<p>From the sending IUT, send AMHS probes to the receiving IUT:</p> <ul style="list-style-type: none"> 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. <p>Verify that the receiving IUT returns</p> <ul style="list-style-type: none"> 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. <p>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”.</p>
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	<p>Defined numbers of messages (beginning with 100, 200, till 400 messages) have to be selected from the data base or generated by the UA or the AFTN terminal.</p> <p>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.</p> <p>No errors due to malfunction of the IUTs should be observed during the interchange period.</p> <p>The time from sending the first till receiving the last message has to be measured and analysed in both IUTs.</p>
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	<p>Create “normal” X.400 routing: (see 3.3, AFTN and X.400 Routing Tables)</p> <p>From the UA send an ATS message (IPM) with ATS-message-priority FF addressed to the UA of the other IUTs.</p> <ul style="list-style-type: none"> • 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. <p>Each message shall have different ATS-filing-time and ATS-message-text. The <i>optional-heading-information</i> element shall be empty.</p> <p>Verify the messages received by both remote UAs.</p> <p>In particular, verify:</p> <ul style="list-style-type: none"> • 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	<p>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.</p> <p>From the UA send an ATS message (IPM) with ATS-message-priority FF to one UA of another IUT.</p> <ul style="list-style-type: none"> • 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. <p>Each message shall have different ATS-filing-time and ATS-message-text. The <i>optional-heading-information</i> element shall be empty.</p> <p>Verify the messages received by the remote UA and passed the IUT in between.</p> <p>In particular, verify:</p> <ul style="list-style-type: none"> • 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	<p>Create a “normal” X.400 routing: (see 3.3, AFTN and X.400 Routing Tables)</p> <p>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.</p> <ul style="list-style-type: none"> • 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. <p>Each message shall have different ATS-filing-time and ATS-message-text. The <i>optional-heading-information</i> element shall be empty.</p> <p>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).</p> <p>Verify the messages received by the remote UA and passed the IUT in between.</p> <p>In particular, verify:</p> <ul style="list-style-type: none"> • 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	<p>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.</p> <p>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.</p> <p>Verify that:</p> <ul style="list-style-type: none"> • the one of the IUTs detects the loop, • this IUT discards the message and • generates a NDR <p>Verify that the sending IUT receives the NDR</p> <p>Repeat the test with all IUTs, so that all sending IUTs have received the NDR.</p>
AMHS SARPs reference	3.1.1, Note 2a (ISO/IEC 10021), 3.1.2.1.6 (AMHS routing), <i>See also ITU-T Rec. X.411 clause 14.3.1 and clause 12.3.1.</i>
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	<p>Tested functionality: Submission, transfer and delivery of messages with different ATS-message-priorities</p> <p>A KK priority message will be submitted from the UA of IUT-A and delivered to the UA of IUT-B.</p>		
Test description:	<p>From the User Agent IUTAMHSA send the following message to the UA IUTBMHSA:</p> <p>PRI: KK FT: <FT> OHI: TEST IT101/TC01</p> <p>Get the message with IUTBMHSA (UA-terminal of IUT-B).</p>		
Test control:	<p>Check the correct reception of the message at the UA IUTBMHSA of the IUT-B system.</p> <p>Check</p> <ul style="list-style-type: none"> - the ATS-message-priority: PRI: KK - the ATS-message-filing-time and - the ATS-message-text 		
Test result:	PASS	FAILED	INCONCLUSIVE

IT101	Submit, transfer and deliver an IPM (UA IUT-A to UA IUT-B)		
Test-case id: IT101/TC02	<p>Tested functionality: Submission, transfer and delivery of messages with different ATS-message-priorities</p> <p>A GG priority message will be submitted from the UA of IUT-A and delivered to the UA of IUT-B.</p>		
Test description:	<p>From the User Agent IUTAMHSA send the following message to the UA IUTBMHSA:</p> <p>PRI: GG FT: <FT> OHI: TEST IT101/TC02</p> <p>Get the message with IUTBMHSA (UA-terminal of IUT-B).</p>		
Test control:	<p>Check the correct reception of the message at the UA IUTBMHSA of the IUT-B system.</p> <p>Check</p> <ul style="list-style-type: none"> - the ATS-message-priority: PRI: GG - the ATS-message-filing-time and - the ATS-message-text 		
Test result:	PASS	FAILED	INCONCLUSIVE

IT101	Submit, transfer and deliver an IPM (UA IUT-A to UA IUT-B)		
Test-case id: IT101/TC03	<p>Tested functionality: Submission, transfer and delivery of messages with different ATS-message-priorities</p> <p>An FF priority message will be submitted from the UA of IUT-A and delivered to the UA of IUT-B.</p>		
Test description:	<p>From the User Agent IUTAMHSA send the following message to the UA IUTBMHSA:</p> <p>PRI: FF FT: <FT> OHI: TEST IT101/TC03</p> <p>Get the message with IUTBMHSA (UA-terminal of IUT-B).</p>		
Test control:	<p>Check the correct reception of the message at the UA IUTBMHSA of the IUT-B system.</p> <p>Check</p> <ul style="list-style-type: none"> - the ATS-message-priority: PRI: FF - the ATS-message-filing-time and - the ATS-message-text 		
Test result:	PASS	FAILED	INCONCLUSIVE

IT101	Submit, transfer and deliver an IPM (UA IUT-A to UA IUT-B)		
Test-case id: IT101/TC04	<p>Tested functionality: Submission, transfer and delivery of messages with different ATS-message-priorities</p> <p>A DD priority message will be submitted from the UA of IUT-A and delivered to the UA of IUT-B.</p>		
Test description:	<p>From the User Agent IUTAMHSA send the following message to the UA IUTBMHSA:</p> <p>PRI: DD FT: <FT> OHI: TEST IT101/TC04</p> <p>Get the message with IUTBMHSA (UA-terminal of IUT-B).</p>		
Test control:	<p>Check the correct reception of the message at the UA IUTBMHSA of the IUT-B system.</p> <p>Check</p> <ul style="list-style-type: none"> - the ATS-message-priority: PRI: DD - the ATS-message-filing-time and - the ATS-message-text 		
Test result:	PASS	FAILED	INCONCLUSIVE

IT101	Submit, transfer and deliver an IPM (UA IUT-A to UA IUT-B)		
Test-case id: IT101/TC05	<p>Tested functionality: Submission, transfer and delivery of messages with different ATS-message-priorities</p> <p>An SS priority message will be submitted from the UA of IUT-A and delivered to the UA of IUT-B.</p>		
Test description:	<p>From the User Agent IUTAMHSA send the following message to the UA IUTBMHSA:</p> <p>PRI: SS FT: <FT> OHI: TEST IT101/TC05</p> <p>Get the message with IUTBMHSA (UA-terminal of IUT-B). A RN is submitted when the message is displayed.</p> <p>Note. – Depending on UA implementation the user might be requested to send the RN.</p>		
Test control:	<p>Check the correct reception of the message at the UA IUTBMHSA of the IUT-B system.</p> <p>Check</p> <ul style="list-style-type: none"> - the ATS-message-priority: PRI: SS - the ATS-message-filing-time and - the ATS-message-text <p>Check the reception of a RN on the UA IUTAMHSA of the IUT-A system.</p>		
Test result:	PASS	FAILED	INCONCLUSIVE

IT102	Submit, transfer and deliver an IPM (UA IUT-B to UA IUT-A)		
Test-case id: IT102/TC01	<p>Tested functionality: Submission, transfer and delivery of messages with different ATS-message-priorities</p> <p>A KK priority message will be submitted from the UA of IUT-B and delivered to the UA of IUT-A.</p>		
Test description:	<p>From the User Agent IUTBMHSA send the following message to the UA IUTAMHSA:</p> <p>PRI: KK FT: <FT> OHI: TEST IT102/TC01</p> <p>Get the message with IUTAMHSA (UA-terminal of IUT-A).</p>		
Test control:	<p>Check the correct reception of the message at the UA IUTAMHSA of the IUT-A system.</p> <p>Check</p> <ul style="list-style-type: none"> - the ATS-message-priority: PRI: KK - 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/TC02	<p>Tested functionality: Submission, transfer and delivery of messages with different ATS-message-priorities</p> <p>A GG priority message will be submitted from the UA of IUT-B and delivered to the UA of IUT-A.</p>		
Test description:	<p>From the User Agent IUTBMHSA send the following message to the UA IUTAMHSA:</p> <p>PRI: GG FT: <FT> OHI: TEST IT102/TC02</p> <p>Get the message with IUTAMHSA (UA-terminal of IUT-A).</p>		
Test control:	<p>Check the correct reception of the message at the UA IUTAMHSA of the IUT-A system.</p> <p>Check</p> <ul style="list-style-type: none"> - the ATS-message-priority: PRI: GG - 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/TC03	<p>Tested functionality: Submission, transfer and delivery of messages with different ATS-message-priorities</p> <p>An FF priority message will be submitted from the UA of IUT-B and delivered to the UA of IUT-A.</p>		
Test description:	<p>From the User Agent IUTBMHSA send the following message to the UA IUTAMHSA:</p> <p>PRI: FF FT: <FT> OHI: TEST IT102/TC03</p> <p>Get the message with IUTAMHSA (UA-terminal of IUT-A).</p>		
Test control:	<p>Check the correct reception of the message at the UA IUTAMHSA of the IUT-A system.</p> <p>Check</p> <ul style="list-style-type: none"> - 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	<p>Tested functionality: Submission, transfer and delivery of messages with different ATS-message-priorities</p> <p>A DD priority message will be submitted from the UA of IUT-B and delivered to the UA of IUT-A.</p>		
Test description:	<p>From the User Agent IUTBMHSA send the following message to the UA IUTAMHSA:</p> <p>PRI: DD FT: <FT> OHI: TEST IT102/TC04</p> <p>Get the message with IUTAMHSA (UA-terminal of IUT-A)</p>		
Test control:	<p>Check the correct reception of the message at the UA IUTAMHSA of the IUT-A system.</p> <p>Check</p> <ul style="list-style-type: none"> - 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	<p>Tested functionality: Submission, transfer and delivery of messages with different ATS-message-priorities</p> <p>An SS priority message will be submitted from the UA of IUT-B and delivered to the UA of IUT-A.</p>		
Test description:	<p>From the User Agent IUTBMHSA send the following message to the UA IUTAMHSA:</p> <p>PRI: SS FT: <FT> OHI: TEST IT102/TC05</p> <p>Get the message with IUTAMHSA (UA-terminal of IUT-A). A RN is submitted when the message is displayed.</p> <p><i>Note. – Depending on UA implementation the user might be requested to send the RN.</i></p>		
Test control:	<p>Check the correct reception of the message at the UA IUTAMHSA of the IUT-A system.</p> <p>Check</p> <ul style="list-style-type: none"> - the ATS-message-priority: PRI: SS - the ATS-message-filing-time and - the ATS-message-text <p>Check the reception of a RN on the UA IUTBMHSA of the IUT-B system.</p>		
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	<p>Tested functionality: Conversion of messages with different AFTN priorities</p> <p>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.</p>		
Test description:	<p>From the AFTN terminal IUTAFTNA of IUT-A send the following message to the User Agent (UA) of IUT-B:</p> <p>KK IUTBMHSA <FT> IUTAFTNA TEST IT201/TC01</p> <p>The message is converted from AFTN into AMHS format in the MTCU of IUT-A.</p>		
Test control:	<p>Check the correct reception of the message at the UA IUTBMHSA of the IUT-B system.</p> <p>Check</p> <ul style="list-style-type: none"> - 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	<p>Tested functionality: Conversion of messages with different AFTN priorities</p> <p>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.</p>		
Test description:	<p>From the AFTN terminal IUTAFTNA of IUT-A send the following message to the User Agent (UA) of IUT-B:</p> <p>GG IUTBMHSA <FT> IUTAFTNA TEST IT201/TC02</p> <p>The message is converted from AFTN into AMHS format in the MTCU of IUT-A.</p>		
Test control:	<p>Check the correct reception of the message at the UA IUTBMHSA of the IUT-B system.</p> <p>Check</p> <ul style="list-style-type: none"> - 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

IT201	Convert an AFTN message to AMHS format (IUT-A)		
Test-case id: IT201/TC03	<p>Tested functionality: Conversion of messages with different AFTN priorities</p> <p>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.</p>		
Test description:	<p>From the AFTN terminal IUTAFTNA of IUT-A send the following message to the User Agent (UA) of IUT-B:</p> <p>FF IUTBMHSA <FT> IUTAFTNA TEST IT201/TC03</p> <p>The message is converted from AFTN into AMHS format in the MTCU of IUT-A.</p>		
Test control:	<p>Check the correct reception of the message at the UA IUTBMHSA of the IUT-B system.</p> <p>Check</p> <ul style="list-style-type: none"> - 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

IT201	Convert an AFTN message to AMHS format (IUT-A)		
Test-case id: IT201/TC04	<p>Tested functionality: Conversion of messages with different AFTN priorities</p> <p>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.</p>		
Test description:	<p>From the AFTN terminal IUTAFTNA of IUT-A send the following message to the User Agent (UA) of IUT-B:</p> <p>DD IUTBMHSA <FT> IUTAFTNA TEST IT201/TC04</p> <p>The message is converted from AFTN into AMHS format in the MTCU of IUT-A.</p>		
Test control:	<p>Check the correct reception of the message at the UA IUTBMHSA of the IUT-B system.</p> <p>Check</p> <ul style="list-style-type: none"> - 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

IT201	Convert an AFTN message to AMHS format (IUT-A)		
Test-case id: IT201/TC05	<p>Tested functionality: Conversion of messages with different AFTN priorities</p> <p>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.</p>		
Test description:	<p>From the AFTN terminal IUTAFTNA of IUT-A send the following message to the User Agent (UA) of IUT-B:</p> <p>SS IUTBMHSA <FT> IUTAFTNA TEST IT201/TC05</p> <p>The message is converted from AFTN into AMHS format in the MTCU of IUT-A.</p> <p><i>Optional:</i> Generate a RN at the receiving UA IUTBMHSA of IUT-B.</p>		
Test control:	<p>Check the correct reception of the message at the UA IUTBMHSA of the IUT-B system.</p> <p>Check</p> <ul style="list-style-type: none"> - the ATS-message-priority: PRI: SS - the message transfer priority: URGENT - the ATS-message-filing-time and - the ATS-message-text <p><i>Optional:</i></p> <p>If a RN is replied from the UA IUTBMHSA of IUT-B, the MTCU of IUT-A converts it into an SS Ack message which is sent to the AFTN terminal of IUT-A.</p> <p>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.</p>		
Test result:	PASS	FAILED	INCONCLUSIVE

IT202	Convert an AFTN message to AMHS format (IUT-B)		
Test-case id: IT202/TC01	<p>Tested functionality: Conversion of messages with different AFTN priorities</p> <p>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.</p>		
Test description:	<p>From the AFTN terminal IUTBFTNA of IUT-B send the following message to the User Agent (UA) of IUT-A:</p> <p>KK IUTAMHSA <FT> IUTBFTNA TEST IT202/TC01</p> <p>The message is converted from AFTN into AMHS format in the MTCU of IUT-B.</p>		
Test control:	<p>Check the correct reception of the message at the UA IUTAMHSA of the IUT-A system.</p> <p>Check</p> <ul style="list-style-type: none"> - 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

IT202	Convert an AFTN message to AMHS format (IUT-B)		
Test-case id: IT202/TC02	<p>Tested functionality: Conversion of messages with different AFTN priorities</p> <p>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.</p>		
Test description:	<p>From the AFTN terminal IUTBFTNA of IUT-B send the following message to the User Agent (UA) of IUT-A:</p> <p>GG IUTAMHSA <FT> IUTBFTNA TEST IT202/TC02</p> <p>The message is converted from AFTN into AMHS format in the MTCU of IUT-B.</p>		
Test control:	<p>Check the correct reception of the message at the UA IUTAMHSA of the IUT-A system.</p> <p>Check</p> <ul style="list-style-type: none"> - 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

IT202	Convert an AFTN message to AMHS format (IUT-B)		
Test-case id: IT202/TC03	<p>Tested functionality: Conversion of messages with different AFTN priorities</p> <p>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.</p>		
Test description:	<p>From the AFTN terminal IUTBFTNA of IUT-B send the following message to the User Agent (UA) of IUT-A:</p> <p>FF IUTAMHSA <FT> IUTBFTNA TEST IT202/TC03</p> <p>The message is converted from AFTN into AMHS format in the MTCU of IUT-B.</p>		
Test control:	<p>Check the correct reception of the message at the UA IUTAMHSA of the IUT-A system.</p> <p>Check</p> <ul style="list-style-type: none"> - 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	<p>Tested functionality: Conversion of messages with different AFTN priorities</p> <p>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.</p>		
Test description:	<p>From the AFTN terminal IUTBFTNA of IUT-B send the following message to the User Agent (UA) of IUT-A:</p> <p>DD IUTAMHSA Test message ID: IT202M04</p> <p><FT> IUTBFTNA DD IUTAMHSA</p> <p>TEST IT202/TC04 <FT> IUTBFTNA</p> <p>TEST IT202/TC04</p> <p>The message is converted from AFTN into AMHS format in the MTCU of IUT-B.</p> <p>Test message ID: IT202M05</p>		
Test control: <FT> IUTBFTNA TEST IT202/TC05	<p>Check the correct reception of the message at the UA IUTAMHSA of the IUT-A system.</p> <p>Check</p> <ul style="list-style-type: none"> - 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

Test-case id: IT202/TC05	<p>Tested functionality: Conversion of messages with different AFTN priorities</p> <p>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.</p>		
Test description:	<p>From the AFTN terminal IUTBFTNA of IUT-B send the following message to the User Agent (UA) of IUT-A:</p> <p>SS IUTAMHSA <FT> IUTBFTNA TEST IT202/TC05</p> <p>The message is converted from AFTN into AMHS format in the MTCU of IUT-B.</p> <p>Optional: Generate a RN at the receiving UA IUTAMHSA of ITU-A.</p>		
Test control:	<p>Check the correct reception of the message at the UA IUTAMHSA of the IUT-A system.</p> <p>Check</p> <ul style="list-style-type: none"> - the ATS-message-priority: PRI: SS - the message transfer priority: URGENT - the ATS-message-filing-time and - the ATS-message-text <p>Optional:</p> <p>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.</p> <p>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.</p>		
Test result:	PASS	FAILED	INCONCLUSIVE

6.4 Gateway Operations (AMHS to AFTN)

IT301	Convert an IPM to AFTN format (IUT-B)		
Test-case id: IT301/TC01	<p>Tested functionality: Conversion of messages with different ATS-message-priorities</p> <p>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.</p>		
Test description:	<p>From the User Agent IUTAMHSA send the following message to the AFTN terminal IUTBFTNA of IUT-B:</p> <p>PRI: KK FT: <FT> OHI: TEST IT301/TC01</p> <p>The message is converted from AMHS into AFTN format in the MTCU of IUT-B.</p>		
Test control:	<p>Check the correct reception of the message at the AFTN terminal IUTBFTNA of the IUT-B system.</p> <p>Check</p> <ul style="list-style-type: none"> - the AFTN priority: KK - 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/TC02	<p>Tested functionality: Conversion of messages with different ATS-message-priorities</p> <p>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.</p>		
Test description:	<p>From the User Agent IUTAMHSA send the following message to the AFTN terminal IUTBFTNA of IUT-B:</p> <p>PRI: GG FT: <FT> OHI: TEST IT301/TC02</p> <p>The message is converted from AMHS into AFTN format in the MTCU of IUT-B.</p>		
Test control:	<p>Check the correct reception of the message at the AFTN terminal IUTBFTNA of the IUT-B system.</p> <p>Check</p> <ul style="list-style-type: none"> - 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	<p>Tested functionality: Conversion of messages with different ATS-message-priorities</p> <p>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.</p>		
Test description:	<p>From the User Agent IUTAMHSA send the following message to the AFTN terminal IUTBFTNA of IUT-B:</p> <p>PRI: FF FT: <FT> OHI: TEST IT301/TC03</p> <p>The message is converted from AMHS into AFTN format in the MTCU of IUT-B.</p>		
Test control:	<p>Check the correct reception of the message on the AFTN terminal IUTBFTNA of the IUT-B system.</p> <p>Check</p> <ul style="list-style-type: none"> - 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	<p>Tested functionality: Conversion of messages with different ATS-message-priorities</p> <p>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.</p>		
Test description:	<p>From the User Agent IUTAMHSA send the following message to the AFTN terminal IUTBFTNA of IUT-B:</p> <p>PRI: DD FT: <FT> OHI: TEST IT301/TC04</p> <p>The message is converted from AMHS into AFTN format in the MTCU of IUT-B.</p>		
Test control:	<p>Check the correct reception of the message on the AFTN terminal IUTBFTNA of the IUT-B system.</p> <p>Check</p> <ul style="list-style-type: none"> - 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	<p>Tested functionality: Conversion of messages with different ATS-message-priorities</p> <p>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</p>		
Test description:	<p>From the User Agent IUTAMHSA send the following message to the AFTN terminal IUTBFTNA of IUT-B:</p> <p>PRI: SS FT: <FT> OHI: TEST IT301/TC05</p> <p>The message is converted from AMHS into AFTN format in the MTCU of IUT-B.</p> <p><i>Optional:</i> Send an SS Acknowledgement message from the receiving AFTN terminal.</p>		
Test control:	<p>Check the correct reception of the message on the AFTN terminal IUTBFTNA of the IUT-B system.</p> <p>Check</p> <ul style="list-style-type: none"> - the AFTN priority: SS - the AFTN filing time and - the AFTN message text <p><i>Optional:</i> 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.</p>		
Test result:	PASS	FAILED	INCONCLUSIVE

IT302	Convert an IPM to AFTN format (IUT-A)		
Test-case id: IT302/TC01	<p>Tested functionality: Conversion of messages with different ATS-message-priorities</p> <p>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.</p>		
Test description:	<p>From the User Agent IUTBMHSA send the following message to the AFTN terminal IUTAFTNA of IUT-A:</p> <p>PRI: KK FT: <FT> OHI: TEST IT302/TC01</p> <p>The message is converted from AMHS into AFTN format in the MTCU of IUT-A.</p>		
Test control:	<p>Check the correct reception of the message on the AFTN terminal IUTAFTNA of the IUT-A system.</p> <p>Check</p> <ul style="list-style-type: none"> - 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	<p>Tested functionality: Conversion of messages with different ATS-message-priorities</p> <p>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.</p>		
Test description:	<p>From the User Agent IUTBMHSA send the following message to the AFTN terminal IUTAFTNA of IUT-A:</p> <p>PRI: GG FT: <FT> OHI: TEST IT302/TC02</p> <p>The message is converted from AMHS into AFTN format in the MTCU of IUT-A.</p>		
Test control:	<p>Check the correct reception of the message on the AFTN terminal IUTAFTNA of the IUT-A system.</p> <p>Check</p> <ul style="list-style-type: none"> - the AFTN priority: GG - 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/TC03	<p>Tested functionality: Conversion of messages with different ATS-message-priorities</p> <p>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.</p>		
Test description:	<p>From the User Agent IUTBMHSA send the following message to the AFTN terminal IUTAFTNA of IUT-A:</p> <p>PRI: FF FT: <FT> OHI: TEST IT302/TC03</p> <p>The message is converted from AMHS into AFTN format in the MTCU of IUT-A.</p>		
Test control:	<p>Check the correct reception of the message on the AFTN terminal IUTAFTNA of the IUT-A system.</p> <p>Check</p> <ul style="list-style-type: none"> - the AFTN priority: FF - 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/TC04	<p>Tested functionality: Conversion of messages with different ATS-message-priorities</p> <p>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.</p>		
Test description:	<p>From the User Agent IUTBMHSA send the following message to the AFTN terminal IUTAFTNA of IUT-A:</p> <p>PRI: DD FT: <FT> OHI: TEST IT302/TC04</p> <p>The message is converted from AMHS into AFTN format in the MTCU of IUT-A.</p>		
Test control:	<p>Check the correct reception of the message on the AFTN terminal IUTAFTNA of the IUT-A system.</p> <p>Check</p> <ul style="list-style-type: none"> - the AFTN priority: DD - 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/TC05	<p>Tested functionality: Conversion of messages with different ATS-message-priorities</p> <p>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.</p>		
Test description:	<p>From the User Agent IUTBMHSA send the following message to the AFTN terminal IUTAFTNA of IUT-A:</p> <p>PRI: SS FT: <FT> OHI: TEST IT302/TC05</p> <p>The message is converted from AMHS into AFTN format in the MTCU of IUT-A.</p> <p><i>Optional:</i> <i>Send an SS Acknowledgement message from the receiving AFTN terminal.</i></p>		
Test control:	<p>Check the correct reception of the message on the AFTN terminal IUTAFTNA of the IUT-A system.</p> <p>Check</p> <ul style="list-style-type: none"> - the AFTN priority: SS - the AFTN filing time and - the AFTN message text <p><i>Optional:</i> <i>When the SS Ack message is replied, the MTCU of IUT-A converts it into a RN.</i> <i>Check the reception of the RN at the UA IUTBMHSA of ITU-B.</i></p>		
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	<p>Tested functionality: Conversion of messages with different AFTN priorities</p> <p>An AFTN message with KK priority will be sent from the AFTN terminal of IUT-A to the AFTN terminal of IUT-B.</p>		
Test description:	<p>From the AFTN terminal IUTAFTNA send the following message to the AFTN terminal IUTBFTNA of IUT-B:</p> <p>KK IUTBFTNA <FT> IUTAFTNA TEST IT401/TC01</p> <p>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.</p> <p>.</p>		
Test control:	<p>Check the correct reception of the message on the AFTN terminal IUTBFTNA of the IUT-B system.</p> <p>Check</p> <ul style="list-style-type: none"> - 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	<p>Tested functionality: Conversion of messages with different AFTN priorities</p> <p>An AFTN message with FF priority will be sent from the AFTN terminal of IUT-A to the AFTN terminal of IUT-B.</p>		
Test description:	<p>From the AFTN terminal IUTAFTNA send the following message to the AFTN terminal IUTBFTNA of IUT-B:</p> <p>FF IUTBFTNA <FT> IUTAFTNA TEST IT401/TC03</p> <p>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.</p> <p>.</p>		
Test control:	<p>Check the correct reception of the message on the AFTN terminal IUTBFTNA of the IUT-B system.</p> <p>Check</p> <ul style="list-style-type: none"> - the AFTN priority: FF - 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/TC04	<p>Tested functionality: Conversion of messages with different AFTN priorities</p> <p>An AFTN message with DD priority will be sent from the AFTN terminal of IUT-A to the AFTN terminal of IUT-B.</p>		
Test description:	<p>From the AFTN terminal IUTAFTNA send the following message to the AFTN terminal IUTBFTNA of IUT-B:</p> <p>DD IUTBFTNA <FT> IUTAFTNA TEST IT401/TC04</p> <p>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.</p> <p>.</p>		
Test control:	<p>Check the correct reception of the message on the AFTN terminal IUTBFTNA of the IUT-B system.</p> <p>Check</p> <ul style="list-style-type: none"> - the AFTN priority: DD - 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/TC05	<p>Tested functionality: Conversion of messages with different AFTN priorities</p> <p>An AFTN message with SS priority will be sent from the AFTN terminal of IUT-A to the AFTN terminal of IUT-B.</p>		
Test description:	<p>From the AFTN terminal IUTAFTNA send the following message to the AFTN terminal IUTBFTNA of IUT-B:</p> <p>SS IUTBFTNA <FT> IUTAFTNA TEST IT401/TC05</p> <p>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.</p> <p><i>Optional:</i> Send an SS Acknowledgement message from the receiving AFTN terminal.</p>		
Test control:	<p>Check the correct reception of the message on the AFTN terminal IUTBFTNA of the IUT-B system.</p> <p>Check</p> <ul style="list-style-type: none"> - the AFTN priority: SS - the AFTN filing time and - the AFTN message text <p><i>Optional:</i> 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 IUT-A.</p>		
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

IT402	Convert an AFTN message to an IPM and back to AFTN format (IUT-B to IUT-A)		
Test-case id: IT402/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-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: 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.		
Test control:	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		
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/TC04	<p>Tested functionality: Conversion of messages with different AFTN priorities</p> <p>An AFTN message with DD priority will be sent from the AFTN terminal of IUT-B to the AFTN terminal of IUT-A.</p>		
Test description:	<p>From the AFTN terminal IUTBFTNA send the following message to the AFTN terminal IUTAFTNA of IUT-A:</p> <p>DD IUTAFTNA <FT> IUTBFTNA TEST IT402/TC04</p> <p>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.</p>		
Test control:	<p>Check the correct reception of the message on the AFTN terminal IUTAFTNA of the IUT-A system.</p> <p>Check</p> <ul style="list-style-type: none"> - 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	<p>Tested functionality: Conversion of messages with different AFTN priorities</p> <p>An AFTN message with SS priority will be sent from the AFTN terminal of IUT-B to the AFTN terminal of IUT-A.</p>		
Test description:	<p>From the AFTN terminal of IUTBFTNA send the following message to the AFTN terminal IUTAFTNA of IUT-A:</p> <p>SS IUTAFTNA <FT> IUTBFTNA TEST IT402/TC05</p> <p>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.</p> <p>Optional: Send an SS Acknowledgement message from the receiving AFTN terminal.</p>		
Test control:	<p>Check the correct reception of the message on the AFTN terminal IUTAFTNA of the IUT-A system.</p> <p>Check</p> <ul style="list-style-type: none"> - the AFTN priority: SS - the AFTN filing time and - the AFTN message text <p>Optional:</p> <p>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.</p> <p>Check the reception of the SS Acknowledgement at the AFTN terminal IUTBFTNA of ITU-B.</p>		
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: <u>Primary Recipients:</u> 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: <u>Primary Recipients:</u> 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

IT501	Distribute an IPM to AMHS and AFTN users		
Test-case id: IT501/TC03	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.		
Test description:	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.		
Test control:	Check the correct reception of the message by IUTBFTNA, IUTBFTNB and IUTBMHSA, IUTBMHSB in the IUT-B configuration.		
Test result:	PASS	FAILED	INCONCLUSIVE

IT501	Distribute an IPM to AMHS and AFTN users		
Test-case id: IT501/TC04	<p>Tested functionality: Distribution of IPM</p> <p>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.</p>		
Test description:	<p>From IUTBMHSA send the following message to:</p> <p><u>Primary Recipients</u>: IUTAMHSA and IUTAFTNA</p> <p><u>Copy Recipients</u>: IUTAMHSB and IUTAFTNB</p> <p>PRI: FF</p> <p>FT: <FT></p> <p>TEST IT501/TC04</p> <p>Get the message at the UA- and AFTN terminals of IUT-A.</p>		
Test control:	<p>Check the correct reception of the message by IUTAFTNA, IUTAFTNB and IUTAMHSA, IUTAMHSB in the IUT-A configuration.</p>		
Test result:	PASS	FAILED	INCONCLUSIVE

IT501	Distribute an IPM to AMHS and AFTN users		
Test-case id: IT501/TC05	<p>Tested functionality: Distribution of IPM</p> <p>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.</p>		
Test description:	<p>From IUTAMHSA send the following message to:</p> <p><u>Primary Recipients:</u> IUTBMHSA and IUTBFTNA</p> <p><u>Copy Recipients:</u> IUTBMHSB and IUTBFTNB</p> <p><u>Blind Copy Recipients:</u> IUTBMHSC and IUTBFTNC</p> <p>PRI: FF</p> <p>FT: <FT></p> <p>TEST IT501/TC05</p> <p>Get the message at the UA- and AFTN terminals of IUT-B.</p>		
Test control:	<p>Check that at the AFTN Station of IUT-B one message with addresses IUTBFTNA, IUTBFTNB and another message with the address IUTBFTNC is received.</p> <p>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.</p> <p>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.</p>		
Test result:	PASS	FAILED	INCONCLUSIVE

IT501	Distribute an IPM to AMHS and AFTN users		
Test-case id: IT501/TC06	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.		
Test description:	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.		
Test control:	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.		
Test result:	PASS	FAILED	INCONCLUSIVE

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

IT502	Expand a DL addressing both AMHS and AFTN users		
Test-case id: IT502/TC02	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.		
Test description:	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.		
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

IT502	Expand a DL addressing both AMHS and AFTN users		
Test-case id: IT502/TC03	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		
Test description:	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.		
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

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

IT503	Convert or reject an IPM, if the ATS-message-text contains more than 1800 characters		
Test-case id: IT503/TC01	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		
Test description:	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 1234567890123456789012345678901234567890123456789012345678901234567890123456789 123456789012345678901234567890123456789012345678901234567890123456789 123456789012345678901234567890123456789012345678901234567890123456789 ... 123456789012345678901234567890123456789012345678901234567890123456789 END		
Test control:	<p>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).</p> <p><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:</p> <ul style="list-style-type: none"> - 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". <p><u>If case b is implemented:</u> Check that IUTBFTNA receives several messages.</p> <p><u>If case c is implemented:</u> Check that IUTBFTNA receives one message.</p>		
Test result:	PASS	FAILED	INCONCLUSIVE
	a / b / c		

IT503	Convert or reject an IPM, if the ATS-message-text contains more than 1800 characters		
Test-case id: IT503/TC02	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		
Test description:	<p>From UA IUTBMHSA of IUT-B send the following message to the AFTN terminal IUTAFTNA:</p> <p>PRI: FF FT: <FT> OHI: TEST IT503/TC02 TEXT 4500 CHARACTERS 123456789012345678901234567890123456789012345678901234567890123456789 123456789012345678901234567890123456789012345678901234567890123456789 123456789012345678901234567890123456789012345678901234567890123456789 ... 123456789012345678901234567890123456789012345678901234567890123456789 END</p>		
Test control:	<p>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).</p> <p><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".</p> <p><u>If case b is implemented:</u> Check that IUTAFTNA receives several messages.</p> <p><u>If case c is implemented:</u> Check that IUTAFTNA receives one message.</p>		
Test result:	PASS	FAILED	INCONCLUSIVE
	a / b / c		

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:	<p>From IUTAMHSA send the following message to the following addressees (all recipients in the corresponding MF-Form):</p> <p>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,</p> <p>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</p> <p>FT: <FT></p> <p>OHI:</p> <p>TEST IT504/TC01</p>		
Test control:	<p>PDR M4050004 (Title: AMHS - Too Many Recipients) is resolved. Therefore the message shall be split into several messages.</p> <p>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.</p> <p>Check the correct reception of the messages on the AFTN terminal of IUT-B.</p>		
Test result:	PASS	FAILED	INCONCLUSIVE

IT504	Split an incoming IPM addressing more than 21 AFTN users		
Test-case id: IT504/TC02	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.		
Test description:	<p>From IUTBMHSA send the following message to the following addressees (all recipients in the corresponding MF-Form):</p> <p>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,</p> <p>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</p> <p>PRI: FF FT: <FT> OHI: TEST IT504/TC02</p>		
Test control:	<p>PDR M4050004 (Title: AMHS - Too Many Recipients) is resolved. Therefore the message shall be split into several messages.</p> <p>The message is split into 3 copies, each conveyed to the AFTN component.</p> <p>The first copy is addressed to 21 of the 50 addressee indicators.</p> <p>The second copy is addressed to further 21 addressee indicators.</p> <p>The third copy is addressed to the remaining 8 of the 50 addressee indicators.</p> <p>Check the correct reception of the messages on the AFTN terminal of IUT-A.</p>		
Test result:	PASS	FAILED	INCONCLUSIVE

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:	<p>On IUT-B UA IUTBMHSA:</p> <p>One Delivery Report (DR) with 2 AFTN recipients from the MTCU and one DR with one recipient from the MTA</p> <p>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”.</p>		
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:	<p>Verify that at UA IUTAMHSA:</p> <p>A Delivery Report, containing the reported recipient IUTBFTNA and a NDR, containing the reported recipient IUTBFTUU, with:</p> <ul style="list-style-type: none"> - non-delivery-reason-code set to “unable-to-transfer”, - non-delivery-diagnostic-code set to “unrecognized-OR-name” <p>are received.</p> <p>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”.</p>		
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	<p>Tested functionality: AMHS traffic interchange after queuing of an amount of messages</p> <p>After queuing of an amount of messages both IUTs start sending a burst of messages</p>		
Test description:	<p>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.</p> <p>Select from the data base or generated by the UA and/or the AFTN terminal 100 messages in both IUTs.</p> <p>For example, from IUTAFTNA send 100 messages to IUTBFTNA, IUTBMHSA. and from IUTBFTNA send 100 messages to IUTAFTNA, IUTAMHSA,</p> <p>In the result on IUT-A and IUT-B there are 100 messages queued in direction to the peer IUT.</p> <p>Re-establish the connection between IUT-A and IUT-B. The queued messages will be sent simultaneously from both IUTs.</p> <p>Measure the time: from re-establishing the connection till sending the first message and from sending the first till sending the last message.</p> <p>Measure the time: from re-establishing the connection till receiving the first message and from receiving the first message till receiving the last message.</p>		
Test control:	<p>Check that all 100 messages are received at the addressed terminals.</p> <p>Check that no errors or malfunction are reported or observed at the IUTs during the interchange period.</p> <p>Analyse the measured time. Calculate at both sides the amount of time needed to flush the queues. Unacceptable delays shall be treated as "FAILED".</p>		
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")			

IT601	Stress load		
Test-case id: IT601/TC02	<p>Tested functionality: AMHS traffic interchange after queuing of an amount of messages</p> <p>After queuing of an amount of messages both IUTs start sending a burst of messages</p>		
Test description:	<p>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.</p> <p>Select from the data base or generated by the UA and/or the AFTN terminal 200 messages in both IUTs.</p> <p>For example, from IUTAFTNA send 200 messages to IUTBFTNA, IUTBMHSA. and from IUTBFTNA send 200 messages to IUTAFTNA, IUTAMHSA,</p> <p>In the result on IUT-A and IUT-B there are 200 messages queued in direction to the peer IUT.</p> <p>Re-establish the connection between IUT-A and IUT-B.</p> <p>The queued messages will be sent simultaneously from both IUTs.</p> <p>Measure the time:</p> <ul style="list-style-type: none"> • from re-establishing the connection till sending the first message and • from sending the first till sending the last message. <p>Measure the time:</p> <ul style="list-style-type: none"> • from re-establishing the connection till receiving the first message and • from receiving the first message till receiving the last message. 		
Test control:	<p>Check that all 200 messages are received at the addressed terminals.</p> <p>Check that no errors or malfunction are reported or observed at the IUTs during the interchange period.</p> <p>Analyse the measured time. Calculate at both sides the amount of time needed to flush the queues. Unacceptable delays shall be treated as "FAILED".</p>		
Test result:	PASS	FAILED	INCONCLUSIVE

IT601	Stress load		
Test-case id: IT601/TC03	<p>Tested functionality: AMHS traffic interchange after queuing of an amount of messages</p> <p>After queuing of an amount of messages both IUTs start sending a burst of messages</p>		
Test description:	<p>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.</p> <p>Select from the data base or generated by the UA and/or the AFTN terminal 400 messages in both IUTs.</p> <p>For example, from IUTAFTNA send 400 messages to IUTBFTNA, IUTBMHSA. and from IUTBFTNA send 400 messages to IUTAFTNA, IUTAMHSA,</p> <p>In the result on IUT-A and IUT-B there are 400 messages queued in direction to the peer IUT.</p> <p>Re-establish the connection between IUT-A and IUT-B.</p> <p>The queued messages will be sent simultaneously from both IUTs.</p> <p>Measure the time:</p> <ul style="list-style-type: none"> • from re-establishing the connection till sending the first message and • from sending the first till sending the last message. <p>Measure the time:</p> <ul style="list-style-type: none"> • from re-establishing the connection till receiving the first message and • from receiving the first message till receiving the last message. 		
Test control:	<p>Check that all 400 messages are received at the addressed terminals.</p> <p>Check that no errors or malfunction are reported or observed at the IUTs during the interchange period.</p> <p>Analyse the measured time. Calculate at both sides the amount of time needed to flush the queues. Unacceptable delays shall be treated as “FAILED”.</p>		
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	<p>Tested functionality: Submission, transfer and delivery of messages to different IUTs</p> <p>An IPM submitted in IUT-A is transferred to IUT-B, IUT-C and delivered to the UAs of IUT-B, IUT-C.</p>		
Test description:	<p>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.</p> <p>From UA IUTAMHSA send an ATS message (IPM) to UA IUTBMHSA and IUTCMHSA:</p> <p>PRI: FF FT: <FT> OHI: TEST IT701/TC01</p>		
Test control:	<p>Verify that the message is received by both remote UAs in IUT-B and IUT-C. In particular, verify:</p> <ul style="list-style-type: none"> • 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	<p>Tested functionality: Submission, transfer and delivery of messages to different IUTs</p> <p>An IPM submitted in IUT-B is transferred to IUT-C, IUT-A and delivered to the UAs of IUT-C, IUT-A.</p>		
Test description:	<p>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.</p> <p>From the UA IUTBMHSA send an ATS message (IPM) to UA IUTAMHSA and IUTCMHSA.</p> <p>PRI: FF FT: <FT> OHI: TEST IT701/TC02</p>		
Test control:	<p>Verify that the message is received by both remote UAs in IUT-A and IUT-C.</p> <p>In particular, verify:</p> <ul style="list-style-type: none"> • 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	<p>Tested functionality: Submission, transfer and delivery of messages to different IUTs</p> <p>An IPM submitted in IUT-C is transferred to IUT-A, IUT-B and delivered to the UA of IUT-A, IUT-B.</p>		
Test description:	<p>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.</p> <p>From the UA IUTCMHSA send an ATS message (IPM) to UA IUTAMHSA and IUTBMHSA.</p> <p>PRI: FF FT: <FT> OHI: TEST IT701/TC03</p>		
Test control:	<p>Verify that the messages is received by both remote UAs in IUT-A and IUT-B.</p> <p>In particular, verify:</p> <ul style="list-style-type: none"> • ATS-message-priority, • ATS-message-filing-time, • ATS-message-text. 		
Test result:	PASS	FAILED	INCONCLUSIVE

IT702	Relay operations		
Test-case id: IT702/TC01	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:	<p>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.</p> <p>From the UA IUTAMHSA send an ATS message (IPM) to the UA IUTCMHSA. PRI: FF FT: <FT> OHI: TEST IT702/TC01</p>		
Test control:	<p>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:</p> <ul style="list-style-type: none"> • ATS-message-priority, • ATS-message-filing-time, • ATS-message-text. 		
Test result:	PASS	FAILED	INCONCLUSIVE

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:	<p>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.</p> <p>From the UA IUTBMHSA send an ATS message (IPM) to the UA IUTAMHSA. PRI: FF FT: <FT> OHI: TEST IT702/TC02</p>		
Test control:	<p>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:</p> <ul style="list-style-type: none"> • ATS-message-priority, • ATS-message-filing-time, • ATS-message-text. 		
Test result:	PASS	FAILED	INCONCLUSIVE

IT702	Relay operations		
Test-case id: IT702/TC03	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:	<p>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.</p> <p>From the UA IUTCMHSA send an ATS message (IPM) to the UA IUTBMHSA. PRI: FF FT: <FT> OHI: TEST IT702/TC03</p>		
Test control:	<p>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:</p> <ul style="list-style-type: none"> • ATS-message-priority, • ATS-message-filing-time, • ATS-message-text. 		
Test result:	PASS	FAILED	INCONCLUSIVE

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:	<p>Verify that the X.400 routing tables are configured according section 3.3, thus:</p> <p>The X.400 routing table of IUT-A routes PRMD=IUTLAND-B to IUT-B and PRMD=IUTLAND-C to IUT-C.</p> <p>The X.400 routing table of IUT-C routes PRMD=IUTLAND-A to IUT-A and PRMD=IUTLAND-B to IUT-B.</p> <p>Cut the direct connection from IUT-A to IUT-B. From the UA IUTAMHSA send an ATS message (IPM) to the UA IUTBMHSA.</p> <p>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).</p>		
Test control:	<p>Verify that the messages had passed the IUT-C in between (if possible). Verify the message received by the UA IUTBMHSA.</p> <p>In particular, verify:</p> <ul style="list-style-type: none"> • 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:	<p>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.</p> <p>Cut the direct connection from IUT-B to IUT-C.</p> <p>From the UA IUTBMHSA send an ATS message (IPM) to the UA IUTCMHSA.</p> <p>If alternate MTA routing functionality is implemented and configured in IUT-B, the message will be transferred automatically via the “alternate” connection.</p> <p>Otherwise: Reroute the queued message manually (an operational procedure for should exist).</p>		
Test control:	<p>Verify that the message had passed the IUT-A in between (if possible). Verify the message received by the UA of IUTCMHSA.</p> <p>In particular, verify:</p> <ul style="list-style-type: none"> • 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:	<p>Verify that the X.400 routing tables are configured according section 3.3, thus:</p> <p>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.</p> <p>Cut the direct connection from IUT-C to IUT-A. From the UA IUTCMHSA send an ATS message (IPM) to the UA IUTAMHSA.</p> <p>If alternate MTA routing functionality is implemented and configured in IUT-C, the message will be transferred automatically via the “alternate” connection.</p> <p>Otherwise: Reroute the queued message manually (an operational procedure for should exist).</p>		
Test control:	<p>Verify that the message had passed the IUT-B in between (if possible). Verify the message received by the UA of IUTAMHSA.</p> <p>In particular, verify:</p> <ul style="list-style-type: none"> • ATS-message-priority, • ATS-message-filing-time, • ATS-message-text. 		
Test result:	PASS	FAILED	INCONCLUSIVE

IT802	Loop detection		
Test-case id: IT802/TC01	Tested functionality: A message traversing a loop is detected by an IUT.		
Test description:	<p>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.</p> <p>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.</p> <p>One IUT detects the looping message, stops the further transfer and non-delivers the message.</p>		
Test control:	<p>Verify that:</p> <ul style="list-style-type: none"> • 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”. 		
Test result:	PASS	FAILED	INCONCLUSIVE

IT802	Loop detection		
Test-case id: IT802/TC02	Tested functionality: A message traversing a loop is detected by an IUT.		
Test description:	<p>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.</p> <p>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.</p> <p>One IUT detects the looping message, stops the further transfer and non-delivers the message.</p>		
Test control:	<p>Verify that:</p> <ul style="list-style-type: none"> • 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”. 		
Test result:	PASS	FAILED	INCONCLUSIVE

IT802	Loop detection		
Test-case id: IT802/TC03	Tested functionality: A message traversing a loop is detected by an IUT.		
Test description:	<p>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.</p> <p>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.</p> <p>One IUT detects the looping message, stops the further transfer and non-delivers the message.</p>		
Test control:	<p>Verify that:</p> <ul style="list-style-type: none"> • 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	<u>To Primary Recipients:</u> IUTBMHSA and IUTBFTNA PRI: FF FT: <FT> OHI: TEST IT501/TC01
Test message ID: IT501M03	<u>To Primary Recipients:</u> IUTBMHSA and IUTBFTNA <u>To Copy Recipients:</u> IUTBMHSA and IUTBFTNB PRI: FF FT: <FT> OHI: TEST IT501/TC03
Test message ID: IT501M05	<u>To Primary Recipients:</u> IUTBMHSA and IUTBFTNA <u>To Copy Recipients:</u> IUTBMHSA and IUTBFTNB <u>To Blind Copy Recipients:</u> IUTBMHSC and IUTBFTNC PRI: FF FT: <FT> OHI: TEST IT501/TC05

From UA IUTAMHSA Test message ID: IT502M01	<u>To:</u> IUTADLLO PRI: FF FT: <FT> OHI: TEST IT502/TC01
Test message ID: IT502M03	<u>To:</u> IUTBDLRE PRI: FF FT: <FT> OHI: TEST IT502/TC03
From UA IUTAMHSA Test message ID: IT503M01	<u>To:</u> 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	<u>To</u> 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	<u>To Primary Recipients:</u> IUTAMHSA and IUTAFTNA PRI: FF FT: <FT> OHI: TEST IT501/TC02
Test message ID: IT501M04	<u>To Primary Recipients:</u> IUTAMHSA and IUTAFTNA <u>To Copy Recipients:</u> IUTAMHSB and IUTAFTNB PRI: FF FT: <FT> OHI: TEST IT501/TC04
Test message ID: IT501M06	<u>To Primary Recipients:</u> IUTAMHSA and IUTAFTNA <u>To Copy Recipients:</u> IUTAMHSB and IUTAFTNB <u>To Blind Copy Recipients:</u> 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 123456789012345678901234567890123456789012345678901234567890123456789 123456789012345678901234567890123456789012345678901234567890123456789 123456789012345678901234567890123456789012345678901234567890123456789 ... <63 figure lines 1234567890 ... 123456789> 123456789012345678901234567890123456789012345678901234567890123456789 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
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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

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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 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).

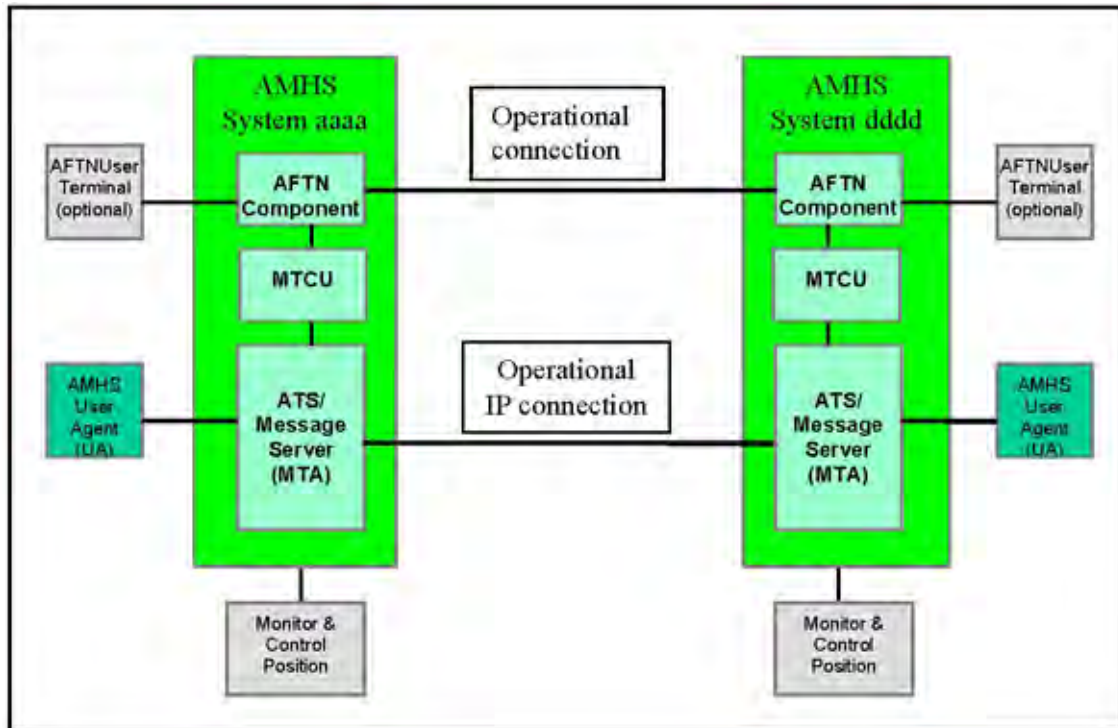


Figure F- 1: AMHS Pre-operational Test Environment

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	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: LEEYNYX
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
123456789012345678901234567890123456789012345678901234567890123456789
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
BBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBB
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
```

(and so on till)

```
ZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZ
```

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	<p>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.</p> <p>An FF priority message is sent from Test partner 2 to Test partner1.</p>

Test description:

From ddddAMHA send the following message to aaaaAMHA:

```

PRE002
123456789012345678901234567890123456789012345678901234567890123456789
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
BBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBB
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC

```

(and so on till)

```

ZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZ

```

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**

APAC PERFORMANCE-BASED NAVIGATION REGIONAL PLAN

Edition 1 - August 2008

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APAC PERFORMANCE-BASED NAVIGATION REGIONAL PLAN

1. Executive Summary

1.1 Asia Pacific PBN Regional 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. 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. Plan envisages pre and post implementation safety assessments and continued application of conventional air navigation procedures during transition. Plan discusses issues related to implementation which include traffic forecast, aircraft fleet readiness, adequacy of ground based CNS infrastructure etc. Implementation targets for various categories of airspace for short term (2008 – 2012) and for medium term (2013 – 2016) have been projected in tabular forms to facilitate easy reference. For long term (2016 and beyond) it has been envisaged that GNSS will be the primary navigation infrastructure. It has also been 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 **APAC PBN Regional Plan.** 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, which describes the RNAV and RNP navigation applications that should be implemented in the short, medium and long term in the APAC Regions.

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 PBN Regional 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 prepare a PBN Regional 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 APAC Region.

4.4 Furthermore, the APAC PBN Regional 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 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 recognizes 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 are 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 aircrafts 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 APAC PBN Regional 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 APAC PBN Regional Plan will provide a high-level strategy for the evolution of the navigation applications to be implemented in the APAC Regions 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 APAC PBN Regional Plan was developed by the APAC States and International Organizations 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 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 APAC Regions 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 characteristic and CNS/ATM capability, the en-route operation can be classified as Oceanic, Remote continental, and Continental en-route.

5.6 In principle above, kind of en-route operation 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, the RNAV and RNP navigation should be coordinated between these states to ensure harmonization.

5.7 In the area where operationally benefit and has appropriate CNS/ATM capability for the more accurate navigation specification, States are encouraged to introduce the more accurate navigation specification on the coordination basis.

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 APAC PBN Regional 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 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 (Part 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.

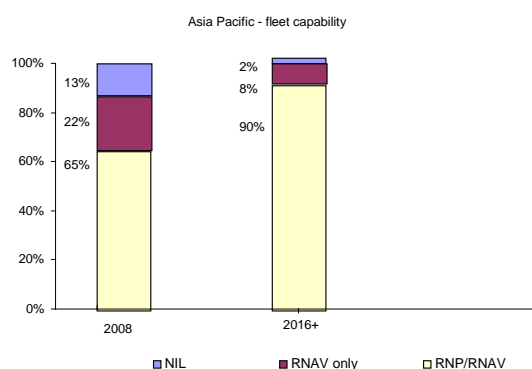
Aircraft fleet readiness status

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 included 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 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 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 ICAO PBN Manual and ICAO PAN-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 PAN-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 applications of RNAV-10 and RNP-4 are expected for Oceanic and Remote continental routes. Prior to implementations 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 applications of RNAV-5 and RNAV-2 navigation specifications are expected. In continental en-route, States may choose to implement RNAV-2 routes to enhance efficiency of airspace usages and support closer route spacing, noting that appropriate communication and surveillance coverage is provided. 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 through 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 RNP-1 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 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 implemented 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		
<ul style="list-style-type: none"> • 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 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 APAC 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 also depends 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 approach for the runway 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 <ul style="list-style-type: none"> • 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 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 need of State/Military aircraft.

8.5 States should encourage operators and other airspace users to equip with PBN 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 implementation. 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.:

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Final approval for publication of an amendment to the PBN Regional Plan will be the responsibility of APANPIRG.

1.5 EDITING CONVENTIONS

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1.6 PBN Regional Plan REQUEST FOR CHANGE FORM

RFC Nr:	
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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]

1.7 AMENDMENT RECORD

Amendment Number	Date	Amended by	Comments
0.1			

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.

<u>TRANSPACIFIC PASSENGER FORECAST</u>			
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.

<u>INTRA ASIA /PACIFIC AIRCRAFT MOVEMENT FORECAST</u>			
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

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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.

**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.

PROPOSED 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.

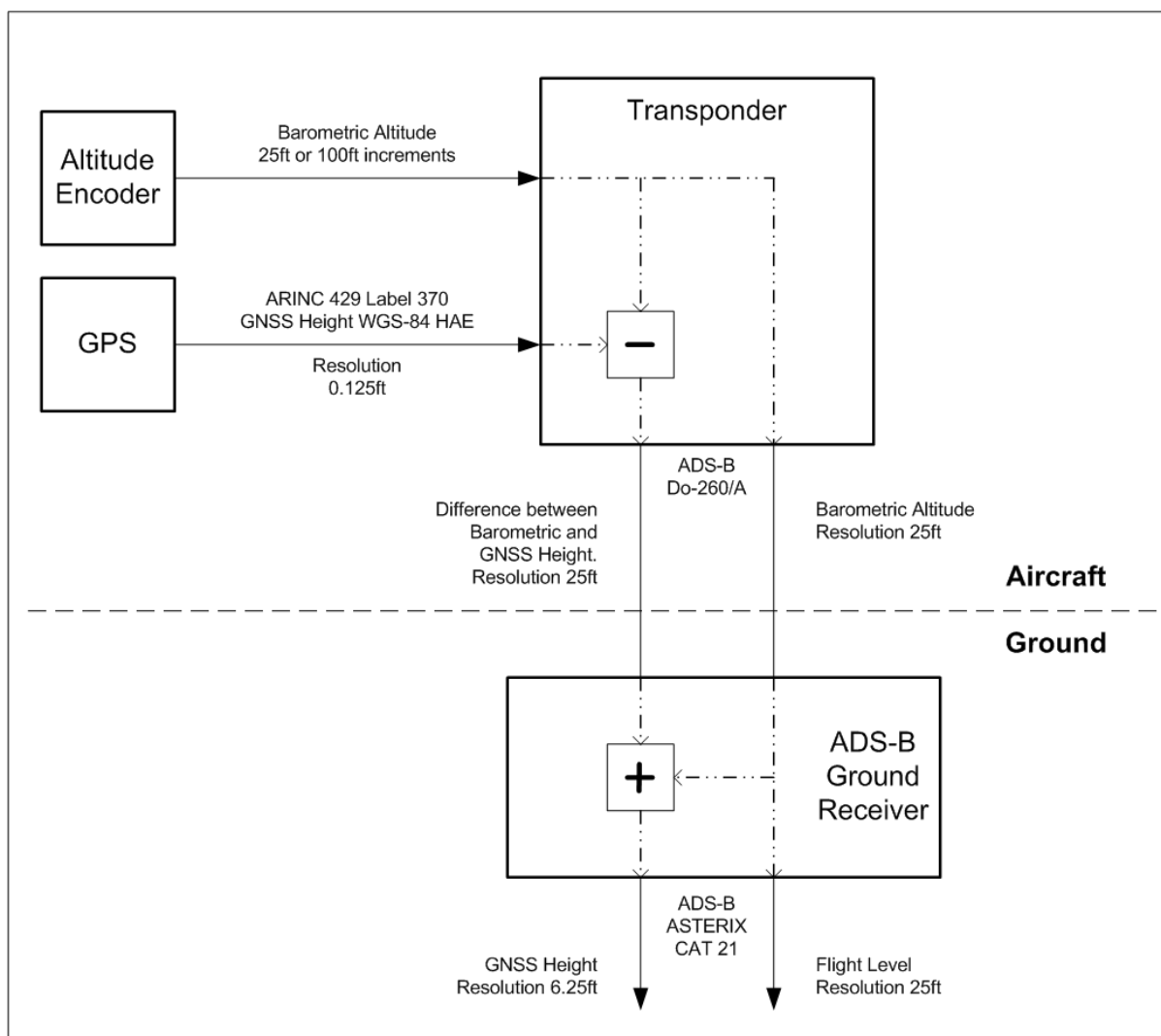
To determine the TVE for each aircraft, the monitoring unit must measure the height of the aircraft and compare this to the barometric altitude of the CFL. The CFL must be converted to a height above ground (or a common reference height) using the known atmospheric conditions at the time.

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 implementation	Completed (4/2007)	Greg Dunstone
5	Develop draft update to AIGD to incorporate multilateralation.	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

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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	Develop 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	Develop 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 feasibility 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.

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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 analysis 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 analyzed	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

the number of 5 second
intervals that contain valid
useable positional data

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.

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 be 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		

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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

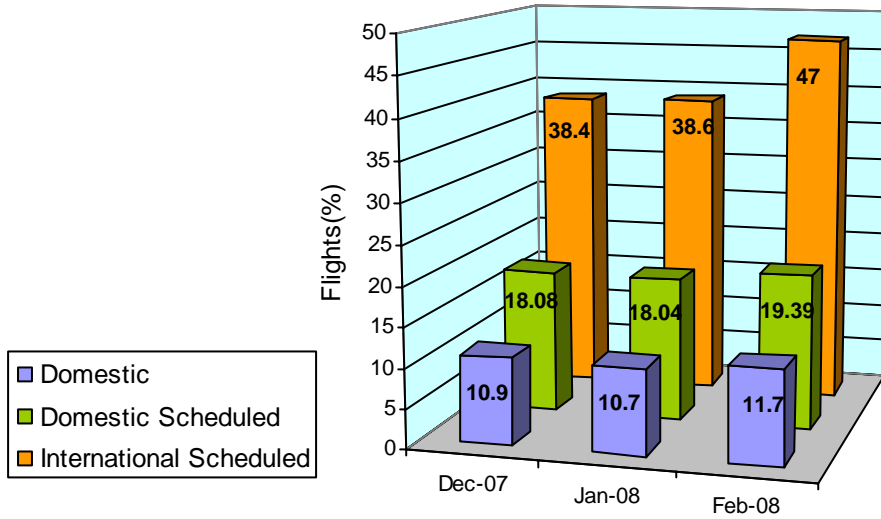


Figure 1 ADS-B Flights Detected since December 2007

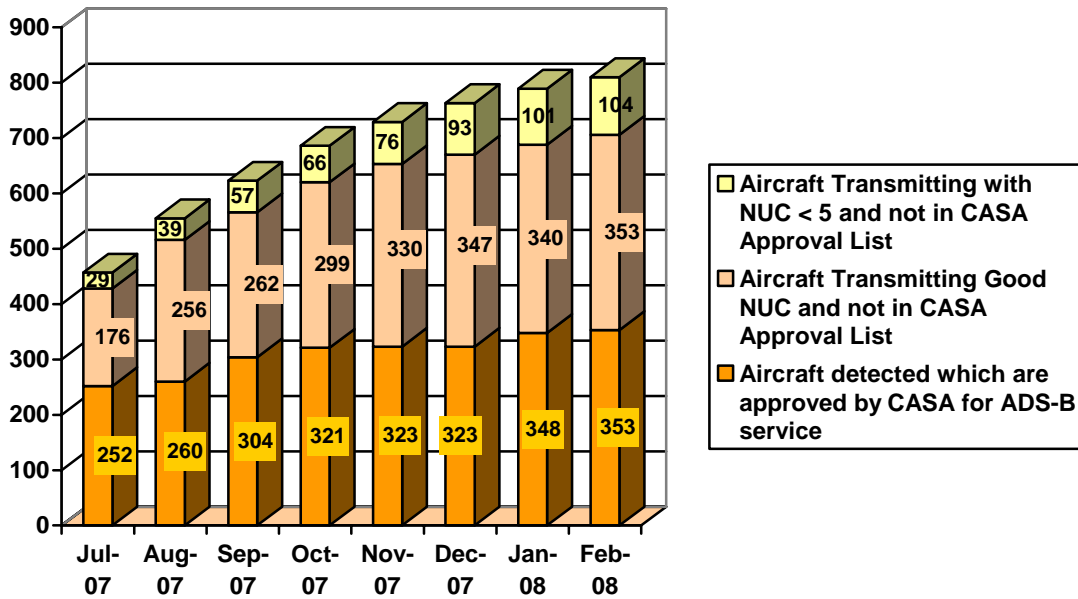


Figure 2 ADS-B Airframes Detected since July 2007

**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.

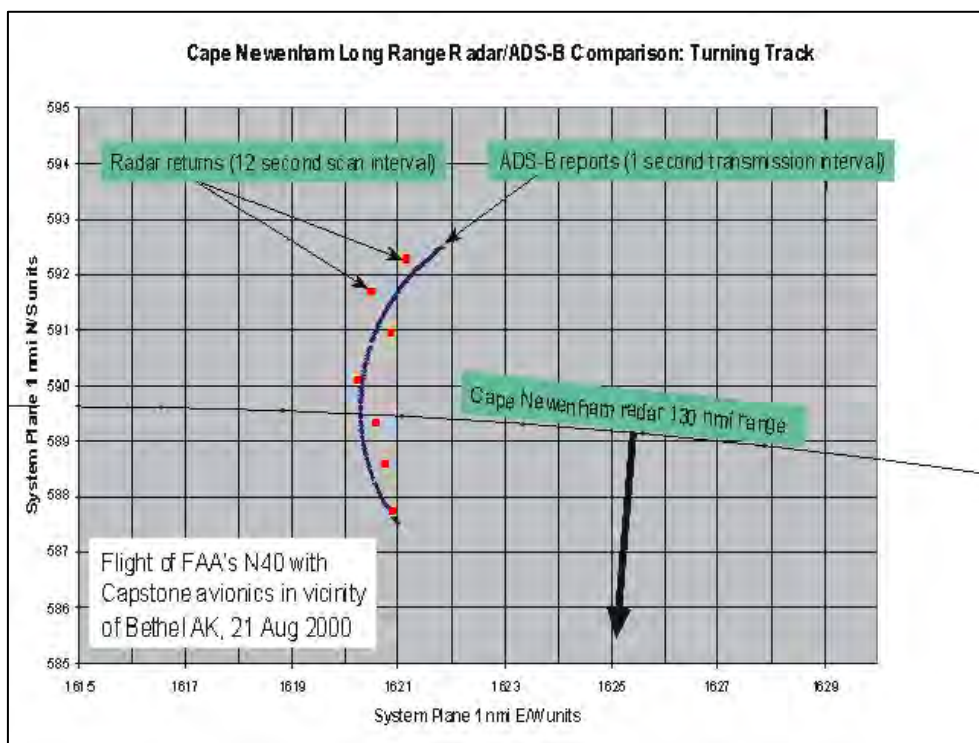


Figure 1 – Alaska: ADS-B and Radar position reports (FAA)

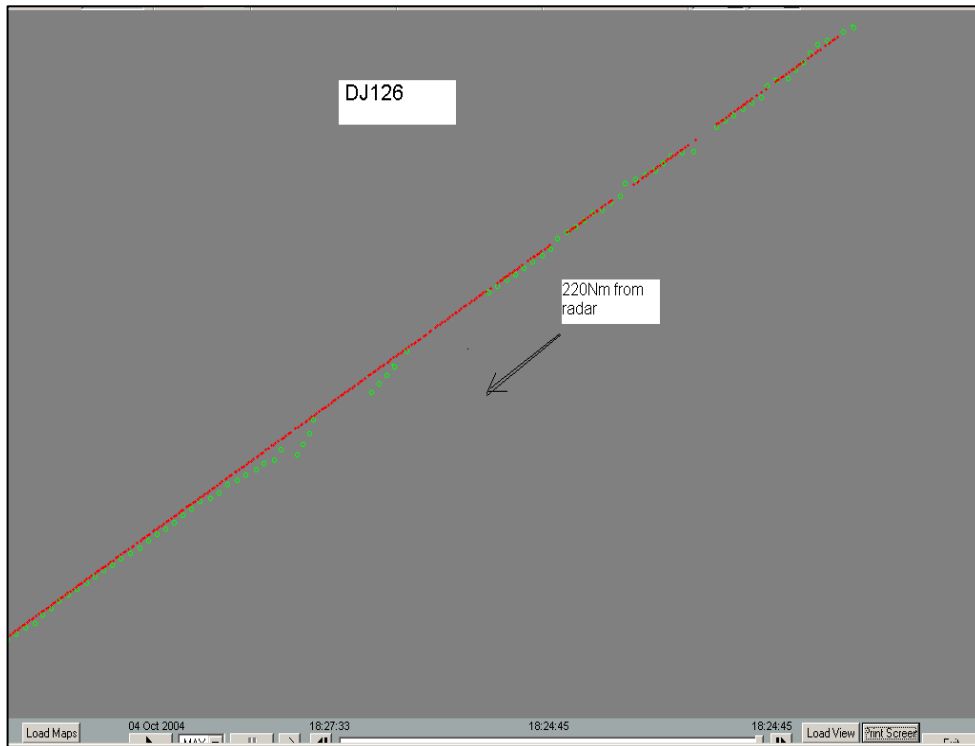


Figure 2 – Australia: ADS-B (red) and Monopulse SSR (green) (Airservices Australia)

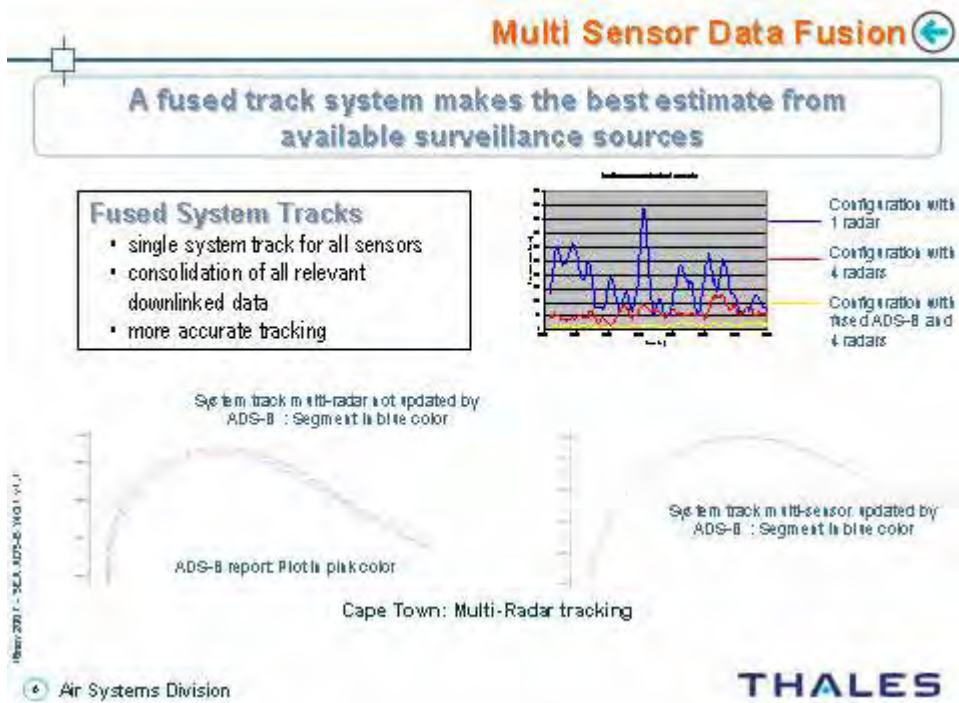


Figure 3 – Analysis of Multisensor Data Fusion with ADS-B (Thales ATM)

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 with 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)

Proposed 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
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**ASIA/PAC AUTOMATIC DEPENDENT SURVEILLANCE-BROADCAST
(ADS-B) IMPLEMENTATION WORKING GROUP**

Proposed 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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Proposed Sample ADS-B Data Sharing Agreement

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.

Proposed Sample ADS-B Data Sharing Agreement

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.

Proposed Sample ADS-B Data Sharing Agreement

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]

Proposed Sample ADS-B Data Sharing Agreement

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

Proposed Sample ADS-B Data Sharing Agreement

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;

Proposed Sample ADS-B Data Sharing Agreement

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 The ADS-B data to be provided are specified in Annex B, H and I.

Proposed Sample ADS-B Data Sharing Agreement

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.

Proposed Sample ADS-B Data Sharing Agreement

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.

Proposed Sample ADS-B Data Sharing Agreement

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.

Proposed Sample ADS-B Data Sharing Agreement

ARTICLE 8 - Liability

[The requirements on this Article should be agreed bilaterally between States]

ARTICLE 9a - Legal Aspects

ARTICLE 9b - Settlement of Dispute

<p>Proposed Sample ADS-B Data Sharing Agreement</p>
<p>ARTICLE 10 - Correspondence</p> <p>1 Correspondence to be applied in the framework of this Agreement is specified in Annex E.</p>
<p>ARTICLE 11 - Annexes</p> <p>1 Annex A, B, C, D, E, F, G, H and I are attachments to this Agreement. The <i>Provider</i> and <i>User</i>, 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.</p>
<p>ARTICLE 12 - Duration</p> <p>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].</p> <p>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.</p> <p>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 <i>Provider</i> shall give to the <i>User</i> not less than [duration to be decided by Parties] notice in writing in advance thereof.</p> <p>4 The Agreement can early terminate on request of the <i>User</i> in the event of modifications to be implemented. The <i>User</i> shall give to the <i>Provider</i> not less than [duration to be decided by Parties] notice in writing in advance thereof.</p>

Proposed Sample ADS-B Data Sharing Agreement

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

Proposed Sample ADS-B Data Sharing Agreement

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.

Proposed Sample ADS-B Data Sharing Agreement

[NOTE : To include a definition: Asterix Category 21 shall mean Eurocontrol Asterix Category 21 Version 0.23.]

ADS-B Data received from each aircraft from each ADS-B ground station shall be transmitted 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.

Proposed Sample ADS-B Data Sharing Agreement

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]

Proposed Sample ADS-B Data Sharing Agreement

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 be 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.

Proposed Sample ADS-B Data Sharing Agreement

(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.

Proposed Sample ADS-B Data Sharing Agreement

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>

Proposed Sample ADS-B Data Sharing Agreement

- 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

Proposed Sample ADS-B Data Sharing Agreement

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

Proposed Sample ADS-B Data Sharing Agreement

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.

Proposed Sample ADS-B Data Sharing Agreement

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 ANSP), 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.

**PROPOSED UPDATED 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.

Note 1:

a) *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 draft 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 draft 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 WAFS 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 WAFS Provider States – details provided in the SADIS FTP Service document outlined above.

Suggested action: *Note this information and forward any feedback to the WAFS Providers 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 WAFS 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 WAFS London and WAFS 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 WAFS 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 WAFS Provider States to develop a web-based interface (one from each WAFS) 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 WAFS 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/temperature 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 advised 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.*

APPENDIX A

**SUMMARY OF THE STRATEGIC ASSESSMENT TABLES:
CURRENT AND PROJECTED DATA VOLUMES 2009-2012**

Table 1. OPMET data volumes per day (in K bytes)

<i>Region</i>	<i>Current 2008</i>	<i>Projected 2009</i>	<i>Projected 2010</i>	<i>Projected 2011</i>	<i>Projected 2012</i>
ASIA	998	1037	1063	1089	1115

Table 2. BUFR data volumes per day (in K bytes)

<i>Region</i>	<i>Current 2008</i>	<i>Projected 2009</i>	<i>Projected 2010</i>	<i>Projected 2011</i>	<i>Projected 2012</i>
ASIA	0	40	40	40	40

Table 3. AIS data volumes per day (in K bytes)

<i>Region</i>	<i>Current 2008</i>	<i>Projected 2009</i>	<i>Projected 2010</i>	<i>Projected 2011</i>	<i>Projected 2012</i>
ASIA	0	20	20	20	20

APPENDIX B

**SADIS STRATEGIC ASSESSMENT TABLES CURRENT AND
PROJECTED DATA VOLUMES 2009-2012**

Note.— 1 octet = 1 byte = 1 character.

Table 1. ASIA— OPMET data volumes

<i>OPMET data</i>	<i>Current 2008</i>	<i>Projected 2009</i>	<i>Projected 2010</i>	<i>Projected 2011</i>	<i>Projected 2012</i>
ALPHANUMERIC DATA					
Number of FC bulletins issued per day	350	350	350	350	350
Number of FT bulletins issued per day	255	280	285	290	295
Number of SA bulletins issued per day	1835	1900	1950	2000	2050
Number of SP bulletins issued per day	3	3	3	3	3
Number of SIGMET bulletins issued per day	53	60	70	80	90
BINARY DATA					
Number of other bulletins issued per day	0	0	0	0	0
TOTALS					
Total number of OPMET bulletins per day	2496	2593	2658	2723	2788
Average size of OPMET bulletin (bytes)	400	400	400	400	400
Total estimated OPMET data volume per day (in K bytes)	998	1037	1063	1089	1115

Note 1.— Changes to the number of FC/FT bulletins may occur in late-2008 as a result of elimination of overlapping FC and FT messages.

Note 2.— No provision is being made for the distribution of BUFR-coded OPMET data. Capacity for this data may need to be included in future depending on the issuance of this data in the region.

Table 2. ASIA — BUFR data volumes

<i>Graphical information in the BUFR code form</i>	Current 2008	<i>Projected 2009</i>	<i>Projected 2010</i>	<i>Projected 2011</i>	<i>Projected 2012</i>
TOTALS					
Total number of BUFR messages per day	0	2	2	2	2
Average size of messages (bytes)	0	20000	20000	20000	20000
Total estimated volume of BUFR messages per day (in K bytes)	0	40	40	40	40

Note. — Provision is made for the potential future distribution of BUFR-encoded VAG.

Table 3. ASIA — AIS data volumes

<i>AIS data</i>	Current 2008	<i>Projected 2009</i>	<i>Projected 2010</i>	<i>Projected 2011</i>	<i>Projected 2012</i>
ALPHANUMERIC AIS DATA (NOTAM related to volcanic ash, ASHTAM)					
Number of ASHTAM bulletins issued per day	0	2	2	2	2
Number of NOTAM bulletins issued per day	0	2	2	2	2
TOTALS					
Total number of AIS bulletins per day	0	4	4	4	4
Average size of AIS bulletin (byte)	0	5000	5000	5000	5000
Total estimated volume of AIS data per day (in K bytes)	0	20	20	20	20

Note.— Provision is made for the distribution of ASHTAMs and NOTAMs related to volcanic ash.

**ANALYSIS OF WAFS NEW GRIDDED FORECASTS ON
ICING, TURBULENCE AND CUMULONIMBUS CLOUDS**

WAFS London Gridded Forecasts
valid 00 UTC 23 Jun (based on 00 UTC 22 June 2008)

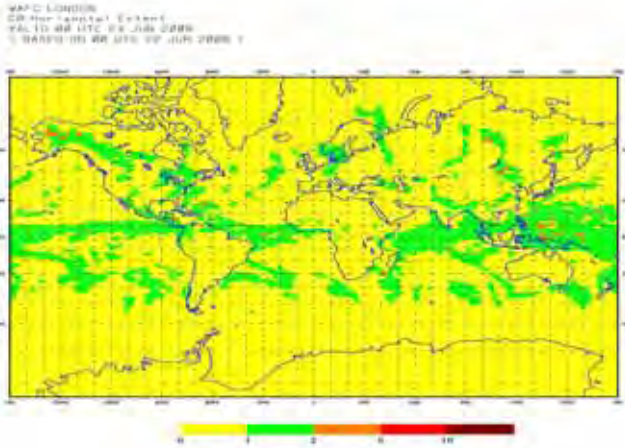


Fig. 3a “CB horizontal extent” [UK]

WAFS Washington Gridded Forecasts
valid 00 UTC 23 Jun (based on 00 UTC 22 June 2008)

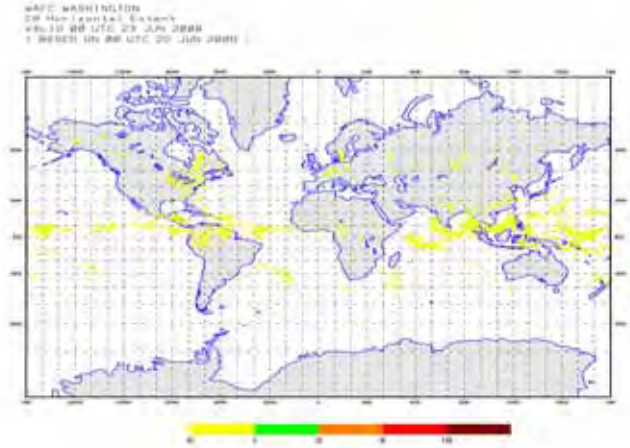


Fig. 4a “CB horizontal extent” [US]

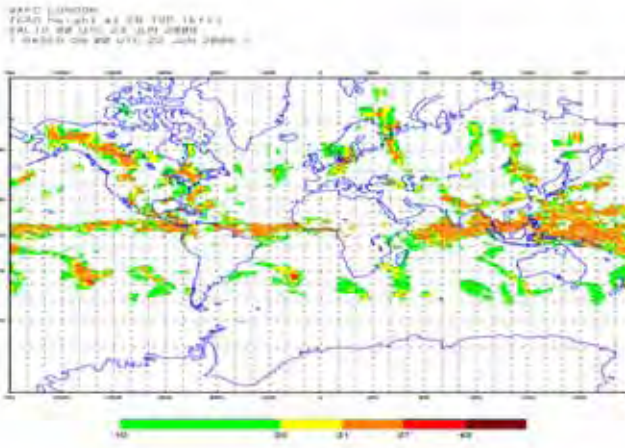


Fig. 3b “ICAO height at CB top (kft)” [UK]

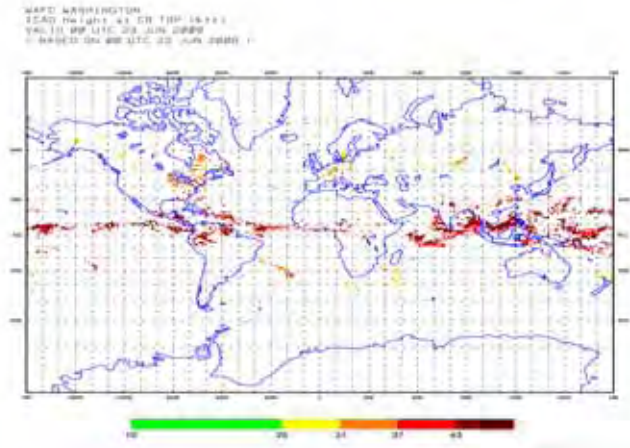


Fig. 4b “ICAO height at CB top (kft)” [US]

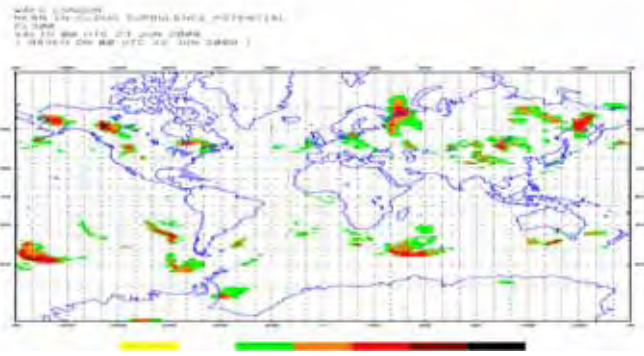


Fig.3c “Mean in-cloud turbulence potential at FL 300” [UK]

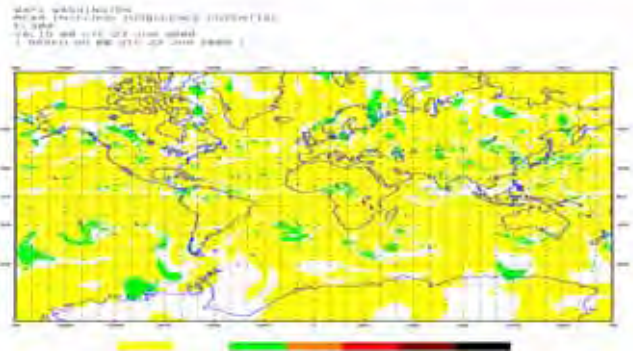


Fig.4c “Mean in-cloud turbulence potential at FL 300” [US]

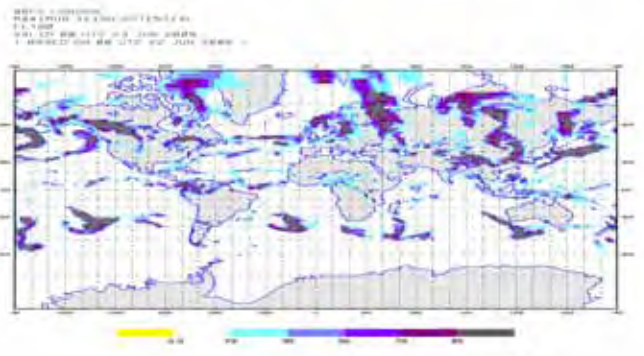


Fig. 3d “Maximum icing potential at FL180” [UK]

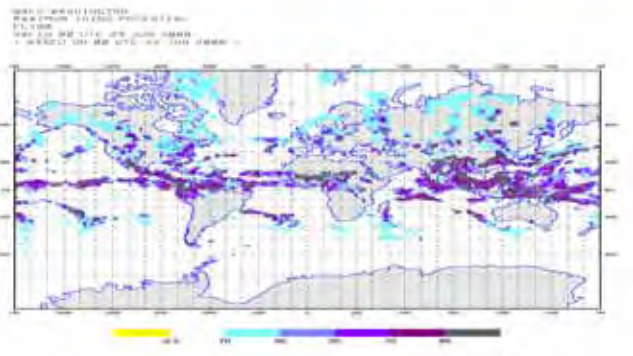


Fig. 4d “Maximum icing potential at FL180” [US]

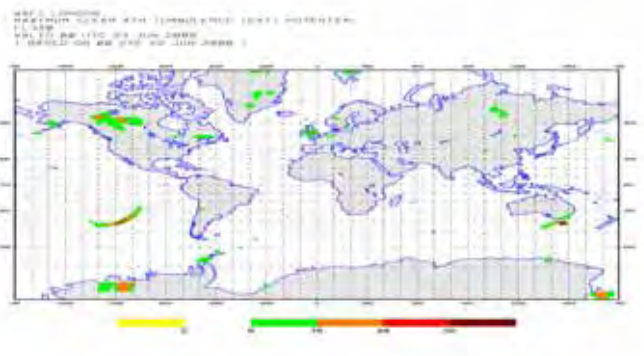


Fig. 3e “Maximum CAT potential at FL340” [UK]

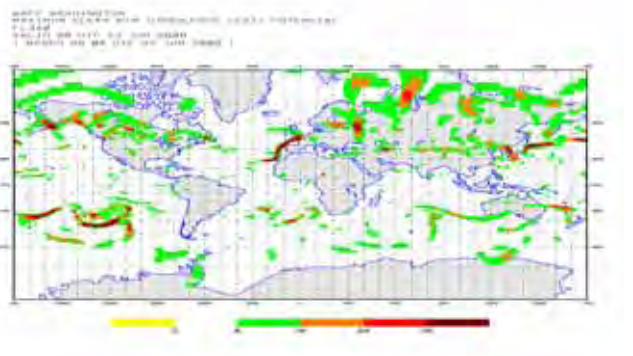


Fig. 4e “Maximum CAT potential at FL340” [US]

STATUS OF STATES' IMPLEMENTATION OF SADIS 2G IN ASIA/PACIFIC

State/Territory	SADIS 2G Implemented (Y/N)	Planned Date for Implementation
Bangladesh	N	No information available.
China	N	July 2008
<i>Hong Kong, China</i>	Y	
<i>Macao, China</i>	N	End 2008
D.P.R. of Korea	Y	
India	N	No information available.
Lao P.D.R.	N	No information available.
<i>Malaysia</i>	<i>N</i>	<i>Not expected. Malaysia withdrew from the SADIS Programme on 31 May 2008, at their request.</i>
Maldives	N	November 2008.
Mongolia	N (SADIS reception not operational)	No information available.
Myanmar	N (SADIS reception via FTP only)	Myanmar seeking assistance through the WMO Trust Fund set up for WAFS/SADIS implementation to assist LDC members. Possible 2008 implementation.
Nepal	Y	
Pakistan	Y	
Republic of Korea	Y	
Sri Lanka	Y	
Thailand	Y	
Viet Nam	Y	



ASIA/PAC WAFS Implementation Plan and Procedures

11th Edition - July 2008

ASIA/PAC WAFS Implementation Plan and Procedures

11th Edition - July 2008

Introduction

1. The Asia/Pacific WAFS Implementation Plan and Procedures has been revised to take account of progress made in the region.

The Implementation of WAFS

2. This plan is based on the understanding that the implementation of WAFS in the Asia/Pacific Region involves:

- a. Production and dissemination by the WAFCs of global forecast winds, temperatures, tropopause height, tropopause temperature and humidity in GRIB format.
- b. The implementation of a communication system/s for the distribution of WAFS products in the Asia/Pacific Region, to all the States that require the products in support of international air navigation. This will be achieved via satellite broadcast (SADIS and ISCS/2). States may need to use an alternative distribution system.
- c. The production and distribution (via satellite broadcast) by the WAFCs, of Global, quality controlled SWH (FL 250 - 630) in BUFR format and in PNG format for the ICAO standard areas.
- d. The production and distribution (via satellite broadcast) by the WAFCs of quality controlled SWM (FL 100 - 250) in BUFR format and in PNG format over limited geographical areas where required by PIRGs.
- e. The capability of States to convert current BUFR and GRIB messages to graphical products on an operational basis.
- f. Transition from SADIS 1G to SADIS 2G service.
- g. Transition from ISCS G2 to ISCS G3 service.
- h. Development and utilization of gridded forecasts of icing, turbulence and convective clouds.
- i. Transition from GRIB1 to GRIB2 WAFS data.

SIGWX Forecasts

3. There will be an ongoing requirement for NMSs to monitor the quality of WAFC products.
4. Action required to be taken by States to adhere to the provision of Annex 3 to ensure the relevant advisories for tropical cyclones, volcanic ash, the accidental release of radioactive material and SIGMETs are made available to the WAFCs in a timely manner. The WAFS Implementation Task Force will coordinate with the ICAO Secretariat and the VAACs in the Region to also make available ASHTAMs and NOTAMs for VA to the WAFCs in a timely manner.
5. The SIGWX forecasts produced by WAFC Washington are also available on the US NWS Aviation Weather Center Internet site at: <http://www.nws.noaa.gov/iscs>. All WAFC London and WAFC Washington products are available on the internet-based SADIS FTP server, together with appropriate GRIB and BUFR decoding facilities (Note: not including the visualization software).
6. States are encouraged to provide inputs to the surveys on the operational efficacy of SADIS and ISCS/2 for the purpose of improving the quality of service and to send comments to the WAFCs about the quality and accuracy of SIGWX on a frequent and regular basis. Contact details for comments are:

WAFC Washington

- i. NWS/Aviation Weather Center
Attention: Mr Larry Burch
Deputy Director
7220 NW 101st Terrace
Kansas City, Missouri
USA 64153-2371
- ii. E-mail addressed to: larry.burch@noaa.gov
- iii. Fax number: 1 816 880 0650

WAFC London

- i. The Met. Office
Attention: Mr. Nigel Gait
International Aviation Manager
Fitzroy Road
Exeter
Devon EX1 3PB
United Kingdom
- ii. E-mail addressed to: nigel.gait@metoffice.com
- iii. Fax number: + 44 (1392) 885 681

Gridded Forecasts of Icing, Turbulence and Convective Clouds

7. Gridded forecasts of icing, turbulence and convective clouds are made available on a trial basis by the two WAFCs via the Internet for evaluation by NMSs. Visualization of the gridded forecasts to provide “at a glance” products for flight planning purposes is being

developed by the WAFCs. Regional training will be provided to WAFS users on the utilization of the gridded forecasts.

Distribution of WAFS Products

8. The two WAFCs distribute by satellite broadcast global forecast winds, temperatures, tropopause height, tropopause temperature and humidity in GRIB format, global quality controlled SWH and quality controlled SWM for limited geographical areas in PNG and BUFR formats. Suitable decoding and visualization software is required by States in the Asia/Pacific Region to operationally construct graphical SIGWX from the BUFR messages. The provision of PNG formatted SIGWX charts is expected to continue at least until 2010.

Transition from SADIS 1G to SADIS 2G service

9. On 12 November 2004, WAFC London launched the SADIS 2G service that was required as a result of SADISOPSG Conclusion 9/15. This new service is available to new and current SADIS users. The current SADIS 1G service will continue to be available in addition to the SADIS 2G service until 5 January 2009. States should arrange for the procurement of the necessary hardware, and as necessary, compliant visualization software for transition to the SADIS 2G service in time. Guidance material for users accessing the SADIS 2G broadcast is available at the SADIS web site – <http://www.metoffice.gov.uk/sadis/index.html>.

Transition from ISCS G2 to ISCS G3 service

10. WAFC Washington plans to implement the ISCS G3 service and to terminate the existing ISCS G2 service by 31 December 2009. Upon advice of the implementation plan from WAFC Washington, States should make the arrangements for the installation of the necessary hardware for transition to the ISCS G3 in time.

Indicative Timetable for Implementation of WAFS

11. The table given in Attachment 1 provides an indicative timetable for the implementation of WAFS within the Asia/Pacific Region.

Volcanic Ash Advisory Centres (VAACs)

12. The VAACs are encouraged to monitor WAFS SIGWX forecasts that cover their areas of responsibility, and to advise the appropriate WAFC to ensure the accurate inclusion of the volcanic ash symbol.

Tropical Cyclone Advisory Centres (TCAC)

13. The TCACs are encouraged to monitor WAFS SIGWX forecasts that cover their areas of responsibility, and to advise the appropriate WAFC to ensure the accurate inclusion of the tropical cyclone symbol.

14. The operational contact points in the WAFCs for coordination with the VAACs and TCACs are:

WAFC Washington

- i. NWS/Aviation Weather Center
7220 NW 101st Terrace
Kansas City, Missouri
USA 64153-2371
- ii. Tel: TBD

WAFC London

- i. The Met. Office
Attention: WAFC London Forecaster
Fitzroy Road
Exeter
Devon EX1 3PB
United Kingdom
- ii. Tel: 00-44-1392-884926 or 00-44-1392-884908

ASIA/PAC WAFS Implementation Plan and Procedures

Attachment 1

Indicative Timetable for Implementation of WAFS

Item	Task/Stage of Implementation of WAFS	Anticipated Date
1	W AFC London products on access controlled internet site	Completed
2	The establishment of back-up distribution arrangements for WAFS products	Completed
3	Training in the operational conversion of GRIB forecasts to Wind / Temp charts	Completed
4	All states that receive GRIB products capable of converting GRIB forecasts to Wind / Temp charts	Completed
5	Removal of T4 Facsimile Wind / Temp charts from the satellite broadcast	Completed
6	Training in the operational conversion of BUFR to SIGWX charts	Completed
7	States having the ability to operate the decoding software to convert BUFR SIGWX messages into graphical format	Completed
8	The satellite distribution by the two WAFCs of global SWH and of SWM for limited geographical areas in BUFR format	Completed
9	Launch of SADIS 2G service	Completed
10	SADIS 2G seminar for ASIA/PAC States	Completed
11	Removal of T4 Facsimile SIGWX products from the satellite broadcast	Completed
12	Procurement of SADIS 2G hardware by SADIS user States	Early 2008
13	Termination of the SADIS 1G service	5 January 2009

Item	Task/Stage of Implementation of WAFS	Anticipated Date
14	Launch of trial gridded forecasts of icing, turbulence and convective clouds	25 October 2006 (WAFS London) Early 2008 (WAFS Washington)
15	Implementation of ISCS G3 service	2009
16	Workshop on gridded forecasts of icing, turbulence and convective clouds	September 2009
17	WAFSs begin parallel broadcast of WAFS forecasts in the GRIB2 code form	September 2009
18	Termination of the ISCS G2 service	31 December 2009
19	WAFSs provide web-based gridded forecasts of icing, turbulence and convective clouds	December 2009
20	Regional training on the use of the gridded forecasts	2010-11
21	WAFS end-user workstations upgraded to accept the GRIB2 code form	November 2011 – November 2013
22	Broadcast of WAFS forecasts in the GRIB 1 and WAFS SIGWX forecasts in the BUFR code form and PNG chart form ceases	November 2013

ASIA/PAC WAFS IMPLEMENTATION TASK FORCE

1. Terms of Reference

Expedite the implementation of the World Area Forecast System (WAFS) in the Asia and Pacific Regions.

2. Work Programme

The work to be addressed by the ASIA/PAC WAFS Implementation Task Force (WAFS/I TF) includes:

- (a) Coordinating the migration of SADIS 1G service to 2G service in the Asia and Pacific Regions.
- (b) Coordinating the migration of ISCS G2 service to ISCS G3 service in the Asia and Pacific Regions.
- (c) Coordinating the arrangement of training and providing user's feedback on the utilization of gridded forecasts of icing, turbulence and cumulonimbus clouds.
- (d) Coordinating the migration of GRIB1 to GRIB2 WAFS data.
- (e) Coordinating the provision of assistance to States to ensure that WAFS can be effectively implemented in the Asia and Pacific Regions.
- (f) Providing inputs (via the CNS/MET SG) to APANPIRG on the regional planning and development of WAFS for coordination with the WAFSOPSG.
- (g) Keeping the ASIA/PAC WAFS Implementation Plan and Procedures up to date.

The work is expected to be carried out primarily by correspondence.

3. Composition

The Task Force is composed by experts from:

Australia; Hong Kong, China (Chairman); India; Japan; New Zealand; Singapore; Thailand; United Kingdom; United States and IATA.

**TERMS OF REFERENCE OF ASIA/PAC OPMETMANAGEMENT TASK FORCE
(OPMET/M TF)**

1. Terms of Reference

- Review the OPMET exchange schemes in the ASIA/PAC and MID Regions and develop proposals for their optimization taking into account the requirements by the aviation users and the current trends for global OPMET exchange;
- Develop standardized quality control, monitoring and management procedures related to ROBEX exchange and other exchanges of OPMET information;
- Regularly update the regional guidance material related to OPMET exchange;
- Liaise with other groups dealing with communication and/or management aspects of the OPMET exchange in ASIA/PAC and other ICAO Regions (ASIA/PAC ATN Implementation Coordination Group, BMG EUR Region, CNS/MET SG MID Region, SADISOPSG).

2. Work Programme

The work to be addressed by the ASIA/PAC OPMET Management Task Force includes:

- (a) to examine the existing and any new requirements for OPMET exchange in ASIA/PAC and MID regions and assess the feasibility of satisfying these requirements, taking into account the availability of the data;
- (b) to keep under review the ROBEX scheme and other OPMET exchange schemes and prepare proposal for updating and optimizing of the schemes;
- (c) to review and update the procedures for interregional OPMET exchange and ensure the availability of the required ASIA/PAC and MID OPMET data for the AFS satellite broadcasts (ISCS and SADIS);
- (d) to keep under review and provide timely amendments to the regional guidance material on OPMET exchange; to ensure that guidance material contains procedures for the exchange of all required OPMET data types: SA, SP, FT, WS, WC, WV, FK, FV, UA;
- (e) to conduct trials and develop procedures for quality control, monitoring and management of the OPMET exchange; to foster implementation of quality management of OPMET data by the ROBEX centres and the RODBs;
- (f) to prepare, in coordination with the ATN IC Group, regional plan for the transition to BUFR coded OPMET information in coordination with the relevant APANPIRG contributing bodies;
- (g) to participate in the regular regional SIGMET tests;
- (h) to *further develop quality control guidance material and to promote assist-in development and implementation of quality control for OPMET management. regional project on related performance objectives.*

3. Composition

- (a) The Task Force is composed by experts from:
Australia (Rapporteur); China; Fiji; Japan; Hong Kong, China; India; Indonesia;
Malaysia, Singapore; Thailand; United Kingdom; United States; and Viet Nam;
- (b) Representatives of IATA, EUR BMG and MID OPMET Bulletin Board are invited to participate in the work of the Task Force

Appendix A

ICAO Indicator	Aerodrome name	Country
AOP aerodromes 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 MUMBAI/CHHATRAPATI	Russia
VABB	SHIVAJI INT	India
VHHH	HONG KONG	Hong Kong (China)
VIAR	AMRITSAR	India
VIDP	DELHI/INDIRA GANDHI	India
VMMC	MACAU	Macao (China)
VTBD	BANGKOK BANGKOK/SUVARNABHUMI	Thailand
VTBS	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 aerodromes 30H TAF SADIS

ZJHK	HAIKOU/MEILAN	China
PADK	ADAK	USA
PASY	SHEMYA	USA
PMDY	MIDWAY	USA
PWAK	WAKE IS	USA
VOHS	HYDERABAD	India

Appendix B

ICAO Indicator	Aerodrome name	Country
AOP aerodromes 24H TAF SADIS		
RJTT	HANEDA	Japan
YPPD	PORT HEADLAND	Australia

**AMENDMENT PROPOSAL TO
TAF-RELATED PROVISIONS IN THE ASIA/PAC BASIC ANP**

The current provision about TAF in the Basic ANP reads 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:

~~Aerodrome forecasts~~TAF 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—24~~ or ~~twenty-four~~30 hours' ~~duration~~ to meet the requirements indicated in ~~FASID~~ Table MET 1A. The filing time of the ~~forecasts—TAF bulletins~~ should be ~~approximately two~~one hours before the start of the period of validity.
[APANPIRG/19 Conclusion 19/xx ~~ASIA/PAC/3, Rec. 8/16~~]

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	Designation	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

**ASIA/PAC PLAN FOR IMPLEMENTATION OF
NEW TAF PROVISION (AMENDMENT 74 TO ANNEX 3)**

Action	Resp. Body	Deliverable	Target Date
Information on airline requirements for TAF period of validity	IATA	Letter to RO with proposal	January 2008
Information to States on TAF changes and survey requesting State plans	RO	State letter with survey	18 January 2008
Information from States on their decision for the period of validity of TAF for all aerodromes included in FASID Table Met 2A	States	Response to Rapporteur OPMET/M TF and RO	25 February 2008
Collation of States responses and draft ASIA/PAC new bulleting structure	OPMET/M TF Rapporteur	Draft ASIA/PAC TAF bulleting structure	5 March 2008
First review of the new ASIA/PAC TAF structure by OPMET/M TF6 meeting	OPMET/M TF	Draft ASIA/PAC TAF bulleting structure	27 March 2008
Review of ROBEX tables for ASI/PAC OPMET TAF Bulletins	OPMET/M TF	OPMET TAF Bulletins prepared from survey results	30 April 2008
OPMET TAF Bulletin structure sent to States for correctness	OPMET/M TF	Correct TAF bulletins from States	1 May 2008
Response from IATA on inclusion of TAF in VOLMET	IATA/RO	IATA member requirements	1 May 2008
Response from States	States	Response on correctness of OPMET TAF bulletins	30 May 2008
TAF Bulletin structure presented to CNS/MET meeting	CNS/MET	Final ASIA/PAC OPMET TAF bulletin structure	21-25 July 2008
Second Review	CNS/MET	Final ASIA/PAC TAF bulletin structure	21-25 July 2008
States and RODB's informed of new bulleting structures	OPMET/M TF & RO	New ASIA/PAC TAF bulletin structure circulated to States	4 August 2008
Amendment proposal to FASID Table Met 1A and MET 2A	RO	State letter with amendment proposal	18 August 2008
Coordination with other ICAO Regions	RO, OPMET/M TF	Exchange of information on TAF bulletin structure	25 August 2008

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Action	Resp. Body	Deliverable	Target Date
Issuance of METNO	RODB's	METNO bulletins sent via AFTN and SADIS/ISCS to all centres concerned	Early October 2008
Implementation date/time	States	Commence issuance of TAF according to new bulletin structure	5 Nov 2008 0000 UTC
Post-implementation monitoring review	RODB's & OPMET/M TF	Monitoring report of traffic Tuesday 9 December	9 December 2008

ASIA/PAC PLAN FOR IMPLEMENTATION OF NEW TAF PROVISION

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		
			VTCL	LAMPANG			24
			VTCL	LAMPANG			24
			VTCL	LAMPANG			24
			VTCL	LAMPANG			24
			VTCL	LAMPANG			24
			VTCL	LAMPANG			24
			VTCL	LAMPANG			24
			VTCL	LAMPANG			24
		FTTH32	VTCL	LAMPANG			24
			VTCL	LAMPANG			24
		FTTH32	VTSB	SURAT TANI/Surat Thani	0400	0600	24

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			VTSM	SURATHANI/Samui	1600	1800	24
			VTSC	NARATHIWAT	Note: issued twice per day		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

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		FTCI32	ZGKL	GUILIN/Liangjiang	0400	0600	24
			ZGNN	NANNING/Wuxu	1000	1200	24
			ZGOW	SHANTOU/Shantou	1600	1800	24
			ZGSZ	SHENZHEN/Bao'an	2200	0000	24
			ZLXY	XIAN/Xianyang			24
			ZMUB	ULAANBAATOR/Bryant-Ukhaa			24
			ZPPP	KUNMING/Wujiaba			24
			ZSAM	XIAMEN/Gaoqi			24
			ZSQD	QINGDAO/Liuting			24
			ZUUU	CHENGDU/Shuangliu			24
		FTCI41	ZBHH	HOHHOT/Baita	0400	0600	24
			ZGHA	CHANGSHA/Huanghua	1000	1200	24
			ZHCC	ZHENGZHOU/Xinzheng	1600	1800	24
			ZHHH	WUHAN/Tianhe	2200	0000	24
			ZJHK	HAIKOU/Meilan			24
			ZJSY	SANYA/Phoenix			24
			ZLLL	LANZHOU/Zhongchuan			24
			ZSNJ	NANJING/Lukou			24
			ZSOF	HEFEI/Luogang			24
			ZUCK	CHONGQING/Jiangbei			24
			ZYCC	CHANGCHUN/Dafangshen			24
			ZYHB	HARBIN/Taiping			24
Brisbane	YBBN	FTAU31	YPAD	Adelaide/Adelaide	0500	0600	30
			YBBN	Brisbane/Brisbane	1100	1200	30
			YPDN	Darwin/Darwin	1700	1800	30
			YMML	Melbourne/Melbourne Intl	2300	0000	30
			YPPH	Perth/Perth			
			YSSY	Sydney/Kingsford Smith Intl			
		FTAU32	YBAS	Alice Springs/Alice Springs	0500	0600	24
			YMAV	Avalon/Avalon	1100	1200	24
			YBCS	Cairns/Cairns	1700	1800	24
			YSCB	Canberra/Canberra	2300	0000	24
			YPKG	Lkalgoorlie/Kalgoorlie			24
			YPLM	Learmonth/Learmonth			24

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		YPTN	Tindal/Tindal RAAF			24
		YBTL	Townsville/Townsville			24
	FTAU33	YBRM	Broome/Broome Intl	0500	0600	18
		YPXM	Christmas Island/Christmas Isl	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/Forrest	1300	1400	12
		YPGV	Gove/Gove	1900	2000	12
		YBHM	Hamilton Isl/Hamilton Isl			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	1800	24
				2245	0000	

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Hong Kong	VHHH	FTHK31	VHHH	HONG KONG/Hong Kong Intl	0400	0600	30
			RCTP	TAIBEI/Taiwan Taoyuan Intl	1000	1200	30
			RCKH	GAOXIONG/Gaoxiong	1600	1800	30
			RCSS	TABEI/Sungshan	2200	0000	24
			VMMC	MACAU/Macau Intl			30
			RPLL	MANILA/Ninoy Aquino Intl			24
			RPVM	LAPU LAPU/Mactan Cebu Intl			24
			RPMD	DAVAO/Francisco Bangoy Intl			24
			RPLB	SUBIC BAY/Subic Bay Intl			24
			RPMZ	ZAMBOANGA/Zamboanga Intl			24
			RPLI	LAOAG/Laoag Intl			24
Incheon	RKSI	FTKO31	RKSI	INCHEON/Incheon	0500	0600	30
			RKSS	GIMPO/Gimpo	1100	1200	24
			RKPC	JEJU/Jeju	1700	1800	24
			RKPK	GIMHAE/Gimhae	2300	0000	24
			RKTU	CHEONGJU/Cheongju			24
			RKNY	YANGYANG/Yangyang			24
			RKTN	DAEGU/Daegu			24
Karachi	OPKC	FTPK31	OPKC	KARACHI/Jinnah Intl	0400	0600	18
			OPRN	ISLAMABAD/Chaklala	1000	1200	18
			OPLA	LAHORE/Allama Iqbal Intl	1600	1800	18
			OPNH	NAWABSHAH/Nawabshah	2200	0000	18
			OPPS	PESHWAR/Peshwar			18
			OPGD	GWADAR/Gwadar			18
Mumbai	VABB	FTIN31	VAAH	AHMEDABAD/Ahmedabad	0400	0600	30
			VABB	MUMBAI/Chhatrapayi Shivaji Intl	1000	1200	30
			VANP	NAGPUR/Nagpur	1600	1800	30
			VECC	KOLKATA/Netaji Subhash Chandra Bose Intl	2200	0000	30
			VEPT	PATNA/Patna			30
			VIAR	AMRITSAR/Amritsar			30
			VIBN	VARANASI/Varanasi			30
			VIDP	DELHI/Indira Gandhi Intl			30
			VIJP	JAIPUR/Jaipur			30

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			VILK	LUCKNOW/Lucknow			30
		FTIN32	VCBI	COLOMBO/Katunayake	0400	0600	30
			<i>VNKT</i>	<i>KATHMANDU/Tribhuvan Intl *</i>	1000	1200	<i>24</i>
			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
			<i>VRMM</i>	<i>MALE/Male Intl *</i>			<i>24</i>
				<i>* Not confirmed part of bulletin</i>			
Nadi	NFFN	FTPS31	NFFN	Nadi, Fiji	0400	0600	24
			<i>NWWW</i>	<i>NOUMEA/La Tontouta *</i>	1000	1200	<i>24</i>
			<i>NSTU</i>	<i>PAGO PAGO/Pago Pago Intl *</i>	1600	1800	<i>24</i>
			NCRG	RAROTONGA, Cook Isld	2200	0000	24
			<i>PLCH</i>	<i>Christmas Isld, Kirrabati</i>			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
			<i>NVVV</i>	<i>PORT VILLA/Bauerfield *</i>			<i>24</i>
			<i>NVSS</i>	<i>SANTO/Pekoa *</i>			<i>24</i>
			NFNA	NAUSORI, Fiji			24
			NLWW	HIHIFO, Wallis (Fr)			24
			NSAP	APIA, Samoa			24
			NGFU	FUNAFUTI INTL, Tuvalu			24
				<i>* Not confirmed part of bulletin</i>			
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

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			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 Intl	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
		RJGG		NAGOYA/Chubu 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

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			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	

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.

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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 Johnstone - 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
Jetstar Asia	√		TAF in the VOLMET.
	√		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%

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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 -

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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

RESULTS OF REGIONAL SURVEY ON ATM REQUIREMENTS FOR MET

Table 1 - Deficiencies and Suggested Improvements

Deficiencies and suggested improvements		
MET element	Number of States providing comment	Summary of comments:
Surface Wind:	4	2 min average preferred Move to digital sensors desired Improved presentation desired (no further details given) Forecast confidence/alternative scenarios would be beneficial Longer lead times Reliability of equipment Forecast accuracy Lack of ATM specific information
Surface Wind Gusts	2	Required for individual runways (assume forecasts) Reliability of equipment, Forecast accuracy Improved presentation desired (no further details given) Lack of ATM specific information
Visibility	4	Multiple visibilities (manual, automated, sector, threshold etc) require simplification Concerns with location of observing site ATM thresholds should be reflected by forecasts Reliability of equipment Forecast accuracy Improved presentation desired (no further details given) Lack of ATM specific information
RVR	3	Accuracy/Observing equipment limitations Improved presentation Lack of ATM specific information

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Deficiencies and suggested improvements		
MET element	Number of States providing comment	Summary of comments:
Vertical Visibility	1	Concerns with location of observing site
Significant weather TS	5	Greater lead time desirable Real- time display requested Lack of spatial/temporal resolution forecast and observed Weather radar overlays, lightning network and satellite information desirable Integration of Met into ATC decision support tools suggested. Graphical displays focussed on ATM specific requirements desired Development of warning on significant weather customised to particular sectors should be considered
Significant weather SN	2	Greater lead time desirable Weather radar overlays requested
Significant weather RA	1	Integration of Met into ATC decision support tools suggested. Graphical displays focussed on ATM specific requirements desired Development of warning on significant weather customised to particular sectors should be considered
Cloud base/amount	4	Concerns with location of observing site and accuracy and reliability of equipment Greater use of satellite imagery (training required) would be beneficial ATM thresholds should be reflected by forecasts Presentation/display could be improved. Should include current and short term forecasts and emphasise ATM thresholds
Turbulence (Terminal)	2	Variation between forecast and observed (accuracy) Integration of Met into ATC decision support tools suggested Graphical displays focussed on ATM specific requirements desired Development of warning on significant weather customised to particular sectors should be considered
Wake Turbulence/Vortex information	3	Forecast values requested

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Deficiencies and suggested improvements		
MET element	Number of States providing comment	Summary of comments:
Turbulence (Enroute)	2	Accuracy limitations Integration of Met into ATC decision support tools suggested. Graphical displays focussed on ATM specific requirements desired Development of warning on significant weather customised to particular sectors should be considered
Upper Winds	1	Integration of wind information into ATC tools would allow more efficient use of information
Icing	1	Presentation needs improving
Wind shear	3	Accuracy/Variation between forecast and observed Observed only - forecast information would be beneficial
TC	0	
VA	0	
TAF	1	Accurate short term information required - concerns over use of long term TAF

Table 2 - MET support in addition to Annex 3 products

Advice on Terminal Weather available to ATM Authority	Advice on En-route Weather available to ATM Authority
Phone consult/briefing, tailored elaborative briefing products	Weather radar access
Audio/visual consult/briefing, weather radar/satellite displays	Plain language adverse weather summary product, weather radar/satellite displays
Local routine reports, graphical display of forecast elements	Daily briefings
Daily briefings	Web based products
Microburst alarm, wind profiler, Weather radar, lightning warning system	Elaborative phone briefing
Elaborative phone briefing	Radar, Satellite, web access, in-person briefing
text based products, web access, and in-person and telephone briefing services	Web access to AIS/MET
Weather radar and AWOS, wind shear alert systems, graphical lightning display, web access to AIS/MET	
Phone consult/briefing	

Table 3 - Decision Support Tools

Brief Description of Current Tools	Tools Under Development
Tailored information for capacity planning, mid level sigwx charts, graphical area QNH product	Radar/lightning TS monitoring display, Satellite with radar and lightning overlay, Graphical TAF monitoring web display
Graphical display of forecast elements, wind shear alert system	Nowcasting system under development
ATM/MET facility to enable information sharing and collaborative decision making	Incorporation of SIGMET and weather radar into ATC display
Real time METAR display in TWR	
AWOS, LLWAS, and limited MET tool for en-route	
Development of MET data display underway	

Table 4 - Comments

Improved awareness of ATC and pilot requirements by aviation forecasters (would be beneficial)
MET observer/forecaster information could be more aviation focussed, potential for more tailoring of MET, reliability of equipment important
It is important Met and ATM have a mutual understanding of MET information and its application to ATC and flight safety

Figure 1
Count of MET Elements Causing Biggest Impact/Greatest Concern

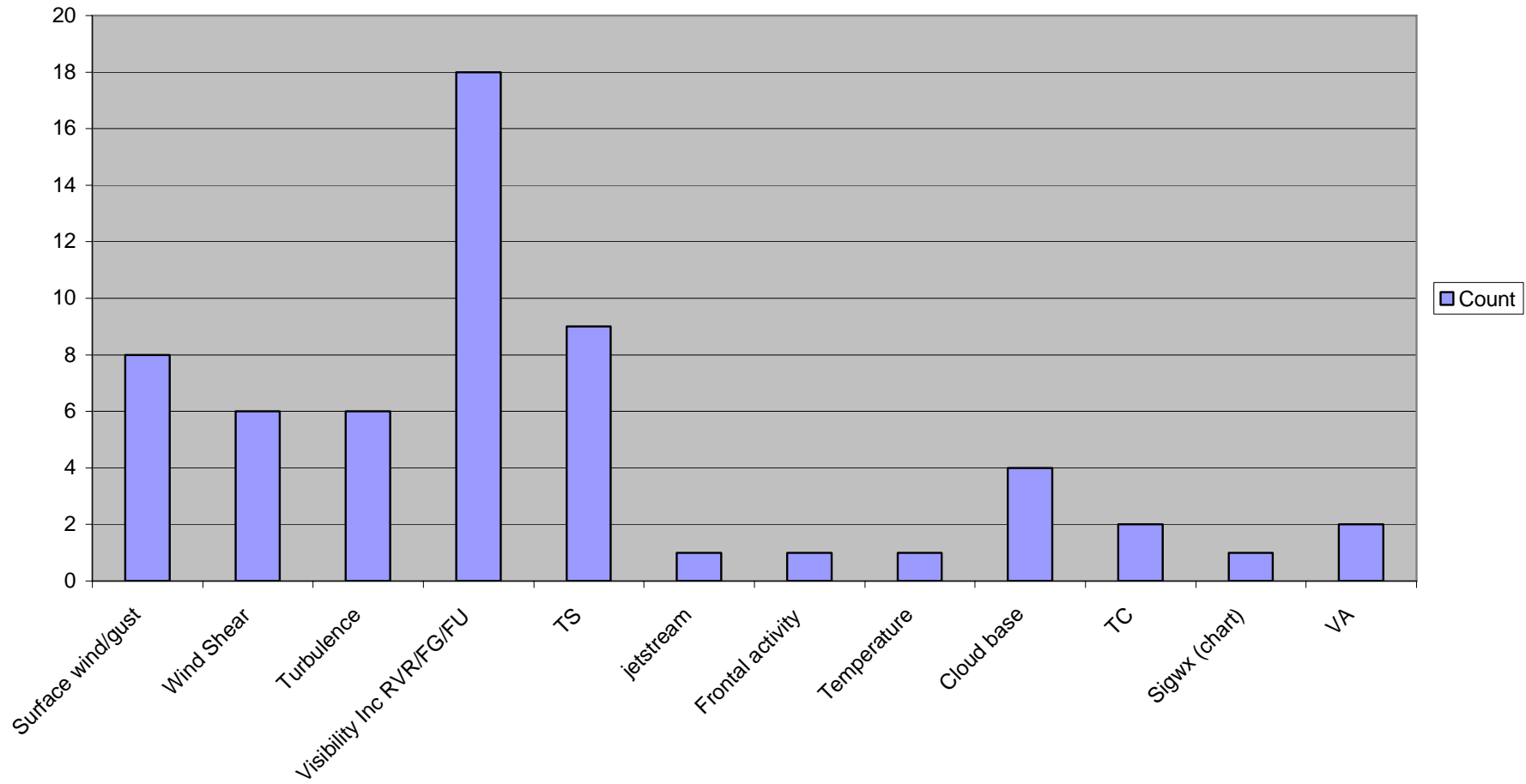
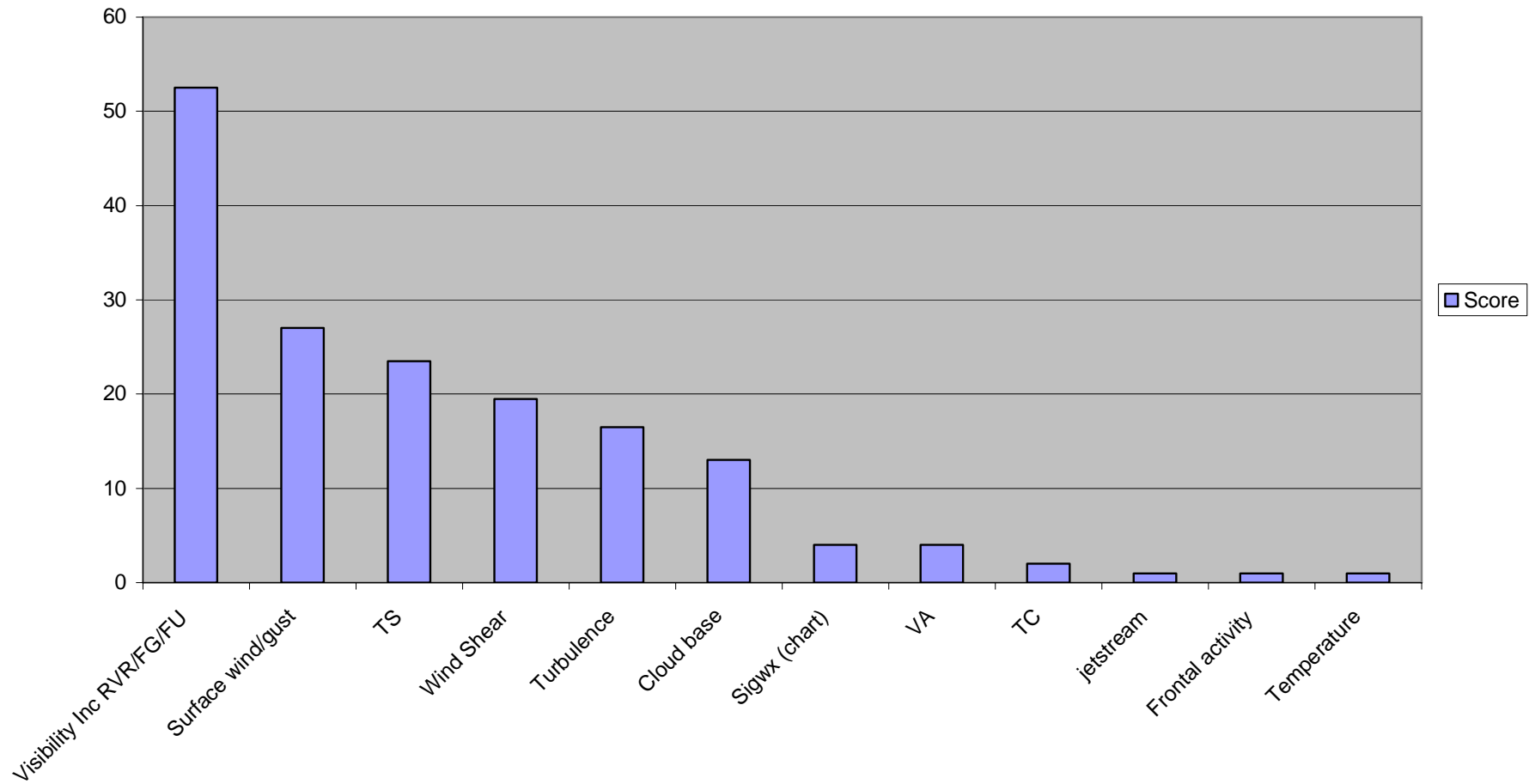


Figure 2
Ranking of MET Elements Causing Biggest Impact/Greatest Concern (after weighting)



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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.			

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				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.			

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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	<p>ATN Router deployed in 2008.</p> <p>Tripartite BBIS trial completed with Bangkok and Hong Kong, China in Jan. 2003.</p> <p>ATN trial with Hong Kong, China conducted 2008.</p> <p>AMHS with Hong Kong, China planned to conduct in 2008.</p> <p>AMHS/ATN trial with Macau is under planning.</p> <p>AMHS/ATN trial with Kuwait is to be delayed.</p>	<p>AIDC between some of ACCs within China has been implemented.</p> <p>AIDC between several other ACCs are being implemented.</p> <p>Operational trial on the AFTN based AIDC between Sanya and Hong Kong commenced on Aug. 2006 and put into operational use in Feb 2007.</p>	<p>Implemented to support certain AIS Rout.</p> <p>L888 route, polar routes and Chengdu-Lhasa route.</p> <p>Trial on HF data link conducted for use in western China.</p>	<p>Implemented in certain airspace.</p> <p>L888, Y1 and Y2 routes.</p>	<p>RNAV (GNSS) implemented in certain airports.</p> <p>Beijing, Guangzhou, Tianjin and Lhasa airports.</p>		<p>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.</p>	<p>FANS 1/A ADS-C implemented to support certain routes.</p> <p>L888 route polar routes and Chengdu-Lhasa route.</p>	

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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.							

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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	<p>ATN/AMHS technical trials with Japan conducted in 2003. Operational trials planned in 2010.</p> <p>64 Kbps ATN Link with Bangkok put into operational use in Jun 2004. AMHS trials planned in 2009.</p> <p>ATN/AMHS technical trials with Beijing, China using VPN over Internet conducted in Sep 2006. Further ATN/AMHS trials planned in 2009.</p> <p>ATN/AMHS technical trials with Macao, China planned for 2009.</p>	<p>Trial on the AFTN based AIDC with Guangzhou and Sanya, China commenced.</p> <p>Operational trial with Sanya commenced in Aug. 2006 and put into operational use in Feb. 2007.</p>	<p>FANS 1/A based CPDLC trials conducted.</p> <p>VDL Mode-2 technical trial conducted.</p> <p>D-ATIS D-VOLMET implemented.</p> <p>PDC service at Hong Kong International Airport (HKIA) upgraded from 1-way data link to 2-way data link on 5 Jun 2008.</p>	Implemented in certain airspace	Implemented in certain airspace.	<p>RNAV (GNSS) departure procedures implemented in July 2005.</p> <p>Flight check for RNAV Procedures conducted in Apr 2008. Operational trial is planned for end 2008.</p>	<p>A-SMGCS trial using ADS-B/ Multilateration technology on the prime airport surveillance area completed in 2006.</p> <p>A larger-scale A-SMGCS covering the whole HKIA put into operational evaluation in July 2008.</p> <p>Data collection/ analysis on aircraft ADS-B equipage in Hong Kong airspace conducted on quarterly basis.</p> <p>ADS-B trial using a dedicated ADS-B system was conducted in Apr 2007. Planning on further trial is in progress.</p>	FANS 1/A trials for ADS-C conducted.	

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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									

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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.	

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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 implementation 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	

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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.		

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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									

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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.		

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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.			

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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.	

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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 Suvarnabhumi Intl. Airport. 22 ADS-B ground stations will be implemented in 2008.	FANS 1/A ADS-C Implemented.	

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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.	<p>Performance Based Navigation (RNP/RNAV) Implementation</p> <p>GNSS Implementation</p> <ul style="list-style-type: none"> • GBAS • SBAS 	<p>Implement performance based navigation, operation and procedures to improve the efficiency and flexible use of airspace.</p> <p>To implement GNSS in accordance with the Asia Pacific Regional Strategy</p> <p>Facilitate market available GBAS ground system (CAT I) certified to Annex 10 SARPs</p>	<p>Report to APANPIRG</p> <p>On-going</p> <p>2008</p>	<p>ATM/AIS/SAR CNS/MET</p> <p>CNS/MET</p>	<p>On-going Phased implementation.</p> <p>SBAS Receivers – (TSO C145/6) now available</p> <p>Lead aircraft with certified GBAS avionics now in service</p>	<p>Reflect performance based navigation, not just RNP.</p> <p>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</p>
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.	<p>Report to APANPIRG</p> <p>FIT-BOB reconvened September 2003. Bay of Bengal operational trial of ADS/CPDLC commenced February 2004, trial on going.</p> <p>FIT-SEA inaugural meeting May 2004. South China Sea operational trial of ADS/CPDLC expected 2006/2007.</p>	ATM/AIS/SAR	<p>Phased implementation.</p> <p>Implementation focus and timetable need to be developed.</p> <p>States are gaining experience in the use of ADS-C.</p>	

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.	<p>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.</p> <p>Two ADS-B Seminars were conducted</p> <p>QMS Seminar SAIDS-2G MET/ATM Coordination Seminars were conducted</p> <p>PBN Seminar were conducted</p>
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.	<p>High importance task. Spectrum must be available to enable CNS/ATM implementation.</p> <p>States to nominate the focal point of contact</p>

KEY PRIORITIES FOR CNS/ATM IMPLEMENTATION IN THE ASIA/PACIFIC REGION

No.	KEY PRIORITIES	DESCRIPTION	MILESTONES	SUB-GROUP	STATUS	DISCUSSION/ACTION
6.	ADS-B	<p>Airline aircraft certificated to participate in ADS-B operations.</p> <p>Develop sub-regional implementation plan: SEA etc.</p>	<p>2009</p> <p>2009</p>	<p>ADS-B SI Task Force</p> <p>ADS-B SI Task Force</p>	<p>Lead aircraft certified for initial ADS-B OUT operation</p> <p>Sample agreement for data sharing has been developed and initial implementation plan has been developed</p>	<p>Roll-out of ADS-B considered an on-going activity.</p> <p>Further develop and finalize the plan.</p>
7.	Implementation of APV	<p>Review applicability of APV and aircraft certification.</p> <p>Develop implementation strategy.</p>	<p>2006</p> <p>2007</p>	<p>CNS/MET</p> <p>ATM/AIS/SAR</p>	<p>APV standards now in PANS OPS.</p> <p>Aircraft certified APV approaches.</p>	<p>Completed</p> <p>ATM/AIS/SAR/SG to consider operational issues including charting.</p>
8.	Data Link Flight Information Services (DFIS) applications	<p>To implement the following applications via request/response mode of data link in the Asia and Pacific Regions:</p> <p>a) Data link –automatic terminal information services (D-ATIS);</p> <p>b) VOLMET data link</p>	2008	ATM/AIS/SAR CNS/MET	Trials and demonstrations are conducted and some operational services are provided by States.	<p>Implementation of D-ATIS is progressing</p> <p>Expected to be implemented at all locations except one by</p>

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

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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 has already reached Dhaka. It was expected to be installed by April 2008. No further follow-up actions were reported by the CAAB.	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 in early 2008 and pilot report continues to indicate occasional communication difficulties.	1998 In late 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

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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)	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. It was expected to be normal operational by 17 March 2008. Updated information will be provided in early August 2008	Civil Aviation Authority of Nepal	December 2007 This deficiency will be removed from the list upon receipt of official report by Nepal	A
Reliable AFTN circuit for timely exchange of operational safety messages.	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 circuit had experienced 14 outages in June 08 due to equipment failure at Manila. The unstable and unreliable performance of the circuit is not acceptable for exchanging safety related ATS messages.	February 2007	It is urgently required to restore the Manila/Hong Kong 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. The problem is likely to exist until Philippines avails the service of other communication service provider.	Prolonged delay in rectification of problem experienced at Manila has resulted in diversion of message traffic for a long time via Taipei. 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 3 rd meeting of the ATNICG of APANPIRG on 7 th May 2008. It was agreed to establish 2 separate circuits one each for X.25 AFTN circuit and for IASC operation to replace existing S+DX arrangement.	Air Transportation Office (AOT) Philippines	By the end of September 2007 The circuit resumed operation on 4 May 2008. An official notification from Air transportation Office on the Restoration was received on 13 May 2008. The Administration was urged to implement the AFTN and the ADS direct circuits without further delay.	U

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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. <i>Note: OPMET/M TF to carry out survey</i> 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. <i>Note: OPMET/M TF to carry out survey</i> 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

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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 <i>Note: ICAO Regional Office to monitor</i> 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

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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. <i>Note: ICAO SIP carried out in 2003; <u>progress in issuance of SIGMET for VA is noted; the outstanding problems to be resolved within 1-year time</u></i> <i>Progress reported by VAAC Darwin</i> 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

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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 <i>A TC project proposal submitted to SSSA, Cambodia</i>	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 <i>A TC project proposal submitted to SSSA, Cambodia</i>	TBD	U

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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 <i>Note: ICAO Regional Office to enquire action plans with fixed target dates from the listed States</i>	State's MET authorities <i>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.</i>	<i>(no action plan submitted to RO)</i> 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	<i>ATMB/GACA Immediate consideration of action plan – establish MWO and provide required regular MET service for Pyongyang FIR.</i>	General Administration of Civil Aviation (GACA) DPR Korea	TBD	U

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. 1-29 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/1 4 (TOR 3)	A-Safety E-Continuity GPI-19	<p>Subject: Inadequate implementation of procedures for advising aircraft on volcanic ash and tropical cyclones</p> <p>Task: Monitoring of the implementation of international airways volcano watch (IAVW) and tropical cyclone advisories and SIGMETs</p>	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

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No.	Ref.	Associated Strategic Objective & GPIs	Task	Priority	Action Proposed/In Progress	Action By	Target Date
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; c) progress the adoption of WGS-84 co-ordinate system and introduction of high integrity systems for the management of the co-ordinate data.	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; 4) Collect information and suggest methods of resolving problems commonly faced by States.	CNS/MET SG ATM/AIS/SAR CNS/MET SG	On-going On-going On-going On-going

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No.	Ref.	Associated Strategic Objective & GPIs	Task	Priority	Action Proposed/In Progress	Action By	Target Date
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	<ol style="list-style-type: none"> 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

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No.	Ref.	Associated Strategic Objective & GPIs	Task	Priority	Action Proposed/In Progress	Action By	Target Date
4 (37)	C 12/24	D – Efficiency GPI-19	Subject : Transition to the GRIB and BUFR coded WAFS products Task : Implementation of the transition to the GRIB and BUFR coded WAFS products	A	<ol style="list-style-type: none"> 1) Monitoring of implementation of BUFR coded SIGWX forecasts 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 	<p>CNS/MET SG</p> <p>WAFS Implementation Task Force</p> <p>(WAFS/I TF)</p> <p>WAFS/I TF</p>	<p>Completed</p> <p>5 Jan 2009</p> <p>2013</p> <p>Dec 2009</p>

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No.	Ref.	Associated Strategic Objective & GPIs	Task	Priority	Action Proposed/In Progress	Action By	Target Date
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	<ol style="list-style-type: none"> 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 MET/ATM TF MET/ATM TF MET/ATM TF	Completed Completed Completed Completed Ongoing 2009 2010
6 (39)	APANPIRG/1 3 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	<ol style="list-style-type: none"> 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

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No.	Ref.	Associated Strategic Objective & GPIs	Task	Priority	Action Proposed/In Progress	Action By	Target Date
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/ITF	Recurrent task Recurrent task Completed Recurrent task
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

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No.	Ref.	Associated Strategic Objective & GPIs	Task	Priority	Action Proposed/In Progress	Action By	Target Date
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.

**Twelfth Meeting of the Communications/Navigation/Surveillance and
Meteorology Sub-group (CNS/MET SG/12) of APANPIRG**

**Bangkok, Thailand
21-25 July 2008**

Attachment 1 to the Report

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CNS/MET SG/12

Attachment 2 to the Report

LIST OF WORKING PAPERS

WP/No.	Agenda Item	Subject	Presented by
1	-	Provisional Agenda	Secretariat
2	2 (1)	Review the APANPIRG/18 Report and Subsequent ANC/Council Actions with Respect to CNS/MET issues	“
3	2 (1)	Review of Actions on the Report of the Eleventh CNS/MET Sub-group and APANPIRG/18 Meetings	“
4	7 (1)	Review WRC-2007 Results and Preparations for WRC-2011	“
5	3 (1)	Review the Report of the Third Aeronautical Telecommunication Network Implementation Coordination Group Meeting (ATNICG/3)	”
6	12 (2)	CNS/ATM and Planning Matrix	“
7	3 (2)	Review of ASIA/PAC AIDC Implementation Status	“
8	2 (2)	Action Items of the 44 th DGCA Conference	“
9	6 (1)	Review Report of the Seventh Meeting of Automatic Dependent Surveillance – Broadcast (ADS-B) Study and Implementation Task Force	“
10	9 (3)	Time Table for Region Implementation – 30 Hour TAF	Rapporteur of OPMET/M TF
11	8 (2)	SADIS Strategic Assessment Table 2008-2012	SADIS provider State United Kingdom
12	8 (3)	Use of the Aeronautical Fixed Service for the Distribution of OPMET and WAFS Products by the SADIS Provider State	
13	8 (1)	Summary of Recent and Forthcoming Developments to the WAFS and SADIS	WAFS London
14	9	OPMET activity in New Zealand	New Zealand

WP/No.	Agenda Item	Subject	Presented by
15	10	Volcanic Eruption Exercise – Ruamoko	New Zealand
16	11	Enhancing NGO Advisory Input to ICAO	New Zealand
17	11	Aeronautical Climatological Information	IATA
18	9 (3)	IATA Operational Requirements for TAF Provision & Broadcasting	IATA
19	9 (1)	Sixth Meeting of the OPMET Management Task Force	Rapporteur of OPMET/M TF
20	6 (3)	Assignment of Interrogator Identifier Codes for SSR Interrogators in ASIA/PACIFIC Region	Secretariat
21	3	The Federal Aviation Administration AFS Plan	USA
22	9 (3)	ROBEX Bulletins Post – 30 Hour TAF Introduction	Rapporteur of OPMET/M TF
23	10 (1)	Implementation of the Notification of Volcanic Activity by Volcano Observatories	USA
24	8 (2)	Harmonization of the ISCS Broadcast with SADIS	USA
25	8 (2)	Planned Changes for the International Satellite Communication System	USA
26	9	Test Bed for 30-Hours Aerodrome Forecast	USA
27	8 (3)	Regional Progress in WAFS Implementation	Chairman of WAFS Task Force
28	10 (3)	New SIGMET Examples for Updating the ASIA/PAC Regional SIGMET Guide	Hong Kong, China
29	11 (1)	ATM Requirement for Visibility Reporting	Hong Kong, China
30	9 (3)	ATM Requirement for TAF	Hong Kong, China
31	5 (3)	Asia/Pacific Regional Testing of Radio Navigation Aids	Secretariat
32	10 (3)	Procedures for Issuing SIGMET for Complex Volcanic Ash Events	Australia
33	12	Report on Activities of the RASMAG	RASMAG Chairman
34	12 (1)	Review Outcome of ATM/AIS/SAR/SG/18	Secretariat

WP/No.	Agenda Item	Subject	Presented by
35	11 (2)	Issues Relating to the Aerodrome Forecast (TAF) Format	Australia
36	6	Review Surveillance Strategy for Asia/Pacific Region	Secretariat
37	12 (1)	Key Priorities and Performance Objective	Secretariat
38	6	Review Outcome of the Third Meeting of South-East Asia Sub-regional ADS-B Implementation Working Group (SEA ADS-B WG/3)	Secretariat
39	5 (1)	Strategies for the Provision of Precision Approach, Landing & Departure Guidance Systems and the Implementation of GNSS Navigation Capability	“
40	14	Terms of Reference and Tasks List of the CNS/MET Sub-group	“
41	8 (3)	Proposal to Keep Corrections to WAFS SIGWX Forecast	China
42	11	Report of the METATM Task Force	Chairman of the METATM Task Force
43	12 (2)	Overview of Proposed Electronic Air Navigation Plan (eANP) Framework	Secretariat
44	10 (3)	Progress with SIGMET Tests – WC and WV	Rapporteur of VA/TC/I TF
45	13 (1)	Status of Noted Deficiency in the CND Field	Secretariat
46	6	ADS-B Out Avionic Equipage Requirements	IATA
47	4	ICAO web-based Aeronautical Radio Frequency Planning	Secretariat
48	4	Satellite Data Communications Performance in Oceanic and Remote Regions and the Work of the FANS SATCOM Improvement Team (FANS SIT)	USA
49	5	ILS DME Location	Secretariat
50	5	Summary of the PBN Task Force Meetings of Asia/Pacific Performance Based Navigation Task Force	Chairman of PBN Task Force

WP/No.	Agenda Item	Subject	Presented by
51	12 (1)	Status of MET Deficiencies	Secretariat
52	9 (3)	Amendment to the MET Part of the ASIA/PAC BANP and FASID	Secretariat

LIST OF INFORMATION PAPERS

IP/No.	Agenda Item	Subject	Presented by
1	-	Meeting Bulletin	Secretariat
2	8 (3)	WAFC Performance Indicators for the Australia/New Zealand Area	WAFC London and WAFC Washington
3	9 (3)	ASIA/PAC Regional Survey Results – 30 Hour TAF	Rapporteur of OPMET/M TF
4	9 (4)	Results of IATA, IFALPA and OPMET/M TF Team, TAF in VOLMET Survey	Rapporteur of OPMET/M TF
5	10	Comparison of WS SIGMET Tests 1, 2 and 3	Australia
6	10 (3)	Progress with SIGMET Test – WS Test 3	Rapporteur of OPMET/M TF
7	11 (2)	Australian Developments in Fog Forecasting	Australia
8	11	AS/AZS ISO 9001:2000 Certification for the Australian Bureau of Meteorology Aviation Weather Services	Australia
9	10 (3)	VA SIGMET Education	Australia
10	10 (1)	VACC Darwin Report July 2007 – June 2008	Australia
11	9	United States Provision of VOLMET Broadcast and Updates to the FASID MET Tables	USA
12	15	Network Enabled Operations (NEO) in Weather	USA
13	9	Changes in the Operations at the National Weather Service Telecommunications Gateway	USA
14	5	FAA GBAS Update	USA

IP/No.	Agenda Item	Subject	Presented by
15	5 (3)	U.S. Space-Based Positioning, Navigation and Timing (PNT) Policy	USA
16	6	Automatic Dependent Surveillance – Broadcast (ADS-B)	USA
17	15	U.S. Next Generation Air Transportation System (NextGen)	USA
18	8 (3)	Observations on WAFS Trial Girded Forecasts	Hong Kong, China
19	11 (2)	Implementation of Dual Light Detection and Ranging (LIDAR) Windshear Alerting System at the Hong Kong International Airport	Hong Kong, China
20	11 (2)	Thunderstorm Nowcasting in support of ATM	Hong Kong, China
21	10	Volcanic Ash Simulation Exercises in the EUR/NAT Region	Secretariat
22	11 (1)	ASIA/PAC Regional Survey on the Evolving Requirements for Meteorological Information and Services in Support of Air Traffic Management	Australia
23	5 (3)	Global Navigation Satellite System (GNSS) Technology Summit & the Twelfth Meeting of the APEC GNSS Implementation Team (GIT/12)	Secretariat
24	6	New Caledonia ADS-B Programme	New Caledonia
25	10 (3)	A Case Study of Volcanic Ash Simulation Exercises in Asia/Pacific Region	Japan
26	6	Certification of Multilateration systems	New Zealand
27	9 (3, 4)	The Implementation Plan for Amendment 74 to Annex 3 on the TAF and VOLMET Broadcasting	China
28	5	Status of the MTSAT Services	Japan
29	11 (2)	Thunderstorm Forecast with the Guidance Using Time-Lagged Ensemble	Japan
30	4 (1)	Seminar on the Implementation of Datalink Flight Information Service (DFIS)	Secretariat
31	12	IATA 2015 Vision	IATA
32	8 (1)	Executive Summary of WAFSOPSG/4 Meeting	Secretariat

IP/No.	Agenda Item	Subject	Presented by
33	8 (1)	Executive Summary of SADISOPSG/13 Meeting	Secretariat
34	10 (3)	Development of SIGMET Posters	Hong Kong, China
35	9 (3)	Plan for implementation of 27 hour TAF by Japan	Japan
36		<i>Paper was withdrawn</i>	
37	10 (3)	Interface for the Issue of SIGMET	Singapore

**The Twelfth Meeting of the Communications/Navigation/Surveillance and
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