

INTERNATIONAL CIVIL AVIATION ORGANIZATION



**REPORT OF THE FIFTH MEETING OF THE REGIONAL AIRSPACE
SAFETY MONITORING ADVISORY GROUP (RASMAG/5)**

BANGKOK, THAILAND, 5 – 8 JUNE 2006

The views expressed in this Report should be taken as those of the
RASMAG and not of the Organization.

Adopted by the RASMAG
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RASMAG/5
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HISTORY OF THE MEETING

1. Introduction

1.1 The Fifth Meeting of the Regional Airspace Safety Monitoring Advisory Group (RASMAG/5) was held in Bangkok, Thailand from 5 to 8 June 2006 at the Kotaite Wing of the ICAO Asia/Pacific Office.

2. Attendance

2.1 The meeting was attended by 22 participants from Australia, Hong Kong China, India, Japan, New Zealand, Singapore, Thailand, United States, IATA and IFALPA. A list of participants is at **Appendix A** to this report.

3. Officers & Regional Office

3.1. Mr. Robert Butcher, Manager Human Factors & Analysis, Safety Management Group, Airservices Australia and Mr. Brian Colamosca, Manager, Separation Standards Analysis Group of U.S. Federal Aviation Administration chaired the meeting.

3.2. Mr. Andrew Tiede, Regional Officer ATM, was the Secretary for the meeting and was assisted by Mr. Polawat Chootai, Regional Officer ATM.

4. Opening of the Meeting

4.1 The meeting was opened by Mr. Andrew Tiede on behalf of Mr. Lalit Shah, Regional Director of the Asia/Pacific Regional Office. Mr. Tiede welcomed the participants to Bangkok and the Fifth meeting of the RASMAG.

4.2 Mr. Tiede recalled that during the last meeting of RASMAG (RASMAG/4, October 2005) a number of concerns had been identified. These included arrangements for the funding of safety monitoring, the lack of provision of safety data by States leading to the inability to conduct safety assessments, the large numbers of Large Height Deviations (LHDs) in the Western Pacific/South China Sea area and the lack of a current horizontal safety assessment for the South China Sea route structure.

4.3 Although progress had been made in some areas, there was still no current horizontal safety assessment for the South China Sea route structure and the meeting would learn that the Target Level of Safety (TLS) for RVSM was being exceeded in both the Western Pacific/South China Sea area and in Australian FIRs. Clearly there was still much work for RASMAG to do in the region.

4.4 Since the last meeting, two meetings of global significance had been held – the Directors General of Civil Aviation Conference on a Global Strategy for Aviation Safety and the Fifth meeting of the ALLPIRG/Advisory Group. The outcomes of these meetings had a direct impact on international civil aviation generally and on the work of RASMAG specifically and would need to be considered by this meeting. Mr. Tiede wished the meeting every success.

5. Documentation and Working Language

5.1 The working language of the meeting as well as all documentation was in English.

5.2 Twenty-two (22) Working Papers and twenty-one (21) Information Papers were presented to the meeting. A list of papers is included at **Appendix B** to this Report.

REPORT ON AGENDA ITEMS

Agenda Item 1: Adoption of Agenda

1.1 The following agenda was adopted for the meeting:

- Agenda Item 1: Adoption of Agenda
- Agenda Item 2: Review of Global DGCA Conference and ALLPIRG/5 outcomes
- Agenda Item 3: Funding of Regional Safety Monitoring Activities
- Agenda Item 4: Airspace safety monitoring documentation and regional guidance material
- Agenda Item 5: Review the airspace safety monitoring arrangements in the Asia/Pacific Region and the activities of regional airspace safety monitoring agencies
- Agenda Item 6: Review of regional safety assessment activities/requirements
- Agenda Item 7: Review and update RASMAG Task List
- Agenda Item 8: Any other business
- Agenda Item 9: Date and venue of the RASMAG/6 Meeting

Agenda Item 2: Review of Global DGCA Conference and ALLPIRG/5 outcomes

Review of Global DGCA Conference 2006

2.1 The Directors General of Civil Aviation Conference on a Global Strategy for Aviation Safety (DGCA/06) was held from 20-22 March in Montreal Canada and was attended by 567 participants from 153 Contracting States and 26 international organizations. The purpose of the Conference was to reach consensus on a Global Strategy for Aviation Safety in the 21st century; the following agenda was adopted:

Theme 1: The Status of Aviation Safety Today

- Topic 1.1 Worldwide and regional trends in aviation safety
- Topic 1.2 The status of safety oversight
- Topic 1.3 Initiatives by States and industry

Theme 2: Improving Aviation Safety

- Topic 2.1: Transparency and sharing of safety information
- Topic 2.2: Management of aviation safety
- Topic 2.3: Unified strategy to resolve safety-related deficiencies
- Topic 2.4: Mutual recognition
- Topic 2.5: Enhancing safety oversight

Theme 3: Beyond the Current Framework

Topic 3.1 Safety framework for the 21st century

2.2 As a result of the deliberations during the DGCA/06 Conference, a formal 'Declaration' (**Appendix C** refers) and list of 'Conclusions and Recommendations' (**Appendix D** refers) recording the outcomes of the Conference were promulgated. Significantly, in recognizing that the transparency and sharing of safety information are fundamental tenets of a safe air transport system, the DGCA/06 Conference agreed to post results from the ICAO Universal Safety Oversight Audit Programme (USOAP) on the ICAO public website by March 2008. The full report of the DGCA/06 Conference is available from the ICAO website at <http://www.icao.int/index.html> under the 'Meetings' menu.

2.3 In the context of RASMAG, much of the material in both the Declaration and the list of Conclusions and Recommendations was of relevance, with particular emphasis on paragraphs 1 c), d), 4 and 5 e) of the Declaration dealing with the expeditious and coordinated implementation of safety management systems, development of sustainable safety solutions including the strengthening of regional safety oversight organizations and studies regarding the development of a new Annex on safety oversight, safety assessment and safety management.

2.4 The meeting noted that the Conclusions and Recommendations under Topic 2.2, dealing with the issue of Safety Management Systems and consideration of the development of a new safety related Annex to the Convention, were relevant to the work of RASMAG. In accepting that it was recommended that States should implement safety management systems across all safety-related disciplines at the earliest possible opportunity, the meeting recognized that the outputs from the DGCA/06 were pointed at the highest level and it would take some time for specific actions to be identified by States and regional bodies that would enable the implementation of the intent of the DGCA/06 Conference. Notwithstanding, the meeting agreed to include an item in the RASMAG task list in respect of the implementation of safety management systems to ensure that a strong focus was retained in this respect.

2.5 States were encouraged to fully and comprehensively review the outcomes of the DGCA/06 Conference with a view to identifying items suitable for action by RASMAG.

Review of ALLPIRG/5

2.6 The Fifth meeting of the ALLPIRG/Advisory Group (ALLPIRG/5) was held at ICAO Headquarters from 23 to 24 March 2006 under the chairmanship of the President of the Council of ICAO. It was attended by one hundred participants from six planning and implementation regional groups (PIRGs), five global and regional service providers, four international organizations and fifty-one observers. A copy of the full report of the ALLPIRG/5 meeting is available from <http://www.icao.int/index.html> under the 'Meetings' menu.

2.7 The meeting worked with the following agenda which was drawn up in line with the terms of reference of ALLPIRG, as established by the Council, and developed eighteen conclusions (**Appendix E** refers). Some highlights of relevance to RASMAG have been included below.

Agenda Item 1: Review of follow-up actions on the ALLPIRG/4 Report

Agenda Item 2: Global Air Navigation Plan

Framework for Global Planning

2.8 ALLPIRG/5 received a comprehensive presentation on the draft second amendment of the Global Air Navigation Plan covering past, present and future work associated with achieving a global ATM system. ALLPIRG/5 agreed that ICAO should conduct a series of workshops at the Regional Offices dealing with the integration of the revised planning processes and GPIs into the current planning framework, and the utilization of the planning tools and methodologies.

Environmental benefits of CNS/ATM systems

2.9 The meeting was apprised of an update on the work of the ICAO Committee on Aviation Environmental Protection (CAEP) and on methodologies for the assessment of the environmental benefits of CNS/ATM systems at the global and regional levels. ALLPIRG/5 invited ICAO to undertake a study on the environmental benefits of the introduction of reduced vertical separation minimum (RVSM)

Agenda Item 3: Aviation Safety

Outcome of and follow-up to the DGCA Conference

2.10 ALLPIRG/5 agreed that each PIRG develop a practical means of implementing the conclusions and recommendations of the DGCA/06 Conference and submit reports to ICAO on a regular basis.

2.11 As a follow-up to the DGCA/06 Conference, ALLPIRG/5 addressed areas of ATM safety requiring urgent, high-priority attention and consequently requested ICAO to urge States to give priority to the establishment and effective operation of their ATM safety management and safety regulatory functions. ALLPIRG/5 further agreed on encouraging States to share safety data.

Agenda Item 4: Aviation Security

2.12 The meeting received a report on the progress made in the Universal Security Audit Programme (USAP) and its overall impact in identifying deficiencies in States' aviation security system and providing recommendations for their resolution.

Agenda Item 5: Interregional coordination and harmonization

Cost-recovery arrangements for RMAs

2.13 ALLPIRG/5 noted that in some of the regions the funding of regional monitoring agencies (RMAs) is the main obstacle for the continuation of monitoring operations. The meeting noted that the proposed global approach would be finalized subsequent to its review by the sixth meeting of the Air Navigation Services Economics Panel (ANSEP/6), held at ICAO Headquarters from 27 to 31 March 2006.

Coordination amongst RMAs

2.14 ALLPIRG/5 suggested that the ICAO European and North Atlantic (EUR/NAT) Office act as the initial focal point to carry out required coordination and standardization tasks amongst RMAs globally.

Monitoring data link applications

2.15 ALLPIRG/5 acknowledged that regional CRAs cannot independently manage FANS-1/A data link operations on a global scale and that having many different regional CRA functions would probably delay identification and resolution of encountered problems. Consequently, the meeting accepted the benefits of adopting the concept of a global CRA function, but considered that, at this stage, it would be premature to endorse such a proposal and that a business case would be needed before endorsing it.

Global harmonization of RNP/RNAV implementation

2.16 The meeting noted that ICAO was in the process of reviewing the current required navigation performance (RNP) concept to meet the increasing demands of airspace planners and aircraft operators for performance-based navigation (PBN). The meeting, supporting the PBN programme, called on ICAO to organize workshops and training activities and agreed that all PIRGs should implement the PBN concept.

Uniform Methodology

2.17 On the subject of deficiencies, ALLPIRG/5 agreed to the application in all the regions of regional online databases of air navigation deficiencies.

2.18 In relation to the elimination of long-standing deficiencies, the meeting adopted a proposal that calls for implementation of “last resort action” by all PIRGs when efforts to eliminate deficiencies prove unsuccessful after exhausting all alternatives. The last resort action consists of two parts: first, propose the inclusion of an alternate facility/procedure in the ANP; and, second, if this is not feasible, States, users and ICAO should be provided with an analysis concerning the risk associated with such a deficiency.

Meeting of Global RMAs

2.19 In reviewing ALLPIRG/5 Conclusion 5/12, RASMAG/5 gave in-principle support to a meeting of all RMAs globally under the auspices of the EUR/NAT Office of ICAO but considered that there were a number of issues to be considered in deciding the arrangements for such a meeting. Of paramount importance was choosing a venue and timing for the meeting that would enable maximum attendance by as many RMAs as possible and a suitable agenda for the meeting would need to be agreed well in advance.

2.20 In identifying matters for discussion at such a meeting, it was also considered important to go beyond the discussions items included in Conclusion 5/12 and include technical and standardization matters for resolution. In this context, the matters considered and agreed during the tripartite meeting of the Asia/Pacific regional RMAs that had been held during RASMAG/4 should be tabled for review during the global RMA meeting. The meeting agreed to include an item on the task list in this respect.

Review of Conclusions and Decisions of APANPIRG/16

2.21 The Sixteenth meeting of the Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG/16) was held in Bangkok, Thailand from 22-26 August 2005. APANPIRG/16 raised a total of 60 new Conclusions and Decisions for regional action.

2.22 The meeting reviewed and discussed the Conclusions and Decisions from APANPIRG/16 that were of relevance in the context of RASMAG, in particular Conclusions 16/2, 16/3, 16/4, 16/5, 16/6, 16/18, 16/19, 16/20 and 16/62.

2.23 The meeting also noted that Decision 16/59 had required that the CNS/MET, ATM/AIS/SAR Sub-groups and RASMAG be tasked to review the Global Air Navigation Plan for the CNS/ATM System and the ASIA/PAC Regional Plan for the New CNS/ATM system with a view to avoiding any duplication with the updated Global Plan, and that the Decision intended that the work should commence immediately after issuance of a new edition of the Global Plan.

2.24 However, as the Global Plan was not expected to be published until later in 2006, RASMAG was not able to commence work in this respect.

Agenda Item 3: Funding of Regional Safety Monitoring Activities

3.1 The Secretariat reminded the meeting that APANPIRG Conclusion 16/2 called for the formation of a study group to develop a feasible and sustainable means to organize and finance the necessary safety monitoring mechanisms, and provided a summary of key background information leading to the APANPIRG Conclusion. The Secretariat explained that the Council of ICAO had taken note of the difficulties encountered in Asia/Pacific in securing funding for regional safety monitoring activities, but the Council had also observed similar problems in other ICAO Regions. Accordingly, the Council had referred the matter to ALLPIRG/5 and the Sixth Meeting of the Air Navigation Services Economic Panel (ANSEP/6, March 2006) to consider developing a globally applicable approach.

3.2 The United States informed the meeting about the status of funding of FANS 1/A CRA services in the South Pacific area, indicating that although interim solutions had been found to maintain the safety monitoring services there remained a need to develop a practicable and equitable solution to sustain the services for as long as they were necessary.

3.3 The Secretariat summarized the approaches being taken in other ICAO Regions as well as noting the global consensus that emerged through the discussions at ALLPIRG/5 and ANSEP/6. The meeting noted that those bodies considered that voluntary funding of Regional Monitoring Agencies (RMAs) was not a sustainable approach and, instead, considered that the most suitable arrangement was for States to enter into administrative agreements to establish multinational (ICAO) facilities/services to provide RMA services. The meeting took particular note of experiences in the MID Region to establish a MID RMA Board designed along these lines.

3.4 The meeting also was informed by the Secretariat that ALLPIRG/5 and ANSEP/6 had endorsed a step-by-step approach for the implementation of the “global” approach to funding RMAs. The meeting was reminded as well about the general guidelines on the establishment of a multinational ICAO Asia/Pac air navigation facility/service contained in the Asia/Pac FASID.

3.5 The Secretariat proposed actions for the meeting as a basis for recommending appropriate mechanisms to APANPIRG/17 in response to Conclusion 16/2. The meeting agreed that the global consensus that had emerged on the most appropriate funding model for RMAs obviated the need for the special study group. The meeting then considered how to place the funding of already-established regional safety monitoring services on a sustainable financial basis, recognizing the need to address SMAs and CRAs as well as the RMAs.

3.6 Accordingly, RASMAG prepared a Working Paper for submission to APANPIRG/17 (**Appendix F** refers) proposing that APANPIRG initiate steps to establish a Regional Safety Monitoring Board – Asia and a Regional Safety Monitoring Board – Pacific by inviting the States concerned to meet with the aim of preparing acceptable Memoranda of Agreement and to take the necessary follow-up steps to establish the Boards to support their activities. The meeting requested that the Secretariat take steps to present the Working Paper, subsequent to final editorial revision, to APANPIRG on the recommendation

of RASMAG as an appropriate mechanism to address the issue of funding mechanisms for regional safety monitoring.

3.7 In order to ensure appropriate preparation by States in this regard, the meeting requested that the Regional Office circulate the Working Paper by State Letter as soon as possible.

Note: State Letter REF:T3/10.1.17 – AP050/06 ATM was issued by the Regional Office on 13 June 2006 in this respect

3.8 Additionally, the meeting considered that as the intention of Conclusion 16/2 had been substantially fulfilled there was no immediate need to convene the study group called for under this Conclusion. Furthermore, the meeting expected that should APANPIRG adopt the mechanism described in the Working Paper from RASMAG there would be no need to convene the study group at all and requested that the Secretariat also bring this to APANPIRG's attention.

Agenda Item 4: Airspace safety monitoring documentation and regional guidance material

Adoption of Amendment 44 to Annex 11

4.1 The meeting was advised that on 24 March 2006, ICAO Headquarters issued a State letter Ref.: AN 13/13.1-06/32 regarding the "Adoption of Amendment 44 to Annex 11". The Annex 11 amendment would become applicable on 23 November 2006 and introduced:

- a) new and revised standards, as well as guidance material on the concept of acceptable level of safety, to harmonize safety management requirements in Annexes 6, 11 and 14, in response to the need to complement the prevailing approach to the management of safety based upon regulatory compliance with a performance-based approach; and
- b) a recommended practice that ATC units be equipped with devices that record background communication and the aural environment at air traffic controller work stations, which may offer additional information to the accident investigation authority.

4.2 The meeting considered the guidance material in respect of the TLS was a useful step forward in assisting States to understand what was required in the identification and implementation of TLS. India raised an issue regarding the need for global guidance in the calculation of TLS/ALS and suggested that this was material that ICAO possibly needed to provide, given the new material in Amendment 44 to Annex 11.

4.3 The meeting was informed that work in this respect was ongoing in a number of ICAO forums and that any agreement on global definitions/guidance in the short term was unlikely.

First Meeting Operational Data Link Panel (OPLINK/1) Recommendations for Amendments

4.4 On 28 April 2006 ICAO Headquarters issued State Letter SP 52/4-06/41– "Recommendations of the first meeting of the Operational Data Link Panel (OPLINK/1), including recommendations for amendments to Annexes 2, 4, 6, 10, 11, 15, the PANS-ABC (Doc 8400) and the PANS-ATM (Doc 4444)" comprising 143 pages. Comments on the amendments proposed are to be received by 18 August 2006 at ICAO Headquarters.

4.5 The Commission, when considering the proposed amendments, recognized that the proposals were extensive and would facilitate implementation of the available technology in relation to a number of data link applications, including automatic dependent surveillance - broadcast (ADS-B), ATS interfacility data communications (AIDC), controller-pilot data link communications (CPDLC) and required communication performance (RCP). The Commission agreed that in order to facilitate replies from States and international organizations on the RCP provisions, the draft *Manual on Required Communication Performance (RCP)* (Doc 9869) would be placed on the ICAO-NET under the "Electronic Publications" heading. A suitable disclaimer had been attached noting that the document was "draft" and subject to editorial revision.

ICAO Safety Management Manual (SMM, Doc 9859)

4.6 In light of the expansion of provisions for safety management systems in other areas in addition to ATS, in particular Annexes 14 – *Aerodromes* and 6 – *Operation of Aircraft*, ICAO pursued the philosophy of a combined safety management manual, rather than a series of separate manuals addressing separate ICAO Annexes.

4.7 The meeting noted that the *ICAO Safety Management Manual* (Doc 9859), which supersedes and replaces the draft *Manual of Safety Management for ATS*, had been published. The First Edition of the manual (comprising 290 pages) was available on the ICAONET, or from the Regional Office at US\$ 167.

Guidance Material for Data Link Ground Equipment

4.8 The meeting was informed that the Guidance Material for End-to-End Safety and Performance Monitoring of Air Traffic Service (ATS) Data Link Systems in the Asia/Pacific Region had been circulated by State Letter (Ref.: T 3/10.1.17 – AP048/06 (ATM)) on 5 June 2006, in accordance with APANPIRG Conclusion 16/20.

4.9 In recognizing the lack of suitable guidance material in relation to the procurement, deployment and implementation of integrated data link systems (including AFN, ADS, CPDLC and AIDC), RASMAG had also commenced work towards drafting suitable regional guidance material in this respect.

4.10 The work in drafting appropriate guidance material had continued since RASMAG/4 (October 2005), with focus on three primary areas:

- a) System procurement processes;
- b) Implementation of systems; and
- c) The specification of data link systems.

4.11 The meeting recalled discussions at RASMAG/4 in which, as the guidance material was being prepared to assist States that were new entrants to data link technologies, it was considered important that the document be straightforward and easy to follow. It was also suggested by RASMAG/4 that the guidance material contain diagrams and charts where appropriate to convey information and reinforce the textual message.

4.12 The meeting recognized that the guidance material was intended as an entry level document for States intending to implement data link technologies for the first time and should be structured in a somewhat simplified form in this respect. It was important to clearly state in the introductory pages that this was the intent of the document to explain why the material was not particularly detailed.

4.13 Australia would seek input from Human Factors experts in relation to Section 5 of the document and provide feedback accordingly. This was important to highlight the importance of human factors in matters such as the selection of appropriate colours for the display etc.

4.14 The current version of the draft guidance material has been included as **Appendix G** for further review and feedback. Comments and feedback should be provided directly to the primary authors in Japan and New Zealand.

Agenda Item 5: Review the airspace safety monitoring arrangements in the Asia/Pacific Region and the activities of regional airspace safety monitoring agencies

RASMAG Terms of Reference

5.1 RASMAG was established under the terms of APANPIRG/14 (August 2003) Decision 14/48, which included draft Terms of Reference (TOR). The RASMAG/1 (April 2004) meeting reviewed the draft Terms of Reference and recommended an amendment to the TOR, which was subsequently adopted by APANPIRG/15 (August 2004).

5.2 As a result of a review of the TOR, the meeting agreed that the TOR, as shown in **Appendix H**, continued to meet the requirements of RASMAG and that the activities of RASMAG were in accordance with the TOR.

Annual December Traffic Sample Data

5.3 In considering the requirements for routine safety assessment, the Second Meeting of the Regional Airspace Safety Monitoring Advisory Group (RASMAG/2, October 2004)) agreed that an annual provision by States of Traffic Sample Data (TSD) as well as the ongoing provision of Large Height Deviation (LHD) and Gross Navigational Error (GNE) reporting was sufficient for vertical and horizontal safety analysis.

5.4 In regard to the continuous monitoring and regular assessment of target levels of safety in reduced separation applications, during November 2005 the Regional Office issued a State Letter (Ref: T3/10.0, T3/10.1.17 – AP117/05ATM) advising States that APANPIRG/16 had adopted a standardized approach for the collection of vertical and horizontal traffic sample data, and emphasizing a number of relevant Conclusions adopted by APANPIRG 16.

5.5 As the month of December routinely experienced high traffic levels, APANPIRG had adopted December every year as the standard sample period for vertical and horizontal traffic sample data collection, commencing from December 2005. States not providing traffic sample data for December each year would be included on the APANPIRG List of Deficiencies in the ATM/AIS/SAR fields.

5.6 The meeting noted the very positive response from States in respect of the provision of TSD for December 2005. The situation had improved significantly and it was expected that this situation could be sustained. IFALPA and IATA complimented and thanked the States involved for recognising the importance of providing suitable data in a timely fashion as it enabled an objective understanding of traffic disposition to be reached.

5.7 However, the meeting identified that a few States had not provided December 2005 TSD or LHD data in accordance with APANPIRG Conclusion 16/4 and therefore should be considered for inclusion on the APANPIRG List of Deficiencies in the ATM/AIS SAR fields, in accordance with APANPIRG Conclusion 16/6. The meeting drafted the following Conclusion in this respect

Draft Conclusion 5/XX

That, as a result of the non-provision of safety related data to approved regional safety monitoring agencies as required by APANPIRG Conclusion 16/4, Bangladesh, Fiji, Lao PDR, Myanmar and Papua New Guinea be included in the APANPIRG List of Deficiencies in the ATM/AIS/SAR Fields in accordance with APANPIRG Conclusion 16/6.

5.8 The Regional Office agreed to write to the States concerned highlighting the draft Conclusion above and seeking the provision of a suitable TSD for December 2005 and outstanding LHD reports to the relevant RMA. The receipt of appropriate data prior to APANPIRG/17 in August 2006 would result in the removal of that State from the Draft Conclusion.

5.9 In the case of Pakistan, the meeting recognized that some confusion existed. Pakistan was accredited to the Middle East Office of ICAO in Cairo, however was also listed in the RMA Handbook as a State of the Bay of Bengal and therefore under the jurisdiction of MAAR. The meeting requested the Regional Office to coordinate with Cairo Office to establish whether Pakistan should be included in the Bay of Bengal under the MAAR, or under the MID RMA.

Report of MAAR's RMA activities

Bay of Bengal

5.10 The Monitoring Agency for the Asia Region (MAAR) provided a summary of airspace safety oversight for RVSM implementation in the Asia Region, focusing on the Bay of Bengal (BOB) airspace. The RVSM safety oversight had been conducted based on a one-month traffic sample data (TSD) collected in December 2005 and monthly Large Height Deviation (LHD) reports between January 2005 and April 2006 submitted by relevant States in the BOB region. The risk estimation was conducted based on the single alternate flight orientation scheme (FLOS) applied on the EMARSSH route structure over the BOB airspace

5.11 LHD occurrences in the BOB RVSM airspace were summarized as follows:

- Total of 9 LHD occurred in the BOB RVSM airspace between January 2005 and April 2006, accounting for 17.0 minutes of operational errors,
- Most of the LHD occurrences were a result of ATC loop error (Category I) – 8 of 9 LHD occurrences

Table 1 below summarizes the results of the airspace safety oversight in terms of the technical, operational, and total risks for the RVSM implementation in the BOB airspace.

Source of Risk	Lower Bound Risk Estimation	TLS	Remarks
Technical Risk	0.77×10^{-9}	2.5×10^{-9}	Satisfies Technical TLS
Operational Risk	1.11×10^{-9}	-	-
Total Risk	1.88×10^{-9}	5.0×10^{-9}	Satisfies Technical TLS

Table 1: Risk Estimates for the RVSM Implementation in BOB Airspace

5.12 In addition, Figure 1 presents the trends of collision risk estimates for each month using the appropriate 12-month interval of LHD reports since January 2005.

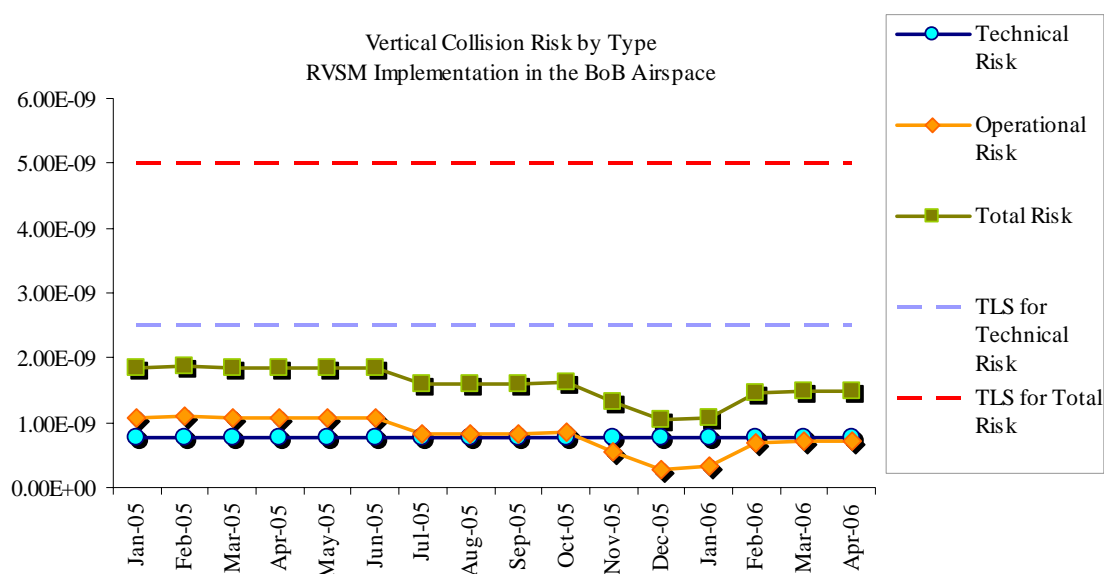


Figure 1: Trends of Risk Estimates for RVSM Implementation in BOB Airspace

5.13 Based on these collision risk estimates, both technical and total risks from the available TSD and LHD reports **satisfy the agreed TLS value** of no more than 2.5×10^{-9} and 5.0×10^{-9} fatal accidents per flight hour due to the loss of a correctly established vertical separation standard of 1,000 ft and to all causes, respectively.

5.14 MAAR noted limitations in the assessment based on the lack of some TSD and LHD data, however informed the meeting that the situation in this respect had improved markedly, thereby increasing the reliability of the analysis.

Western Pacific/South China Sea

5.15 MAAR also provided a summary of airspace safety oversight for RVSM implementation Western Pacific/ South China Sea (WPAC/SCS) area. The RVSM safety oversight had been conducted based on a one-month traffic sample data (TSD) collected in December 2005 and monthly Large Height Deviation (LHD) reports between January 2005 and April 2006 submitted by relevant States in the WPAC/SCS region. The risk estimation was conducted based on the modified single alternate flight orientation scheme (FLOS) applied on the on the WPAC/SCS route structures.

5.16 LHD occurrences in the WPAC/SCS RVSM airspace were summarized as follows:

- Total of 96 LHD occurred in the WPAC/SCS RVSM airspace between January 2005 and April 2006, accounting for 260.4 minutes of operational errors,
- 76% of LHD occurrences were subject to errors in ATC-unit to ATC-unit transfer/transition message (Category M) – 73 of 96 LHD occurrences.
- Significant LHD occurrences:
 - 26 operational errors totaling 145 minutes of operational errors occurred within a single FIR during December 2005 – March 2006.
 - One operational error totaling 45 minutes occurred in another FIR in December 2005.

Table 2 summarizes the results of the airspace safety oversight in terms of the technical, operational, and total risks for the RVSM implementation in the WPAC/SCS airspace.

Source of Risk	Lower Bound Risk Estimation	TLS	Remarks
Technical Risk	0.37×10^{-9}	2.5×10^{-9}	Satisfies Technical TLS
Operational Risk	6.71×10^{-9}	-	-
Total Risk	7.08×10^{-9}	5.0×10^{-9}	Exceeds Overall TLS

Table 2: Risk Estimates for the RVSM Implementation in WPAC/SCS Airspace

5.17 In addition, **Figure 2** presents the trends of collision risk estimates for each month using the appropriate 12-month interval of LHD reports since January 2005.

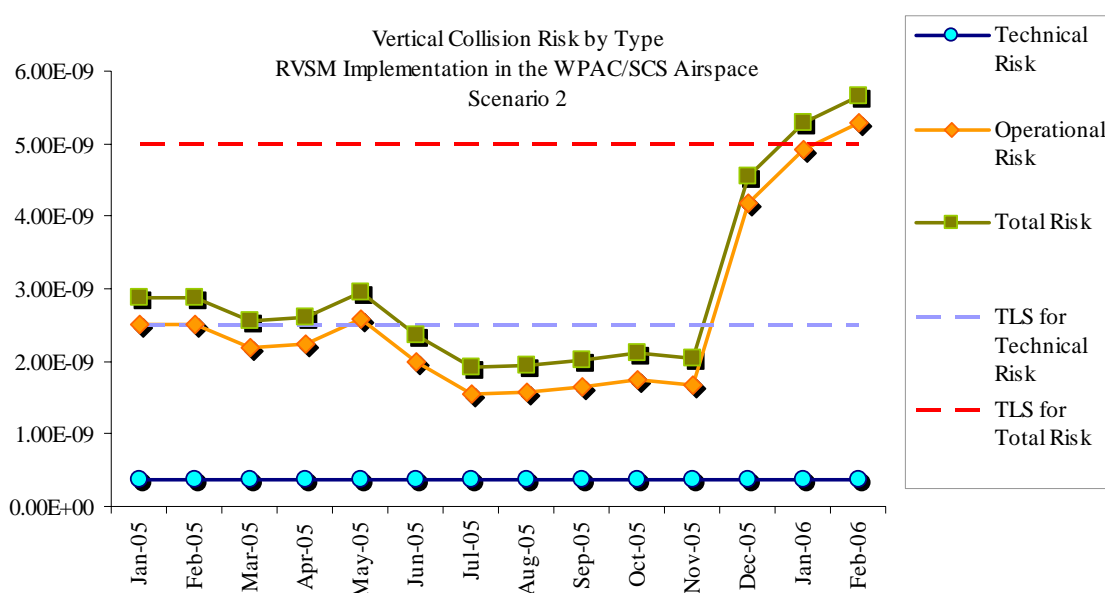


Figure 2: Trends of Risk Estimates for the RVSM Implementation in WPAC/SCS Airspace

5.18 Based on these collision risk estimates, the estimate of technical risks satisfies the agreed TLS values of no more than 2.5×10^{-9} fatal accidents per flight hour due to the loss of a correctly established vertical separation standard of 1,000 ft. However, the estimate of **overall risk exceeds the agreed TLS** values of 5.0×10^{-9} fatal accidents per flight hour due to all causes.

5.19 MAAR noted limitations in the assessment based on the lack of some TSD and LHD data, however informed the meeting that the situation in this respect had improved markedly, thereby increasing the reliability of the analysis.

5.20 The meeting thanked MAAR for the excellent assessment work undertaken by them in reviewing the BOB and the WPAC/SCS areas and for bringing the issues in relation to the WPAC/SCS exceeding the TLS to the attention of RASMAG. The meeting strongly endorsed the recommendation made to States by the MAAR regarding the need to mitigate identified LHD occurrences, fully endorsing MAAR's statement that:

Based on the LHD summary, it is important to note that the numbers of LHD occurrences and erroneous duration for aircraft operations in the WPAC/SCS RVSM airspace are extremely high. Therefore, MAAR strongly recommends all States concerned to put in place remedial actions to mitigate such significant errors on an urgent basis.

Report of Australia's RMA activities

5.21 Australia presented the results of a safety assessment of the Australian Domestic and Indian Oceanic Airspaces where a Reduced Vertical Separation Minimum (RVSM) has been introduced. In relation to the estimate of Technical Risk, the meeting was informed that for the Australian Domestic RVSM airspace this was determined to be 0.0142×10^{-9} fatal accidents per flight hour, and for the Indian Oceanic RVSM airspace 0.0135×10^{-9} . This is more than two orders of magnitude less than the required technical TLS in each case and highlights the situation already demonstrated by reports from PARMO and MAAR, that the technical risk is being easily met within the Asia/Pacific Region.

5.22 In relation to the assessment of operational errors, Australia explained that incident reports involving large height deviations were obtained from Airservices' incident data base and analyzed to determine the duration of the errors. This assessment revealed a total of 223.5 minutes of operational errors in the 12 month period to December 31, 2005, of which 194.5 minutes related to the Australian Domestic RVSM airspace, and 29 minutes to the Indian Oceanic RVSM airspace. Unfortunately this analysis shows that at the time of the assessment, **the overall vertical risk of 8.67×10^{-9} fatal accidents per flight hour did not satisfy the target TLS of 5×10^{-9}** , although this is lower than the previously assessed 12 month period to 31 December 2004 which was reported to RASMAG/3 as 9.26×10^{-9} .

5.23 Specifically, the meeting noted that of the total calculated minutes used in the risk calculation, 167.5 minutes (75%) were credited to just 7% of the reports with the category containing the highest assessed error time being that of 'M: Error in ATC-unit-to-ATC-unit transferred message'. This was the same as the assessments under taken by both PARMO and MAAR that also identified a similar trend.

5.24 Australia stressed the importance of any assessment clearly identifying factors that contribute to errors and for States ensuring that controls are put in place to minimize the likelihood of these errors occurring in the future. In following this process, the meeting was informed that Airservices Australia had identified a number of contributory factors related to the errors and that their RMA had reviewed the status of actions to implement controls.

Technical and Operational Error

5.25 In reviewing the reports of the three regional RMAs, it was apparent to the meeting that performance in terms of technical error was meeting a good standard throughout all areas. In no case had the technical TLS been exceeded and in general the technical TLS was achieved easily. This result suggested good airframe performance and was a credit to regional operators.

5.26 However, in terms of operational error the TLS was not being achieved in a number of areas. A consistent theme in the analysis of these errors was that of difficulties in ATC-to-ATC coordination, which accounted for a large proportion of LHD. The meeting encouraged all States to be aware that this ground-ground communication interface exhibited weaknesses in all the regional examples examined. Accordingly, undertaking investigations in this respect would be a logical point to start in attempting to reduce the instances of LHD.

5.27 In this regard, the meeting recognized the value of ATS Interfacility Data Communications (AIDC) between ATS facilities in reducing the potential for ground-ground coordination

errors by enabling routine coordination to be undertaken directly between the ATS equipment in respective ATC facilities. This removed the possibility of human readback and hearback errors, resulting in a decrease in coordination errors and associated decrease in LHD occurrences. In this respect the meeting drafted the following conclusion for consideration by APANPIRG/17.

Draft Conclusion 5/XX

That, in noting the prevalence of RVSM Large Height Deviation (LHD) occurrences resulting from ATC Unit-to-ATC Unit coordination errors, as reported by RMAs assessing RVSM operations within Asia Pacific Region, the Regional Office draws to the attention of States that investigations into LHD should concentrate in this area and that benefits would be achieved from the early implementation of AIDC between ATC Units in this regard.

Exceeding Target Levels of Safety

5.28 In noting that the RVSM TLS was being exceeded in both the WPAC/SCS and Indian Ocean airspaces, the meeting recalled discussions that had been held during RASMAG/3 (June 2005). RASMAG/3 had reviewed references in Annex 11, the Air Traffic Services Planning Manual (Doc 9426) and the Manual on Airspace Planning Methodology for the Determination of Separation Minima (Doc 9689) in this respect, noting guidance in respect to the derivation and application of TLS.

5.29 RASMAG/3 had held extensive discussions in relation to necessary actions if the outcome of airspace safety monitoring determined that the target level of safety had been exceeded. The meeting considered information provided in the ICAO Airspace Planning Manual, Doc 9426, Part II, Para 4.10.3.8. This information, while related to monitoring for minimum navigation performance specification (MNPS), was considered to be conceptually applicable.

... it must be kept in mind that the target level of safety is equivalent to an expectation of very long time intervals between collisions and that a small increase in the statistical probability of collision during a six (or even a twelve) month period can be therefore acceptable. Such an investigation may show that the causes for the large deviations can be eliminated by improved procedures. Such procedures should then be brought to the attention of the operators and/or air traffic controllers through the appropriate channels. Results should then be closely observed.

5.30 Similar information was detailed in the ICAO Manual on Airspace Planning Methodology for the Determination of Separation Minima, Doc 9689, paragraph 8.10:

If monitoring demonstrates that performance is outside the established limits, remedial action will need to be instituted to restore the system to conformance. A number of options may be considered, namely:

- a) improving training programmes for individual operators or ATS providers;*
- b) changing ATC operating procedures;*
- c) limiting demand;*
- d) modifying the route structure or airspace classification (level of ATS provided); or*
- e) increasing separation minima.*

5.31 It was therefore agreed by the meeting that a single event in which airspace safety monitoring identified that the target level of safety had been exceeded, was not sufficient cause to cease the application of the separation minimum. RASMAG/5 highlighted that fluctuations about the TLS should serve as a warning bell to prompt intensive investigation of the circumstances, not as an on-off switch to suddenly continue or discontinue RVSM operations. However, it would be important to consider use of the steps stated above, continue monitoring and re-assess the safety on a regular basis to ensure that there was not an unsafe trend.

5.32 In this context, the meeting noted that the TLS in the WPAC/SCS was showing an adverse trend, despite the concerns of RASMAG having been brought to the attention of affected States by State Letter T3/10.0, T3/10.1.17 – AP117/05 (ATM) on 21 November 2005 under the terms of APANPIRG Conclusion 16/3, as follows:

Large Height Deviations – Western Pacific/South China Sea area

That, in noting the prevalence of RVSM large height deviation occurrences in the Western Pacific/South China Sea area, the Regional Office draw the attention of all States concerned to identify and put in place remedial actions to mitigate such significant errors on an urgent basis.

5.33 Although it was understood that the States involved had acted upon the above conclusion, the meeting considered that further action was necessary to establish and correct the reasons behind the high number of LHDs in this area. Accordingly, in order to again alert the States involved to the circumstances and request their assistance in investigating the matter, the meeting drafted the following conclusion for consideration by APANPIRG/17 in August 2006:

Draft Conclusion 5/XX

That, in noting the continuing prevalence of RVSM large height deviation occurrences in the Western Pacific/South China Sea area despite the actions taken as a result of APANPIRG Conclusion 16/3, the Regional Office again draws the attention of all States concerned to urgently identify and put in place remedial actions to mitigate such significant errors.

Report of PARMO's RMA activities

5.34 The Pacific Approvals Registry and Monitoring Organization (PARMO) provided an update to the meeting based on their 1st quarter 2006 report, including a summary of large height deviation reports, results of traffic data analysis, and an estimate of vertical risk for the airspace. The report covers the current reporting period, April 2005 through March 2006, in the PARMO's ongoing process of providing quarterly updates of information relevant to the continued safe use of the RVSM in Pacific and North East Asia airspace.

5.35 Six risk-bearing large height deviations not involving whole numbers of flight levels were reported to the PARMO during the reporting period. The cause of one deviation was reported as pilot response to Traffic Alert and Collision Avoidance System (TCAS) or Airborne Collision Avoidance System (ACAS) resolution advisories. The causes of four deviations were reported to be turbulence or other weather-related cause and the cause of one deviation was an engine surge.

5.36 Additionally, thirty-one risk bearing large height deviations involving whole numbers of flight levels were reported to the PARMO during the reporting period. Of these, thirteen of the thirty-one errors were related to ATC transition messages. Ten of the errors were reported to be flight level errors in

air traffic control (ATC)-unit-to-ATC-unit transition messages. Three additional errors were caused by a negative transfer received from another ATC-unit. Over 32 percent of the large height deviations involving whole numbers of flight levels were attributed to errors in the ATC-unit to ATC-unit transition messages.

Pacific Airspace

5.37 The vertical collision risk was estimated in order to determine whether the target level of safety (TLS) continued to be met in Pacific airspace, thus supporting the ongoing safe application of RVSM in Pacific airspace. The technical risk remained unchanged with a value of 0.0932×10^{-9} fatal accidents per flight hour. The operational risk estimate is 2.64×10^{-9} fatal accidents per flight hour. The estimate of the overall vertical collision risk was 2.73×10^{-9} fatal accidents per flight hour. **This estimate was roughly 47 percent below the regionally agreed TLS value of 5.0×10^{-9} fatal accidents per flight hour.** This new estimate was based on the most-recent 12 months of large height deviation reporting.

5.38 **Figure 3** provides the PARMO's updated risk estimates for Pacific RVSM airspace based on recent reports of large height deviations.

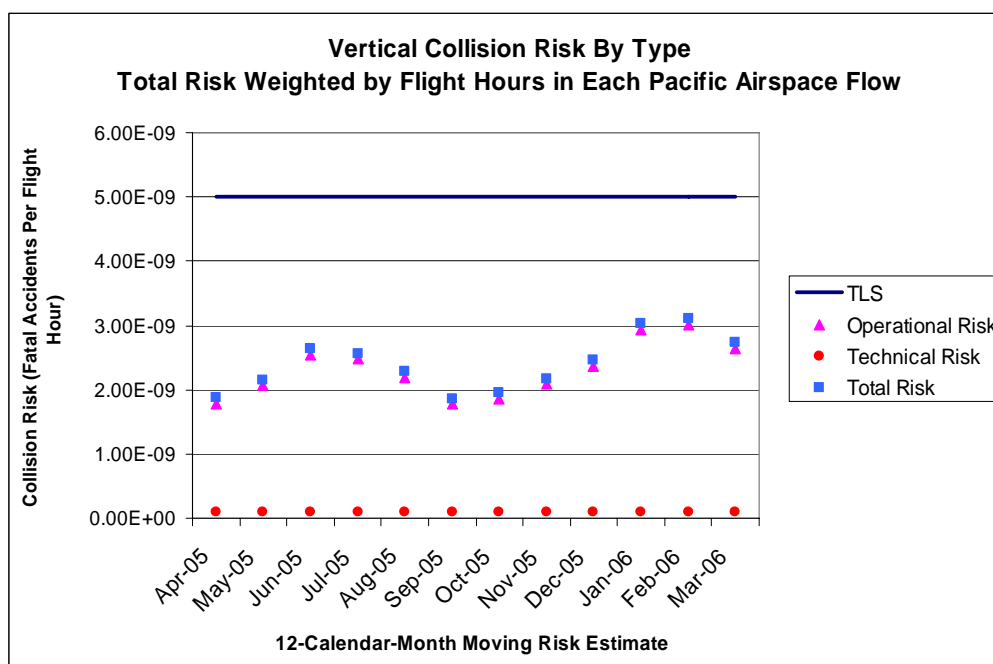


Figure 3. Vertical Collision Risk for Pacific RVSM Airspace

North East Asia Airspace

5.39 The collision risk estimate for North East Asia airspace was presented at the Twenty-Seventh Meeting of the ICAO RVSM Implementation Task Force by MAAR. The technical risk was reported to be 8.08×10^{-10} fatal accidents per flight hour. The operational risk estimate was reported to be 2.80×10^{-9} fatal accidents per flight hour. The estimate of the overall vertical collision risk was 3.60×10^{-9} fatal accidents per flight hour. **The estimate of the overall vertical collision risk was roughly 28 percent below the regionally agreed TLS value of 5.0×10^{-9} fatal accidents per flight hour.**

5.40 **Figure 4** presents the MAAR trends of collision risk estimates for each month using the appropriate 12-month interval of LHD reports since January 2005.

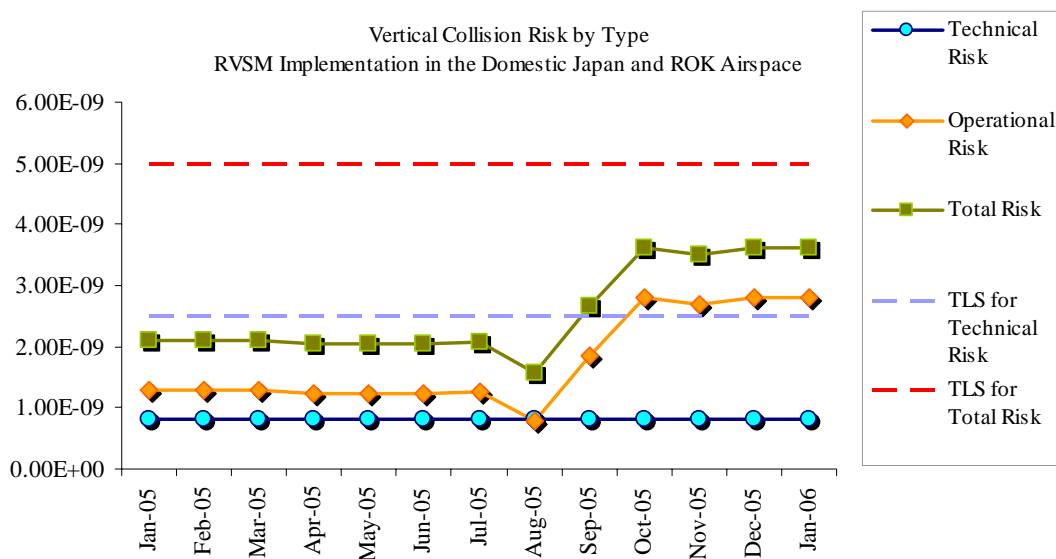


Figure 4: Trends of Risk Estimates for the RVSM Implementation in Japan/ROK Domestic Airspace

Establishment of Safety Monitoring Agency (SMA) for the Asia Region

5.41 The meeting recalled that during RASMAG/4 (October 2005), the following matters regarding MAAR's intention to assist ICAO and States regionally in the safety monitoring of RNP-based horizontal-plan separation minimum application in the Asia Region were discussed:

- Thailand updated RASMAG/4 in respect of the progress being made towards the establishment of a SMA for the Asia Region, following up MAAR's intention to fulfill the role of SMA to support the implementation of RNP-based horizontal-plane separation minima in the Asia Region in addition to its current RMA duties.
- Thailand reported that they had undertaken consultation with the FAA Technical Center regarding the possibility of transferring the technical knowledge for the implementation and operation of reduced horizontal separation. These consultations had been positive and the FAA confirmed that they were willing to provide the required technical support and training for the MAAR personnel to be able to carry out the SMA services.
- MAAR proposed the action plan for the establishment of SMA services based on the technical capability and prior experience of the RMA for the RVSM implementation in the Asia Region.
- MAAR also advised the meeting that two training phases were proposed to ensure the quality of the SMA services. The programme for the first training has been provided, while the programme for the second phase would be determined at a later stage.
- MAAR reported that in order to expand its role to provide SMA services in addition to the RMA services currently provided at no charge, MAAR would require financial support on a cost-recovery basis.

5.42 The RASMAG/4 meeting had commended MAAR on its performance as an RMA and considered that it was likely that any additional services provided by MAAR could reasonably be expected to be of a similar quality. In noting expressions of support from a number of States represented at the RASMAG/4 meeting, including Australia, Hong Kong China, India, Japan, Singapore and the United States, as well as the Regional Office, RASMAG/5 again supported the initiatives of Thailand and encouraged MAAR to proceed in accordance with the proposal as presented to the meeting.

5.43 RASMAG/4 noted that the Thailand proposal should be brought to the attention of the respective ATS Coordination Groups and the ATM/AIS/SAR Sub Group. Accordingly, the BBACG/17 meeting (January 2006) and the SEACG/13 meeting (May 2006) had been briefed as to the proposals and the ATM/AIS/SAR/SG/16 would also be informed.

MAAR SMA Progress Report

5.44 The estimated cost of SMA establishment is provided in **Table 3** below. The total costs represents all of the expected expenses incurring in the SMA establishment and ongoing services, which include the setup, operating (meeting and coordination), and staff-wage costs.

Cost Items	Estimated Cost (US Dollar)	
	Initial Setup (2006-07 Combined)	Per-Year After Initial Setup (Starting 2008)
Setup Cost-Training	40,000	-
Setup Cost-System and Equipment	10,000	-
Operating Cost-Coordination/Task Force Meetings	25,000	40,000
Staff Wages	80,000	60,000
Total cost	155,000	100,000

Table 3: Total Cost of SMA Establishment

5.45 FAA and AEROTHAI have recently completed formal modification to the existing United States-Thai agreement covering FAA-AEROTHAI cooperation in the RVSM airspace safety monitoring. Upon the completion of the FAA-AEROTHAI agreement, the first training was scheduled on 19 – 23 June 2006. The provisional agenda for this training is provided in **Appendix I** and the updated action plan for the establishment of SMA services is provided in **Appendix J**.

Expanded Airspace Monitoring and Assessment Capability – Japan

5.46 Japan informed the meeting that JCAB had developed its functions and capabilities required for the safety assessment and monitoring in the areas of Reduced Vertical Separation Minimum (RVSM), reduced horizontal (lateral and longitudinal) separation minima using RNP and aircraft separation applications using data link, *e.g.* ADS and CPDLC as follows:

- a) **RVSM:**
JCAB conducted pre- and post-implementation assessment for the domestic RVSM implementation on 29 September 2005. This function does not include program for oceanic airspace operations;
- b) **RNAV/RNP:**
JCAB conducted pre-implementation assessment for RNP10-based lateral separation reduction in NOPAC and CENPAC, and assessment for further reduction based on RNP4 operations in the oceanic airspace is under way;

- c) ADS/CPDLC:
JCAB established CRA for Tokyo FIR in 2001 as part of IPACG FIT programme, while FAA established CRA for Anchorage and Oakland Oceanic FIRs. JCAB had conducted data link operational trials since 1997, and had recently concluded the trials and would commence regular operations from 6 July 2006.

5.47 Accordingly, JCAB considers it essential to strengthen its functions and capabilities in the area of airspace safety assessment and monitoring in view of providing such services within the entire airspace of Fukuoka FIR as minimum. At present, JCAB is planning the following:

- a) RVSM assessment and monitoring functions will include the oceanic airspace in the Pacific within Fukuoka FIR. This arrangement will be similar to the current arrangement for Brisbane and Melbourne FIRs by Airservices Australia, which has been recognized by APANPIRG as one of three RMAs in the region;
- b) JCAB will consider the potential need for setting up ground-based height monitoring units (HMU) if justified. This HMU is considered to enhance RVSM monitoring capability in Asia region;
- c) JCAB developed the “RNAV Roadmap” in April 2005, and will progressively implement RNAV/RNP routes in the domestic airspace. Safety assessment and monitoring programmes will be part of this implementation;
- d) JCAB will continue IPACG FIT activities in coordination with FAA with the aim of reducing longitudinal separation to 30NM in Pacific; and
- e) CRA Japan offered the provision of CRA services for FIT-SEA, and this offer was accepted by FIT-SEA. Japan will commit to the provisions of such CRA services in the South China Sea area as defined by its Terms of Reference and Work Programme.

5.48 Japan informed the meeting of its intention to fulfil the responsibility of providing airspace safety assessment and monitoring services for RVSM and RNAV/RNP within Fukuoka FIR by strengthening the current capabilities in terms of staffing, system equipment, expertise, etc. Thus, JCAB wished to be recognized as a regional monitoring agency (RMA) for RVSM and a safety monitoring agency (SMA) for RNP in the region when JCAB becomes fully capable of providing the services. Japan is considering whether safety assessment and monitoring services for RVSM and RNAV/RNP would be able to be provided to other FIRs beyond Fukuoka FIR in the future.

5.49 Japan agreed to update each meeting of RASMAG in regard to the progress of these initiatives.

Regional Safety Monitoring Groups Required

5.50 The meeting recalled that RASMAG/1 (April 2004) had agreed that, in addition to RMA services, it was necessary to establish safety monitoring groups to undertake the safety management programmes for the application of RNP, data link services and related separation minima.

5.51 In addition to arrangements involving the existing MAAR, PARMO and Airservices Australia RVSM RMA's and the Datalink CRA's being established for the Bay of Bengal and South-East Asia areas, the following areas were identified as still requiring a safety monitoring group to be established for airspace safety monitoring services and safety assessments in the Asia/Pacific Region:

- a) South China Sea area –for the safety assessment of the RNP 10 route structure and reduced horizontal separation, and application of data link services;
- b) RNP 10 routes across the Bay of Bengal area – for the safety assessment and monitoring of the routes, reduced horizontal separation, and application of data link services;
- c) RNP 10 routes from Southeast Asia to the Middle East – for the safety assessment and monitoring of the routes, reduced horizontal separation, and application of data link services;
- d) Some FIRs in the Pacific Region required further investigation to determine the safety services to be established.

5.52 In this respect the meeting welcomed the advice by both Thailand in respect of their intention to proceed with the addition of SMA capability and Japan in respect of their intention to provide RMA services for international airspace in the near term, and to expand capability to provide both SMA and CRA services internationally in due course. IATA expressed their support for these initiatives, noting that a wider availability of these services would eventually allow States more choice in selecting a provider for these types of services.

5.53 The meeting supported the initiatives by both States, agreeing that under its TORs RASMAG could inform APANPIRG that RASMAG considered both States as competent and capable in the provision of these airspace safety monitoring functions. The meeting congratulated both States and encouraged them to continue their preparations in this regard and to advise the Regional Office and RASMAG once the respective monitoring functions became available.

5.54 In order to provide a clear picture of which safety monitoring services were available regionally and from which agency, the meeting agreed to create and maintain a list (**Appendix K** refers) showing the name of the agency, State, services provided and areas of responsibility in addition to other relevant information. In the case of the new initiatives being pursued by Thailand and Japan, these should be included in the record with an anticipated commencement date for the services.

Safety assessment for RNP10 Operations in the SCS area

5.55 The meeting reviewed the status of the safety assessment for RNP10 operations in the SCS area, noting that APANPIRG/16 had been advised that a safety assessment had not been undertaken since implementation of the revised route structure in November 2001, more than 4 years ago.

5.56 Although attempts had been made during RASMAG/4 to arrange that a horizontal assessment be conducted on a one-off assistance basis by Airservices Australia, arrangements were still not in place and the safety assessment work had not commenced. Australia indicated to the meeting that as a result of a change in organizational priorities, the resources required for this assistance work would need to be re-assessed and it was likely that assistance may not be available in the short term.

5.57 In light of the progress being made by MAAR towards SMA capability, the meeting considered that the MAAR SMA would be in a position by the third quarter of 2006 to undertake such a horizontal safety assessment. Accordingly, the meeting requested that this information be made available to the States involved to assist them in addressing their safety responsibilities in this regard and drafted the following Conclusion for consideration by APANPIRG:

Draft Conclusion 5/XX

That, recognizing that no horizontal safety assessment for the South China Sea route structure has been conducted since implementation in 2001, the Regional Office draws this to the attention of concerned States, provides information in respect of the near term availability of SMA services in the Asia region and urges the completion of a horizontal safety assessment in accordance with ICAO ATS safety management provisions at the earliest opportunity.

Completion of Datalink Trials in Japan

5.58 Japan updated the meeting in relation to the ATS data link trials that had commenced in 1997 using the ODP (Oceanic Data Processing) Version 2.5 System. Since then, the trials had continued and were planned to be completed in July 2006 upon implementation of regular operations.

5.59 In support of the trials, the Informal Pacific ATC Coordinating Group (IPACG) established the IPACG FANS Interoperability Team (FIT) in 2000, and this FIT agreed to establish the Central Reporting Agencies (CRAs) for Tokyo (now Fukuoka) FIR by Japan and for Anchorage and Oakland FIRs by USA in early 2001.

Trend of ATS Datalink Operation

5.60 The number of ATS data link aircraft operating in the Japanese FIR in April 2002 was about a hundred (100) per day which accounted for 28% of total traffic. Three years later in April 2005, it was 190 aircraft per day accounting for 43% of total traffic. Assuming traffic increases continued at the same rate, the FANS aircraft operating in the Japanese FIR would exceed 90% of total traffic by 2010. The number of CPDLC and ADS messages has increased almost at the same rate as that of the ATS data link aircraft.

System Performance

5.61 The JCAB CRA had monitored the ATS data link system performance. The result of analyses of the CPDLC and ADS data indicates that the system performance has generally met the requirements prescribed in FANS-1/A Operations Manual (FOM). Although there were some performance data slightly lower than the criteria, measures have been taken by JCAB to cover these deficiencies with operating procedures and system upgrades.

Problem Reports

5.62 The number of Problem Reports (PRs) received from ATSU and aircraft operators were approximately four hundred (400).

5.63 For convenience of analyzing trends, the PRs were sorted into four categories, namely ADS, CPDLC, connection, and message delivery. The number of problems categorized in the ADS and the connection has decreased; on the other hand, the problems relating to the message delivery have increased. There were some factors involved in the message delivery problems. The typical causes for the message delivery failure were as follows:

- a) ground facility performance of a datalink service provider;
- b) unstable link with the aircraft flying near the fringe areas of VHF coverage;
- c) interface deficiency among datalink service providers;
- d) message stuck on the specific avionics in specific situations;

- e) mixed use of HF data link by aircraft; and
- f) unscheduled system stoppage of ground systems.

Summary of trials

5.64 With the system performance analysis and the problem reporting program carried out by the CRA, the trends and causes of individual problems were identified, and most of them were resolved. JCAB as the ATC service provider took measures with supplementary procedures and systems upgrade to cover these deficiencies. The CRA disseminated the information to the FIT stakeholders on the lessons learnt which were identified from the PRs.

Recommendation made by Final Report

5.65 The final report on trials concluded that the trials demonstrated satisfactory performance, and recommended to JCAB that the ATS data link trials be terminated and regular operations should commence in the oceanic airspace of Fukuoka FIR.

5.66 As a consequence of the implementation of full ATS datalink operations in the oceanic area, JCAB intends to reduce the longitudinal separation minimum from time-based 15 minute separation to distance-based 50 NM separation using ATS datalink, as of 6 July 2006.

5.67 Details of ATS Datalink operations and reduction of longitudinal separation minimum are described in the AIP-Japan GEN3.3-29 – 36, and ENR3.6-32, which was published on 11 May 2006 and will become applicable on 6 July 2006.

5.68 The meeting congratulated Japan on this implementation, noting the benefits that would immediately accrue to operators in the airspace. Recognizing that the adjacent Oakland FIR was also capable of 50NM longitudinal separation, the meeting urged Japan and the USA to continue coordination with the objective of implementing end-to-end 50NM longitudinal separation as soon as possible.

Implementation of 50NM Longitudinal – Japan

5.69 The meeting was informed that JCAB had recently presented a comprehensive working paper in respect to the ENRI fast-time simulation conducted to predict the traffic in the environment of 50NM longitudinal separation minimum to the Ninth Meeting of the Working Group of the Whole of the Separation and Airspace Safety Panel (SASP), which was held in Montreal, Canada, from 22 May to 2 June, 2006.

5.70 The simulation utilized the traffic sample data (TSD) from financial year 2004 (April 2004-March 2005) with an assumption that the surveillance update rate of position information by Automatic Dependent Surveillance-Contract (ADS-C) was set at 27 minutes.

5.71 The maximum estimated collision risk was evaluated based on January 2005 TSD and the result was 4.46×10^{-10} [fatal accidents/flight hours] when the update rate of position information was 27 minute intervals. This is less than the target level of safety (TLS) 5.0×10^{-9} [fatal accidents/flight hours], which was regionally agreed upon by APANPIRG.

5.72 JCAB reviewed this result and concluded that 50NM longitudinal separation should be implemented in a phased manner in the oceanic airspace in Fukuoka FIR. As the first step, 50NM longitudinal separation minimum will be applied between ADS/CPDLC equipped aircraft on ATS routes R580 and R220 on 6 July 2006. This application will be expanded to other ATS routes and airspace after gaining operational experience.

State focal point for safety-related activities

5.73 The meeting was informed that ICAO had placed considerable priority on identifying and rectifying deficiencies and strongly supported the sharing of safety data. APANPIRG/16 had considered that with the expansion of the USOAP during 2005 in the Asia/Pacific Region and in view of the persistence of operational deficiencies as reported by IATA, a renewed effort should be made by States to take proactive action in tackling such deficiencies. In adopting Conclusion 16/62, APANPIRG/16 considered that an important step in this process would be to provide to the Regional Office a contact address and name of a suitable person in respective State administrations who would respond in a timely and effective manner in addressing operational deficiencies notified by operators.

5.74 The meeting noted that the Regional Office had established data base of 'Safety Contact Officers' called for under APANPIRG Conclusion 16/62, and was invited to identify responsible State Safety Contact Officer (s) and submit contact details to the Regional Office for inclusion in the database, a copy of which has been included as **Appendix L**. The meeting agreed that highlighting the name of a suitable individual and their direct email address, in addition to the office held, was extremely import in increasing the speed and effectiveness of communications.

Agenda Item 6: Review of regional safety assessment activities/requirements**Twenty Eighth Meeting of the RVSM/TF – FLOS Review**

6.1 The meeting reviewed the discussion at the Twenty Eighth Meeting of the ICAO RVSM Implementation Task Force (RVSM/TF/28, April 2006), held in April 2006, recalling that this FLOS review meeting had been delayed for twelve months because the lack of safety data from some States had meant that MAAR had been unable to complete suitable safety assessments.

6.2 RVSM/TF/28 reviewed the current flight level allocation system (FLAS), alternative Scenario 1 developed at RVSM/TF/22 (September 2004, Bangkok), and additional Scenario 2 proposed at SCM RVSM FLOS (September 2005, Bangkok).

6.3 RVSM/TF/28 was informed that Scenario 2 was essentially the same as Scenario 1 but with minor FLAS change on ATS Routes A1 and P901. MAAR clarified to RVSM/TF/28 that in Scenario 2, in order to eliminate existing flight level transition issues while achieving acceptable capacity and risk level on A1 and P901, two flight levels were taken out for each direction of flight to accommodate flights on routes crossing A1 and P901. It was noted that the decision on flight levels to be removed could be left to States concerned.

6.4 Although the Philippines had originally supported Scenario 1, they now wished to continue to operate with the current FLAS. Furthermore, the Philippines advised the meeting of its desire to adopt the single alternate FLOS without any modification in the Manila FIR. After deliberation on the current and proposed FLAS in terms of safety, capacity, regularity, transition workload, operations and harmonization, with the withdrawal of the support for Scenario 1, RVSM/TF/28 could not reach consensus to adopt the new FLAS proposed by the Philippines and Thailand at RVSM/TF/22.

6.5 However, RVSM/TF/28 agreed that the endeavor to address the concerns expressed by several States should be continued. In this regard, with the completion of the one-year review for the WPAC/SCS airspace, SEACG/12 May 2005 had noted that the RVSM/TF was no longer involved with RVSM operations in this area, therefore SEACG was required to continue to provide oversight of RVSM matters. SEACG/13 would be kept up to date on the RVSM issues.

6.6 RVSM/TF/28 expressed appreciation to MAAR for the tireless work to conduct the safety assessment for the new FLAS in the SCS area. To facilitate MAAR in conducting the safety assessment on the proposed FLAS in the future, the meeting agreed that the States concerned should finalize and agree the details of the proposed FLAS before requesting MAAR to conduct the safety assessment.

6.7 Hong Kong, China suggested to RVSM/TF/28 that a dedicated body be established under the auspices of ICAO to pursue measures/options to address concerns of several States in relation to the transition and capacity under the current FLAS arrangement in the SCS area. In light of the foregoing, the Secretariat advised RVSM/TF/28 that the States consult each other and when the States concerned agree on a finalized FLAS an ICAO meeting could be convened.

6.8 In considering the circumstances, RASMAG/5 expressed concern at the number of LHDs reported in this area and the possibility that they may be related in some way to the difficulties with the FLOS interfaces. Although no direct evidence could be provided in this respect, the meeting urged States to convene the dedicated body described above at the earliest opportunity and to conduct an airspace safety assessment in accordance with the provisions of Annex 11 and the Safety Management Manual (Doc 9859). This structured safety management process would identify hazards associated with the airspace and enable the identification of appropriate risk controls and mitigations that should be implemented. The meeting requested that RASMAG be kept fully apprised of progress in this regard.

Post-implementation RVSM safety assessment – Japan/Republic of Korea

6.9 Japan updated the meeting in respect to the post-implementation safety assessment of the RVSM implementation in the Japan domestic and Republic of Korea airspace on 29 September 2005, as presented at the Twenty-seventh Meeting of RVSM Task Force (RVSM/TF/27 90-day review, Feb-March 2006). Japan had conducted the assessment for the airspaces under Japan’s jurisdiction.

6.10 From July 2004 to January 2006 JCAB received 13 LHD reports. 6 LHD were caused by ATC operational errors relating to transfer (TRF) between ATC units, cooperative actions were undertaken by the ATC units concerned with the aim of preventing further recurrence of similar error after the October 2005 case.

6.11 The results of the post implementation safety assessment for the 19-month period (July 2004-January 2006) as well as the 12-month period (February 2005-January 2006) of the Japanese domestic RVSM airspace are shown in **Tables 4 and 5** respectively.

Table 4: Risk Estimates for the last 19-month period of the Japanese domestic RVSM airspace

Source of Risk	Lower Bound Risk Estimation [accidents / flight hour]	TLS [accidents / flight hour]	Remarks
Technical Risk	0.48×10^{-9}	2.5×10^{-9}	Satisfies Technical TLS
Operational Risk	2.5×10^{-9}		
Overall Risk	3.0×10^{-9}	5.0×10^{-9}	Satisfies Overall Risk

Table 5: Risk Estimates for the last one year (12-month) of the Japanese domestic RVSM airspace

Source of Risk	Lower Bound Risk Estimation [accidents / flight hour]	TLS [accidents / flight hour]	Remarks
Technical Risk	0.48×10^{-9}	2.5×10^{-9}	Satisfies Technical TLS
Operational Risk	2.9×10^{-9}		
Overall Risk	3.4×10^{-9}	5.0×10^{-9}	Satisfies Overall TLS

6.12 MAAR also provided the results of 90-day airspace safety oversight for the Incheon FIR for the RVSM implementation in the Japan and the Republic of Korea airspace. **Table 6** below summarizes the results of the risk assessment in terms of technical, operational, and total risks for the RVSM implementation in the Japan and the Republic of Korea airspace conducted by MAAR.

Table 6: Risk estimates for the RVSM implementation in the Japan and the Republic of Korea Airspace

Source of Risk	Lower Bound Risk Estimation	TLS	Remarks
Technical Risk	0.808×10^{-9}	2.5×10^{-9}	Satisfies Technical TLS
Operational Risk	2.80×10^{-09}	-	-
Total Risk	3.60×10^{-09}	5.0×10^{-9}	Satisfies Overall TLS

6.13 Based on the provided collision risk modeling input and estimated collision risks, both technical and total risks satisfy the agreed TLS value of no more than 2.5×10^{-9} and 5.0×10^{-9} fatal accidents per flight hour due to the loss of a correctly established vertical separation standard of 1 000 ft and to all causes, respectively.

6.14 RVSM/TF/27 also examined the readiness of PARMO to assume the duties and responsibilities of RMA to support the continued safe use of RVSM in the Japanese and the Republic of Korea airspace, and concluded that the responsibilities of RMA for the Japan and the Republic of Korea airspace be reverted from MAAR to PARMO as previously agreed. It was agreed that Japan and the Republic of Korea would continue to provide MAAR with the LHD data.

Establishment of Central Reporting Agency (CRA) for FIT-SEA

6.15 Japan informed the meeting that, in considering the establishment of a CRA for the FIT-SEA, the generous offer by CRA Japan to provide CRA services to the FIT-SEA for operations in the SCS area was accepted by the participating States present during the Second Meeting of FIT-SEA (FIT-SEA/2) in April 2005, including the Philippines and Singapore, and was strongly supported by the Regional Office as well as IATA and IFALPA. Subsequently Indonesia and Viet Nam, who were not present at FIT-SEA/2, were advised by the Regional Office in this regard and had also accepted the offer from CRA Japan.

6.16 FIT-SEA/3 noted that services to be provided by the CRA Japan would be on a voluntary and temporary basis until a formal CRA was established, and adopted the terminology FIT-SEA CRA for the services provided by CRA Japan for the SCS area.

6.17 It was agreed that the geographical area of FIT-SEA CRA services shall be defined as “the FIT-SEA CRA will provide CRA services for the airspace within the Ho Chi Minh, Manila and Singapore FIRs, where implementation of ADS/CPDLC technologies is considered to enhance surveillance and communications capability, leading to significant benefits for operational efficiency and regularity of flights in the South China Sea area.” Specific route segments where an ADS/CPDLC trial could be planned would be determined by respective States in due course and would be advised to FIT-SEA and the FIT-SEA CRA.

6.18 In addition, FIT-SEA/3 recognized that procedural separation had been applied on ATS routes in the Sanya AOR and consequently any reduction of separation may not be possible in its adjacent FIRs utilizing ADS/CPDLC in the future. In this regard, it was considered crucial for FIT-SEA to have China involved in the future development of the ADS/CPDLC trial in the South China Sea area.

6.19 SEACG/13 held in May 2006 noted the establishment of FIT-SEA CRA and other relevant activities by FIT-SEA.

Scrutiny Group 30/30 Oakland FIR – USA

6.20 On 22 December 2005, the U.S. Federal Aviation Administration (FAA) implemented 30NM lateral and 30NM longitudinal separation standards on an operational trial basis in a portion of the Oakland Oceanic Flight Information Region (FIR). The operational trial, which is planned to last for a nominal period of one-year, permits the FAA to evaluate the relevant performance of aircraft with suitable State approval for participation in the trial, as well as operation of the new Ocean21 oceanic automation system introduced into full-time operation at the Oakland Air Route Traffic Control Center on 17 October 2005. The implementation followed all guidelines in outlined in Annex 11 of the Convention on International Civil Aviation and the International Civil Aviation Organization (ICAO) Doc 4444.

6.21 As part of the operational trial, the FAA had formed a group of experts to evaluate performance of the various components of the system supporting the reduced separation minima. This group has been termed the “30-30 Scrutiny Group”, more simply known as the Scrutiny Group. The Scrutiny Group is chaired by FAA Flight Standards Services and has representatives from various groups within the FAA, such as the Oakland and Anchorage ARTCC, Flight Standards Services, Aircraft Certification Service, Oceanic Enroute Procedures, FAA Technical Center, and support contractors.

6.22 This group has met twice since the start of the operational trial, agreeing on terms of reference (**Appendix M refers**). The group has reviewed pertinent data from a number of sources and has developed a list of action items (**Appendix N refers**) based on review of these data. The FAA Technical Center has assembled data from a number of sources:

- Ocean21 data reduction archives
- Enhanced Traffic Management System
- Technical Center archives of ZOA enroute radar data
- FAA accident and incident databases
- NASA Aviation Safety Reporting System

6.23 Ocean21 data reduction archives cover all of Oakland oceanic center operations. As a consequence, while the operational trial is being conducted only in Oakland Oceanic Sector 3 (OC3), data pertinent to the performance of key systems are available for all of Oakland-controlled international airspace.

6.24 The meeting noted the thoroughness of the work being undertaken by the Scrutiny Group in monitoring and assessing many parameters of the 30/30 operational trial. Although the performance of the trial to date was generally in accordance with what had been anticipated, the analysis provided by the Scrutiny Group was valuable in demonstrating the safety of the operation. The meeting expressed appreciation to the USA for sharing the material and would appreciate being kept up to date in terms of the conduct of the trial.

6.25 The meeting expressed support for the concept of a Scrutiny Group and thanked the United States for the copies of the Terms of Reference and list of action items from the 30/30 Group. It was anticipated that a similar scrutiny group would bring benefits to the various implementations occurring throughout the region and, in particular, may serve as a valuable means of progressing the difficulties in the WPAC/SCS area in terms of the FLOS and LHD issues discussed previously in this report. In order to retain a focus in this respect, an item was added to the task list in this respect.

Long Term Monitoring of Height Performance

6.26 The USA informed the meeting that the NAT OPS/AIR Sub-Group consisted of representatives from State regulatory authorities, the major aircraft and avionics manufacturers, aircraft design organizations and RVSM regional monitoring agencies (RMAs). In the late 1990's, the NAT Central Monitoring Agency (NAT CMA), the RMA for the NAT Region, began to report analysis of NAT results showing that the Altimetry System Error (ASE) of some airframes monitored over several years exhibited changes over time that could be characterized as a linear trend. In 2003, the European RMA, EUROCONTROL, began to report similar results to the NAT OPS/AIR Sub-Group.

6.27 The NAT OPS/AIR Sub-Group agreed that such trends violated a primary assumption underlying State approval of aircraft for RVSM operations: that the ASE of an airframe would be stable, or unchanging in value, over long periods of time. Accordingly, it launched studies through its membership to verify independently the changes ASE exhibited in monitoring results. Confirming the ASE trends, the Sub-Group then initiated further studies to explain the causes of this lack of ASE stability. It became evident from these studies that faults in altimetry system components were a major cause of observed ASE trends.

6.28 The NAT OPS/AIR Sub-Group has affirmed at several of its recent meetings that monitoring is highly valuable and should continue. The Sub-Group is in the process of developing changes to the State RVSM approval process which will strengthen maintenance requirements, expecting that monitoring will play a role in confirming that such changes have a beneficial effect on ASE stability.

6.29 At SASP's Ninth Meeting of the Working Group of the Whole (SASP-WG/WHL/9), 22 May through 2 June 2006, Project Team 2 reviewed the latest work of the NAT OPS/AIR Sub-Group and other matters pertinent to the determination of long-term monitoring requirements contained in Working Paper 28 of the Meeting (SASP-WG/WHL/9-WP/28). That document forms the **Appendix O** to this report.

6.30 The subsequent report of Project Team 2 to SASP-WG/WHL/9 in this respect forms **Appendix P** to this report. Section 3 of this appendix proposed that the SASP review the progress in developing long-term monitoring requirements and consider ways to bring the matter to completion. In particular, paragraph 3.6 of the appendix proposes that the SASP consider involving RMAs in the development process at its Tenth Meeting of the Working Group of the Whole, planned for Australia in November 2006. This involvement, it was noted, could be facilitated by augmenting the delegations of several SASP Member States which also provide RMA services to include RMA representatives at SASP/WG/WHL/10. After presentation of the report of Project Team 2, the Working Group of the Whole (SASP/WG/WHL/9) accepted the proposals presented in section 3 of Attachment 2.

6.31 In recognizing the importance of this matter, the RASMAG/5 meeting also gave in-principle support for such a meeting in order to progress the ASE issue. MAAR was the only one of the 3 current regional RMAs that was not represented on the SASP, but also expressed a strong interest in attending the meeting. The other RMAs had representation on the SASP and expected to either use this representation or send an extra official to the SASP meeting. Japan, as an imminent RMA was also represented on the SASP.

6.32 RASMAG/5 considered that the meeting in respect of the ASE issues comprised a completely separate and distinct meeting to that which had been referred to under ALLPIRG Conclusion 5/12 in relation to a meeting of Global RMAs for other purposes. Relevant parties at the meeting requested to be kept apprised of the progress of the arrangements in respect to the ASE meeting.

ICAO Training Courses on Implementation of Safety Management Systems in States

6.33 The meeting was informed that the Strategic Objectives of ICAO for 2005 to 2010 include Strategic Objective A: Safety – *Enhance global civil aviation safety*, Key Activity A8: *Support the implementation of safety management systems across all safety-related disciplines in all States*.

6.34 Work on Key Activity A8 has already started, with a proposal for harmonizing safety management provisions in Annex 6 — *Operation of Aircraft, Part I — International Commercial Air Transport — Aeroplanes*, and Part III — *International Operations — Helicopters*, Annex 11 — *Air Traffic Services*, and Annex 14 — *Aerodromes, Volume I — Aerodrome Design and Operations*. The ICAO *Safety Management Manual* (Doc 9859) had been developed as essential guidance material to support the implementation of the harmonized provisions relating to safety management in Annexes 6, Parts I and III, 11 and 14, Volume I.

6.35 In continuation of the work that builds upon the harmonized provisions and Doc 9859 discussed above, it was intended that the following critical tasks would be completed by ICAO over the next two years:

- a) analysis of all Annexes to assess the feasibility of developing Standards and Recommended Practices (SARPs) to support performance-oriented regulatory approach to the management of safety in States;
- b) development of model regulations to support a performance-based regulatory approach to the management of safety in States;
- c) development of guidance material for the integration of safety management programmes by national oversight authorities, as well as the application of safety management systems and practices in aviation organizations; and
- d) development and delivery of a programme of training courses in each ICAO Regional Office to assist States to implement the harmonized provisions discussed above.

6.36 This would complete the first phase of the implementation of Key Activity A8, planned to coincide with the next ordinary session of the ICAO Assembly in September 2007.

6.37 In the programme of training courses under paragraph 6.34 d) above, two training courses had been scheduled at the Asia and Pacific Regional Office during September 2006, as detailed in State Letter Ref: AP040/06 ATM transmitted on 29 May 2006. The courses would be facilitated by a team from ICAO Headquarters under arrangements with Captain Dan Maurino, Coordinator Flight Safety and Human Factors Programme. The two identical five-day Courses will be held consecutively, with the first Course from 4 to 8 September 2006 open to all States regionally, and the second Course from 11 to 15 September 2006 as a combined activity of the three regional COSCAPs (North, South and South East Asia).

6.38 Since it was expected that participants who successfully complete these courses would lead the implementation of SMS within their States, the course would include a final exam on a pass-fail basis and applicants would be reviewed for suitability based on qualifications and experience before participation in the course was confirmed.

6.39 The courses will build upon the harmonized safety management provisions and Doc 9859, in accordance with the course outline included as **Appendix Q**. The objective of the courses is to

develop participants' knowledge and understanding of safety management concepts and requirements for air operators, maintenance organizations, air traffic services providers and aerodrome operators, as well as to provide the means to assist with the implementation of the Standards and Recommended Practices (SARPs) on safety management.

Regional Special Implementation Projects

6.40 Special Implementation Projects (SIPs) are established under a special budget of the ICAO Assembly and are designed to assist States in overcoming problems of implementation, which may have significant adverse effects on the safety, regularity, or efficiency of international civil aviation. Approval for SIP funds is only granted by the ICAO Council after consideration of specific applications to Council in respect of individual projects.

6.41 The Regional Office had raised the following ATM related SIP proposals for consideration by the ICAO Council in the first quarter of 2006. During the first quarter 2006 the ICAO Council had granted approval for all three SIPs and the Regional Office would complete further coordination with States in due course with regard to the conduct of the SIPs.

- a) ATS Safety Management System Training;
- b) Development of State ATS Contingency Plans; and
- c) International SAR Seminar and SAREX – Pacific Islands.

6.42 The project and objective for the ATS Safety Management System Training are as follows:

Project: To formulate a two/three day ATS safety management workshop and deliver the workshop in-country to a minimum of three States.

Objective: To assist States to meet obligations for ATS safety management by facilitating a suitable ATS safety management workshop enabling practical hands on experience in the application of safety management techniques.

6.43 The project and objective for the Development of State ATS Contingency Plans are as follows:

Project: Project mission to one State to prepare ATS contingency planning arrangements in accordance with the provisions of Annex 11, Section 2.28.

Objective: To prepare and implement State ATS contingency planning arrangements for a single State to the point where the arrangements were ready to be tested during exercise by the State concerned. Finalization of ATS contingency plans would be accomplished by the State, subject to exercise outcomes. Following finalization, the process followed and documentation raised would be used to develop a model for use in a regional strategy.

6.44 The meeting was informed that in relation to State ATS Contingency Plans, coordination and arrangements had been made with Indonesia for this SIP to be conducted during July 2006 using a contracted SIP Official and it was anticipated that the output from the SIP would be made available to APANPIRG/17 in August for consideration as a regional model.

6.45 In relation to ATS Safety Management System Training, the meeting recalled that the conduct of the SIP was contingent upon support from a State or States in providing at least one fully funded State ATS Safety Management System expert who would be available to support the SIP

throughout. States were encouraged to discuss this with their administrations and forward information to the Regional Office in regard to the availability of suitable officers to assist with the SIP.

6.46 The meeting recognised that care would need to be taken in ensuring that the SIP programmes complimented the work of the ICAO Headquarters SMS Training Course that would be run at the Regional Office during September 2006, as reported above.

Review of RASMAG/3 ATS Safety Management Seminar

6.47 The meeting recalled that the 3-day RASMAG ATS Safety Management Seminar had been conducted from 8 to 10 June 2005 at the ICAO Asia/Pacific Regional Office, immediately following the RASMAG/3 meeting.

6.48 Subsequently, resource constraints meant that the original proposal envisaged by RASMAG under which a similar workshop would be delivered on-site in States around the region was not possible. Notwithstanding, RASMAG/3 recognized the value and quality of the material that had been delivered during the seminar and agreed that the three day seminar programme should be edited to provide a training aid that could be delivered over two days. RASMAG/4 commenced this work 'off-line' with the intention of selecting the topics from the seminar that should be retained or developed for further delivery.

6.49 In noting that the ATS SMS SIP had now been approved by the Council for implementation during 2006 and that two ICAO Training Courses on Implementation of Safety Management Systems in States would be conducted at the Regional Office during September 2006, the meeting considered that the work on editing the RASMAG/3 ATS Safety Management Seminar had been overtaken by events. Additionally, the Regional Office informed that it was likely that arrangements would be finalized with the Civil Aviation Department of Hong Kong China for the delivery of a combined SMS workshop during the first quarter 2007. The meeting requested that the Regional Office make the material from RASMAG/3 seminar available to the ATS SMS SIP and RASMAG/6 would further review the situation during the November 2006 meeting.

The First Meeting of the ICAO RNP Task Force (RNP/TF/1)

6.50 The meeting was provided with an overview of the First Meeting of the ICAO RNP Task Force (RNP/TF/1), which was held in Singapore from 13-15 March 2006. Singapore reported to RNP/TF/1 that attention of ATM/AIS/SAR/SG/15 (July 2005) was drawn to the significant increase in traffic volume that had been experienced on RNAV routes L642 and M771 in the South China Sea parallel route structure. In light of the increasing traffic volumes forecast for Asia and Pacific Region, the route capacity would be saturated during the peak periods. The meeting considered it essential to reduce horizontal separations to increase capacity in the whole South China Sea area and, as a start, reducing the longitudinal separation on RNAV routes L642 and M771 from 80 NM to 50 NM based on RNP 10 operations should be considered to enhance the route capacity as these routes had seen the largest increase in traffic volumes.

6.51 While it was important that the Task Force achieved its immediate objective to address the issue of increasing the capacity of the pair of routes by applying a 50 NM lateral/50NM longitudinal (50/50) separations, RNP/TF/1 recognized that it must not lose sight of the fact that this should be an interim step towards capacity enhancement and improved efficiency over the entire traffic flow between Southeast Asia and Northeast Asia.

6.52 Accordingly, RNP/TF/1 drafted Terms of Reference as follows:

Terms of Reference of the RNP TASK FORCE (now RNP-SEA/TF)

The objective of the Task Force is to:

Develop strategic, benefits-driven implementation plans in collaboration with stakeholders, to improve en-route airspace efficiency by means of reduced horizontal separation based on RNP operations within the Southeast Asia area, ensuring inter-regional harmonization.

To meet this objective the Task Force shall:

- a) Review the current South China Sea route structure and examine its suitability for application of reduced horizontal separation based on RNP operations.*
- b) Identify routes where the application of reduced horizontal separation would bring immediate operational efficiency*
- c) Determine the reduced horizontal separation required, taking into account the aircraft approval status of the traffic operating on the relevant routes, capacity increase desired, and communication and surveillance capability of ATS providers.*
- d) Examine the possibility of a phased implementation of reduced horizontal separation based on RNP operations and to detail the phases required and the areas/routes concerned.*
- e) Develop the necessary strategic plans to implement the agreed horizontal separation taking into account airspace user requirements, the need for inter-regional harmonization, and ICAO Standard and Recommended Practices.*
- f) Explore the possibility of further harnessing operational efficiency of the routes through re-configuration and enhanced surveillance.*
- g) Consider setting up appropriate teams/groups which might but not necessarily, include the entire Task Force, to address and implement specific agreed measures within their airspace; and*
- h) Cooperate with other Task Forces and groups which are involved with similar work in the adjacent airspace in order to achieve harmonized inter-regional solutions.*

Scope of Initial Work

The Task Force shall adopt a phase-by-phase approach, beginning with the 50 lateral/50 longitudinal separations based on RNP 10 operations on RNAV routes L642 and M771 as Phase 1.

The Task Force reports to the South East Asia ATS Coordination Group (SEACG).

6.53 The Thirteenth Meeting of the South East Asia ATS Coordination Group (SEACG/13, May 2006), as the parental body of the RNP/TF, reviewed and adopted the TOR of the Task Force as described above. SEACG/13 also discussed the proper title for the Task Force and adopted the name *South East Asia RNP Implementation Task Force (RNP-SEA/TF)* as it correctly reflected the TOR.

6.54 The meeting noted that the TOR of RNP-SEA/TF included an objective and list of actions associated with the implementation of reduced horizontal separation minima and felt it essential that the Task Force consider the safety implications of each such implementation or change. This was particularly pertinent in respect to APANPIRG Conclusion 16/5 under which implementation of reduced separation minima could only proceed where implementing States could demonstrate an ability to comply with Annex 11, Chapter 2 provisions. Accordingly, the meeting requested that the Regional Office draw this to the attention of the next meeting of the Task Force and propose the inclusion of a work item in the TOR that would ensure that formal safety assessments were carried out in accordance with Annex 11 provisions.

Bay of Bengal ATFM Operational Trial

6.55 The meeting noted the progress being made by the Air Traffic Flow Management Task Force (ATFM/TF) of the Bay of Bengal ATS Coordination Group (BBACG), towards the operational trial of an automated flow management tool for regulating the flow of traffic across the Bay of Bengal transiting the Kabul FIR during the night time peak traffic period (2000-2359UTC).

6.56 In addition to the large numbers of affected flights originating from India, Malaysia, Pakistan, Singapore and Thailand, ATFM/TF had identified specific cases of long haul flights originating from China, Hong Kong China, Viet Nam, Philippines and Indonesia that would transit the Kabul FIR during this period.

6.57 During the Special ATS Coordination Meeting for the Bay of Bengal ATFM Operational Trial (SCM BOB ATFM TRIAL) held on 16-17 February, 2006, the ATFM/TF considered that the development of Thailand's Bay of Bengal Cooperative ATFM Advisory System (BOBCAT) was at the stage where an operational trial should be conducted in order to enable an operational assessment of BOBCAT. Accordingly, the ATFM/TF finalized a suitable Safety Assessment (**Appendix R**) with associated Hazard Log (**Appendix S**) and model text for an AIP Supplement describing the arrangements for the ATFM operational trial.

6.58 The ATFM/TF agreed that the ATFM operational trial should commence on AIRAC date 6 July 2006, preceded by a 7-day ghosting period commencing 29 June 2006. A final Go/No Go decision in respect of the commencement of the trial would be made after a review by the ATFM/TF of all aspects of preparedness; a SCM of core team members of the ATFM/TF has been scheduled on 14-16 June 2006 for this purpose.

6.59 As well as the BOBCAT user interface itself, the BOBCAT website at <https://www.bobcat.aero> would contain additional documentation necessary for the education and training of airline dispatcher and ANSP staff, including the *Bay of Bengal and South Asia ATFM Handbook* and BOBCAT Safety Assessment, as well as a summary of frequently asked questions (FAQ). It is the intention of the ATFM/TF that the BOBCAT website comprises a single point of focus for the ATFM operational trial and affected airline operators and ANSPs are encouraged to make an application via email to atfmu@bobcat.aero for user name and password as soon as possible, to enable access to the website.

Safety Management Systems in India

6.60 India updated the meeting in respect of the development and implementation of safety management systems. SMS containing all the essential elements of safety management as envisaged in Safety Management Manual of ICAO (Doc. 9859) had been developed in Airports Authority of India (AAI) with the assistance of Airservices Australia.

6.61 AAI had formulated its Safety Policy and Objectives of ATS Safety Management System which were approved by the Board in 2004. The Safety Management Manual developed for Corporate Headquarters contains the safety policy and objective of AAI, including the following essential safety elements:

1. Safety accountabilities and responsibilities.
2. Change and risk management.
3. Safety performance indicators.
4. Safety occurrence reporting analysis.
5. Safety audits.
6. Interfaces, consultations and communication.
7. Safety culture.

6.62 AAI was in the process of developing a supplementary Safety Management Manual for each aerodrome which would contain safety accountabilities and responsibilities at local level and any other local prevalent safety practices.

6.63 The meeting noted that AAI had adopted safety parameters in the form of Acceptable Level of Safety (ALS) and Target Level of Safety (TLS). ALS had been established for two parameters of airprox and bird strike incidents whereas TLS would have to be established in a quantitative way for each sub component of overall AAI system e.g. RVSM etc. Other safety parameters like runway incursion and breach of separation were in the process of development in consultation with the regulator.

6.64 AAI had categorized safety occurrences as accidents, serious incidents, incidents and events. Accidents, serious incidents and incidents are mandatory to report however, events are voluntary in nature. A system of confidential reporting had also been established to gather all safety concerns that do not fall in the category of safety occurrences given above. AAI would also adopt “Just Culture” practices to encourage reporting of safety occurrences. These issues were being addressed in consultation with regulator.

6.65 AAI also carries out the following activities to enhance the implementation of SMS:

1. Delivery of SMS awareness programme to all managers.
2. Introduction of SMS training at induction level
3. Publication of safety journal.
4. Promotion of safety culture.

6.66 The meeting, in recognizing the work undertaken so far, congratulated India in taking these initial steps toward the implementation of safety management systems. It was evident that there was still much to be done, however the early steps were in accordance with ICAO provisions and formed a solid foundation upon which to proceed.

Agenda Item 7: Review and update RASMAG Task List

7.1 In reviewing the RASMAG task list, the meeting was apprised of the status of items remaining open, noting the progress that had been made. The meeting noted that the task list had been renumbered by the Secretariat in the manner agreed at the last meeting.

7.2 A task list item in respect of ensuring a focus was retained on the implementation of SMS in accordance with the outcomes of the DGCA/06 Conference was included, as was an item to ensure that the material from the RASMAG/3 tripartite meeting of RMAs was included in any global meeting of RMAs held pursuant to ALLPIRG/5 Conclusion 5/12. Additionally, a number of other items were added

to the task list and after reviewing and updating the RASMAG task list (**Appendix T** refers), the meeting agreed that this met the work programme of the group.

Agenda Item 8: Any other business

Airbus A380 Wake Turbulence

8.1 As the new Airbus A380 aircraft would commence regional demonstration flights from approximately 10 November 2005, ICAO had received a number of requests from States in respect of the wake turbulence separation minima to be applied, leading to the transmittal of Regional Office State letter Ref.: AP-108/05 (ATM) dated 3 November 2005 which advised caution in respect of wake turbulence spacing with the A380.

8.2 Subsequently an additional ICAO State letter AP111/05 (ATM) was transmitted on 10 November 2005 by the Regional Office in respect of this issue and included specific guidance on the increased wake turbulence parameters to be applied in respect of the A380.

8.3 In view of the size/weight of the aircraft, an ad hoc group of experts under the auspices of the United States Federal Aviation Administration (FAA), EUROCONTROL, the Joint Aviation Authorities (JAA) and the manufacturer was examining the wake turbulence aspects of the aircraft in comparison with other large aircraft.

8.4 In the interim, concerned States may wish to further enquire with the State of Manufacture and/or the aircraft manufacturer for information on latest wake turbulence data in order to facilitate consideration of these issues.

Wake Vortex Report - EANPG

8.5 The meeting noted information in respect of an August 2005 incident involving wake vortex which was reported to Shannon Operations Management through the Irish Aviation Authority's Mandatory Occurrence Reporting scheme. The report indicated that a B757-200 aircraft had experienced a violent and uncontrollable roll of 45° accompanied by a 400 feet loss of altitude caused, in the pilot's opinion, by the wake of a preceding aircraft, an A345.

8.6 The 47th Meeting of European Air Navigation Planning Group (EANPG/14, November-December 2005) noted that in-trail climbs were a normal action used by air traffic controllers in the management and organization of air traffic and that, at the time of the incident, the separation between the aircraft was well in excess of the separation standard used by ATC.

8.7 In recognition of the concerns in this regard, EANPG/14 formulated Conclusion 47/5 inviting EANPG States to note the information concerning the above mentioned wake turbulence incident and requesting the wide dissemination of information on the potential severity of such incidents. In order to determine the appropriate course of action to be taken in relation to wake vortex encounters, ICAO EUR/NAT Office requested that all wake turbulence related incidents in EANPG States be reported to the Regional Office.

ICAO Runway Safety Toolkit

8.8 The meeting was informed of the availability of the "*Runway Safety Toolkit*", which was produced by ICAO and Embry-Riddle Aeronautical University, Florida, United States as part of a continuing effort to assist States in the implementation of runway incursion prevention programmes. The toolkit was the compilation of best available material, obtained over a period of several years, and also

made use of information and knowledge obtained during a series of ICAO seminars on the subject of runway safety, held between October 2002 and October 2004.

Language Proficiency

Global Survey

8.9 The meeting recalled that APANPIRG/16 had recognized the high stakes involved in implementing the language proficiency provisions, with particular regard to the potential loss of careers of industry participants who, although having worked operationally for many years, were unable to reach the Level 4 requirements for operational staff. In order to establish the magnitude of regional difficulties being experienced in this respect, APANPIRG/16 endorsed Conclusion 16/21 requiring the Regional Office to conduct a survey of Asia/Pacific States in order to ascertain States' circumstances in respect of compliance by March 2008 with ICAO language proficiency provisions. ICAO Headquarters supported the proposal and expanded the scope of the survey to global applicability.

8.10 The meeting was informed that a State letter Ref.: T3/9.4 – AP128/05 (ATM) was issued on 7 December 2005 by the Regional Office requesting the participation of States in the global survey, with responses to be received at the Regional Office by 24 February 2006. All responses to the surveys received by the Regional Office were treated confidentially and summarized and forwarded to ICAO Headquarters for consideration by the ANC and the ICAO Council during the second quarter of 2006. It was anticipated that the review by the ANC would result in additional work items being raised for action by ICAO and contracting States.

Speech Sample Training Aid

8.11 The meeting was informed that ICAO Headquarters had recently released the "ICAO Language Proficiency Requirements – Rated Speech Samples CD-ROM" containing recorded samples of operational speech to assist in assessing language proficiency levels - State Letter Ref.: AN 12/44.2-06/39 dated 24 March 2006 refers. The objective of the CD-ROM was to support the implementation of the new Standards and Recommended Practices (paragraph 1.2.9 and Appendix 1 of Annex 1 refer) with regard to language proficiency. The CD-ROM had been designed to supplement the *Manual on the Implementation of ICAO Language Proficiency Requirements* (Doc 9835).

Dimensions – Large Commercial Aircraft

8.12 In the context of the parameters to be used in collision risk modeling, discussion arose concerning the physical size of current large commercial aircraft. IFALPA provided some generic information to the meeting in this respect, using information obtained from the public websites of aircraft manufacturers.

8.13 The largest size commercial aircraft are from Airbus Industries. The A380 (passenger and freighter) has the largest wingspan (79.8m / 261' 8'') and is the tallest (24.1m / 79' 7'') commercial aircraft, and the A340-600 is the longest (75.3m / 246' 11'') aircraft. Interestingly the A380 is the only aircraft that has a wing span greater than its length.

8.14 As it was likely that the generic manufacturer's data would have some rounding effects clarification from the manufacturer should be sought before using the dimensions below for precise calculations.

- **A340-600**
75.30 metres (246' 11'') long, 63.45 metres (208' 2) wing span, 17.3 metres (56' 9'') high

- **A380**
73 metres (239' 3") long, 79.8 metres (261' 8") wing span, 24.1 metres (79' 7") high
- **B747-8F**
75.3 metres (250' 2") long, 68.5 metres (224' 9") wing span, 19.4 metres (63' 6") high
- **B747-400**
70.67 metres (231' 10.25") long, 64.92 metres (213') wing span, 19.59 metres (64' 3") high
- **B777-300ER**
73.08 metres (239' 9") long, 64.80 metres (212' 7") wing span, 18.85 metres (61' 10") high

Development of State Contingency Plans

8.15 APANPIRG/14 recognized that the Regional Office's survey of State contingency plans called for by APANPIRG12 under Conclusion 12/6 had not yet been undertaken, and noted the matter as ongoing. APANPIRG/14 urged States to complete State contingency plans and send a copy to the Regional Office.

8.16 The Regional Office conducted the survey of Asia/Pacific States contingency plan in March 2005 (State letter Ref: AP029/05 (ATM) refers). ATM/AIS/SAR/SG/15 was advised of the results of the survey and the poor response from States. As of 16 July 2005, the Regional Office had only received responses from 12 States. However, some States' responses did not fully address the parameters described in the survey.

8.17 APANPIRG/16 requested the Regional Office to continue with the survey and undertake follow up actions with States that had not responded to the survey request. A summary of the survey outcomes as will be presented to ATM/AIS/SAR/SG/16 and APANPIRG/17 for consideration.

Agenda Item 9: Date and venue of RASMAG/6 meeting

9.1 Although it was intended that RASMAG would eventually move towards a single annual meeting, it was apparent to the meeting that there was still much work to be completed by RASMAG in ensuring adequate oversight of safety monitoring issues in the region. Accordingly, the meeting considered that a further five day meeting was necessary during 2006 and requested that the Secretariat make arrangements for the week of 6-10 November in this respect.

10. Closing of the meeting

10.1 The Chairman, Mr. Butcher, thanked delegates for their participation in the meeting and for the excellent work achieved. Improvements by several States in submitting data required for airspace safety monitoring were evident. Mr. Butcher noted that this type of increased interest and attention to safety monitoring was a major step forward to developing and improving safety management programs.

10.2 Participants were urged review the guidance material documents that were presented during the meeting and to forward recommendations for changes to the authors. There were now a number of items on the task list needed attention before the next meeting and Mr. Butcher encouraged delegates to pursue actions in this regard.

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LIST OF WORKING PAPERS AND INFORMATION PAPERS

WORKING PAPERS

NUMBER	AGENDA	TITLE	PRESENTED BY
WP/1	1	Provisional Agenda	Secretariat
WP/2	6	Proposed Regional Special Implementation Projects	Secretariat
WP/3	6	Bay of Bengal ATFM Operational Trial	Secretariat
WP/4	4	Adoption of Amendment 44 to Annex 11	Secretariat
WP/5	5	Traffic Sample Data (TSD) State Letter	Secretariat
WP/6	6	ICAO Training Courses on Implementation of Safety Management Systems in States	Secretariat
WP/7	7	Review of RASMAG Task List	Secretariat
WP/8	6	Review of the 28 th Meeting of the ICAO RVSM Implementation Task Force (RVSM/TF/28) – FLOS Review	Secretariat
WP/9	5	State Focal Point for Safety Related Activities	Secretariat
WP/10	4	Guidance Material – Data Link Ground Equipment	Japan & New Zealand
WP/11	5	RASMAG Terms of Reference	Secretariat
WP/12		Review of the First Meeting of the ICAO RNP Task Force (RNP/TF/1)	Secretariat
WP/13	2	Review of Global DGCA Conference 2006	Secretariat
WP/14	5	Progress Report on Safety Monitoring Agency (SMA) Establishment for Asia Region	MAAR
WP/15	2	Review of Conclusions and Decisions of APANPIRG/16	Secretariat
WP/16	3	Implementation of Regional Safety Monitoring Mechanisms in the Asia/Pacific Region	Secretariat
WP/17	5	Long-term Requirements for Monitoring Aircraft Height-Keeping Performance in Support of Continued Safe Use of the RVSM: Recent Activities of the ICAO Separation and Airspace Safety Panel	United States
WP/18	2	Review of ALLPIRG/5	Secretariat
WP/19	5	Summary of the Airspace Safety Review for the RVSM Implementation in Asia Region	MAAR
WP/20	5	RVSM Safety Assessment of the Australian Airspace for the period 1 Jan 2005 through 31 Dec 2005	Australia
WP/21	6	A Summary of Scrutiny Group Activities related to the Operational-Trial Use of 30NM Lateral and Longitudinal Separation Standards in the Oakland Flight Information Region	United States

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NUMBER	AGENDA	TITLE	PRESENTED BY
WP/22	5	JCAB Planning to strengthen airspace safety assessment and monitoring capability for RVSM and RNAV/RNP within Fukuoka, including oceanic airspace	Japan

INFORMATION PAPERS

NUMBER	AGENDA	TITLE	PRESENTED BY
IP/1	-	List of Working Papers (WPs) and Information Papers (IPs)	Secretariat
IP/2	8	Guidance Material in regard to Wake Vortex Aspects of A380 Aircraft	Secretariat
IP/3	6	Review of State Contingency Planning Arrangements	Secretariat
IP/4	8	Wake Turbulence	Secretariat
IP/5	8	ICAO Runway Safety Toolkit	Secretariat
IP/6	3	Funding of the Informal South Pacific Air Traffic Services Coordinating Group (ISPACG) FANS Interoperability Team (FIT) and Central Reporting Agency (CRA) Services	United States
IP/7	8	Language Proficiency – Rated Speech Samples	Secretariat
IP/8	8	ICAO Language Proficiency Survey	Secretariat
IP/9	8	ICAO Safety Management Manual (Doc 9859)	Secretariat
IP/10	8	Dimensions – Large Commercial Aircraft	IFALPA
IP/11	4	Operational Data Link Panel Recommendations for Amendments	Secretariat
IP/12	4	Development and Implementation of Safety Management System in India	India
IP/13	3	Implementation of Regional Safety Monitoring Mechanisms in the Asia/Pacific Region	Secretariat
IP/14	5	Summary of Safety Assessment prior to Implementation of 50NM Longitudinal Separation Minimum in R220 and R580	Japan
IP/15	5	Final Report on ATS Data Link Trials in Japan	Japan
IP/16	8	Implementation of ATS Data Link Operations and 50NM Longitudinal Separation Minimum in the Oceanic Area within Fukuoka FIR	Japan
IP/17	3	Global Approaches to Funding Safety Monitoring Mechanisms	Secretariat
IP/18	3	Implementation of Funding Safety Monitoring Mechanisms	Secretariat
IP/19	5, 6	A Post-Implementation RVSM Safety Assessment for the Japanese Domestic Airspace and the Transfer of RMA Responsibilities for Japan and the Republic of Korea Airspace from MAAR to PARMO	Japan

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NUMBER	AGENDA	TITLE	PRESENTED BY
IP/20	5	Establishment of Central Reporting Agency (CRA) for FIT-SEA	Japan
IP/21	5	1 ST Quarter 2006 Safety Monitoring Report from the Pacific Approvals Registry and Monitoring Organization	PARMO

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DIRECTORS GENERAL OF CIVIL AVIATION CONFERENCE ON A GLOBAL STRATEGY FOR AVIATION SAFETY

Montréal, 20 to 22 March 2006

DECLARATION

Whereas the Convention on International Civil Aviation and its Annexes provide the essential framework required to meet the safety needs of a global aviation system;

Whereas the Directors General of Civil Aviation have a collective responsibility for international civil aviation safety;

Recognizing that the safety framework must be fully utilized by all stakeholders and continuously evolve to ensure its sustained effectiveness and efficiency in the changing regulatory, economic and technical environment of the 21st century;

Recalling that transparency and sharing of safety information are fundamental tenets of a safe air transportation system;

Recalling that recognition as valid of certificates and licences of other States is governed by Article 33 of the Convention and applicable Standards;

Recalling the role of ICAO in the settlement of disputes;

Recognizing that mutual trust between States as well as public confidence in the safety of air transportation is contingent upon access to adequate safety information;

Recognizing that safety is a shared responsibility, and advancements in global safety can only be possible through the leadership of ICAO, and a cooperative, collaborative and coordinated effort among all stakeholders; and

Recognizing that further improvements in aviation safety within and among States require a cooperative and proactive approach in which safety risks are identified and managed;

The Directors General of Civil Aviation:

1. *Commit* to reinforce the global aviation safety framework by:
 - a) sharing as soon as possible appropriate safety-related information among States, all other aviation stakeholders and the public, including the disclosure of information on the results of their safety oversight audit as soon as possible and, in any case, not later than 23 March 2008;
 - b) exercising safety oversight of their operators in full compliance with applicable SARPs, assuring themselves that foreign operators flying in their territory receive adequate oversight from their own State and taking appropriate action when necessary to preserve safety;

- c) expeditiously implementing safety management systems across the aviation industry to complement the existing regulatory framework;
- d) developing sustainable safety solutions, including the formation or strengthening of regional and sub-regional safety oversight organizations and initiatives; and
- e) promoting a just culture;

The Conference:

2. *Calls upon* States to base the recognition as valid of certificates and licences of other States exclusively on safety considerations and not for the purpose of gaining economic advantage;

3. *Calls upon* States, ICAO, industry, and donor organizations to direct resources towards the establishment of sustainable safety oversight solutions;

4 *Calls upon* States, ICAO and industry to support the coordinated implementation of safety management systems;

5. *Calls upon* ICAO to:

- a) develop and actively support information exchange mechanisms that allow for an unrestricted flow of safety information between all aviation stakeholders;
- b) develop by June 2006 a strategy to communicate safety information effectively to the public;
- c) develop a mechanism under Article 21 of the Convention to make available aircraft registration and operator information;
- d) develop guidelines and procedures to verify the conditions for recognition as valid of certificates and licences, in keeping with Article 33 of the Convention; and
- e) study the development of a new Annex on safety oversight, safety assessment and safety management;

6. *Calls upon* States to demonstrate the political will to address aviation safety shortcomings, this includes the establishment, where necessary, of an autonomous Civil Aviation Authority which is empowered and adequately funded to provide effective safety oversight; and

7. *Calls upon* States and industry to closely coordinate with ICAO their safety initiatives to ensure optimum benefits to global aviation safety and to reduce duplication in effort.



DIRECTORS GENERAL OF CIVIL AVIATION CONFERENCE ON A GLOBAL STRATEGY FOR AVIATION SAFETY

Montréal, 20 to 22 March 2006

CONCLUSIONS AND RECOMMENDATIONS

Theme 1: The Status of Aviation Safety Today

1. CONCLUSIONS

1.1 The Conference agreed on the following conclusions:

a) *Aviation safety*

Even though air transport is a very safe mode of transportation, there is a need to achieve a further reduction in the number of accidents and especially fatal accidents to maintain the public confidence in the safety of the global air transport system;

b) *Safety oversight*

1) the first cycle of the ICAO Universal Safety Oversight Audit Programme (USOAP) has demonstrated that most of the ICAO Contracting States have made progress in improving their safety oversight capability. However, several States still do not have the capacity to exercise properly their safety oversight responsibilities and it is not certain that some of them will ever have the human and financial resources and the volume of activity necessary to support an independent safety oversight system. It is therefore necessary to promote approaches such as a Safety Oversight Regional Organization that are allowing States to share the resources necessary for discharging their individual safety oversight obligations; and

2) the fact that a small number of States have not yet submitted their action plan or information on the status of implementation of their action plan is a source of concern. These States should cooperate fully with ICAO and take the requisite action.

c) *Initiatives by States and industry*

1) it is encouraging to see the numerous initiatives taken by States and the industry to improve aviation safety. The conference noted with interest the initiatives presented such as the various regional safety groups (CAST, PAAST, JSSI, ASET, NARAST, SARAST and SEARAST) and the various industry activities such as the IOSA programme of IATA, the IS-BAO of IBAC, and including the

programme developed by the Republic of Korea to assist in the monitoring of compliance with SARPs. The conference also noted that the safety data collected by such initiatives can be very useful to States when developing or performing their safety oversight activities or developing safety activities;

- 2) while initiatives by States or the industry to improve aviation safety are useful, and effective, their full potential is not always realized due to a lack of prioritization, to the duplication of effort and to shortfalls in communication. There is a risk that lessons learnt and solutions found in different locations that involve knowledge, procedures and techniques may not be shared in a way that can provide benefits to all. In that context, the conference welcomes the development of the Global Aviation Safety Roadmap by the industry at the request of ICAO which will provide that basis for development by ICAO of a global framework for the coordination of safety policies and initiatives;
- 3) where further initiatives result in additional regulation proposed regulations should be subjected to risk assessment and cost-benefit analysis to establish their full validity;
- 4) ICAO should analyse recommendations of the various regional safety groups and assess whether some aspects could be incorporated in ICAO SARPs and guidance material; and
- 5) the conference also reaffirmed the central role of ICAO in securing the necessary coordination of efforts across the whole spectrum of involvement of States and industry.

2. **RECOMMENDATIONS**

2.1 The Conference agreed on the following recommendations:

a) *Aviation safety*

Further improvement of aviation safety and the reduction of the number of accidents, fatal accidents and fatalities should continue to be an objective of the highest priority for ICAO, which will require a comprehensive and proactive approach coordinated among ICAO, States, industry and service providers;

b) *Safety oversight*

Proper safety oversight by States is one of the basic tenets of aviation safety. In view of the continuing difficulties faced by several States and the resulting need for assistance, ICAO, States, industry, and donor organizations should direct resources towards the establishment of sustainable safety oversight solutions; and

c) *Initiatives by States and industry*

ICAO, in collaboration with all States and other stakeholders, should continue the development of an integrated approach to safety initiatives based on the Global Aviation Safety Roadmap which would provide a global framework for the

coordination of safety policies and initiatives.

THEME 2: IMPROVING AVIATION SAFETY

Topic 2.1 Transparency and sharing of safety information

1. CONCLUSIONS

1.1 The Conference agreed on the following conclusions:

a) *State and industry access to information and assistance*

- 1) transparency is a cornerstone of aviation safety. All Contracting States and concerned stakeholders should cooperate to secure access to the information that is necessary to manage safety properly. Further improvements in aviation safety require an increased sharing of safety information among Contracting States, ICAO and all civil aviation stakeholders;
- 2) sharing of information among Contracting States is essential to maintain mutual trust; and
- 3) the implementation of a transparency policy by a State, with regards to its level of safety oversight, is a clear signal that the State acknowledges any weakness that may exist and should be an incentive for other States and donors to provide assistance.

b) *Public access to information*

- 1) the public should be able to access, without delay, the information necessary to make an informed decision about the safety of air transportation including safety oversight audit information. However, some States will need time to update their systems to be in a position to make audit information available to the public; and
- 2) ICAO should adopt a strategy to communicate safety information effectively to the public based upon the Universal Safety Oversight Audit Programme (USOAP) reports. The system should be designed to avoid potential abuse of the information.

c) *Implementation of Article 21 to the Convention*

Each Contracting State should have access to reliable and timely information on registration, ownership and control of aircraft normally used in international navigation; and

d) *Transparency and sharing of airworthiness information*

- 1) the implementation of a centralized database that would facilitate the timely sharing of airworthiness information concerning aircraft conducting scheduled

and unscheduled international operations would be a means to improve safety;
and

- 2) communication and sharing of airworthiness information between the States of Design and Registry is essential to flight safety.

2. RECOMMENDATIONS

2.1 The Conference agreed on the following recommendations:

a) *State and industry access to information and assistance*

- 1) The results of the audits conducted under the comprehensive systems approach should continue to be shared openly among Contracting States;
- 2) the Council should facilitate the implementation of “just culture” reporting systems in Contracting States to promote the sharing of accident and incident and all other safety-related information. The “just culture” should create an environment in which the reporting and sharing of information is encouraged and facilitated;
- 3) States should be fully transparent to enable other States and donors to provide more rapid and effective assistance to resolve safety oversight deficiencies; and
- 4) the Council should consider the preparation of an annual report on aviation infrastructure and required improvements to assist donors in allocating the support needed by Contracting States.

b) *Public access to information*

- 1) States are urged to give consent to ICAO to publish the results of their initial safety oversight audits or audits follow-up as soon as possible, following the format presented in DGCA/06-IP/39. States may also allow ICAO to publish the final safety oversight audit reports derived from the initial audit cycle;
- 2) States sharing their ICAO safety oversight information should have the opportunity to provide their own comments, relative to progress made since the conduct of its audit, in the section of the ICAO websites dedicated to the audit information;
- 3) the Council, in May/June 2006, should develop an ongoing process to allow the release of relevant information to the public on safety oversight audits conducted under the comprehensive systems approach;
- 4) pending the development of the process, as proposed in paragraph 3) above, States should authorize ICAO to publish the relevant information to the public on safety oversight audits conducted under the comprehensive systems approach. The release of such information would be agreed and entered into through a separate consent form;

- 5) the Council should develop a system to assess USOAP findings against the safety oversight system critical elements with a view to evaluating the safety oversight capability of individual Contracting States and report to the Assembly in 2007; and
- 6) Contracting States should give their consent to the publication of relevant information as soon as possible and, in any case, not later than 23 March 2008. ICAO would then issue a press release providing the names of the States that have not authorized release of the results of their audits and place this information on the public website. A progress report should be made to Council during each Session and to the Assembly in 2007.

c) *Implementation of Article 21 to the Convention*

The Council should ensure that Contracting States have access to reliable and timely information on registration, ownership and control of aircraft habitually used in international navigation. Contracting States should cooperate with ICAO in providing the required information, under guidelines and procedures to be developed; and

d) *Transparency and sharing of airworthiness information*

- 1) the Council should study the possibility of establishing an expanded database application that would allow Contracting States to voluntarily share airworthiness information related to aircraft habitually involved in international operations; and
- 2) States of Design and Registry should conclude an airworthiness agreement as laid down in the *Airworthiness Manual* (Doc 9760) as a means to promote the exchange of continuing airworthiness information between the States.

Topic 2.2 Management of aviation safety

1. CONCLUSIONS

1.1 The Conference agreed to the following conclusions:

a) *Safety management systems*

- 1) civil aviation organizations, including civil aviation administrations, are under pressure to discharge their mandate in the face of ever-diminishing resources, thus facing efficiency issues;
- 2) SMS presents the international civil organizations with a data driven approach to the prioritization of resources towards safety concerns that hold the greatest risk potential, and towards activities likely to produce the biggest return on resources invested;

- 3) experience suggest that benefits of SMS include:
 - reduced incident and accident rates;
 - greater operating efficiencies such as fewer returns to gate and flight cancellations;
 - improved employee morale as a result of being empowered and seeing results through the SMS;
 - reductions in insurance rates;
 - tangible savings for operators as a result of knowing the operational risks and preventing incidents, resulted in substantial savings; and
 - less regulatory involvement due to the operators management of their own day-to-day activities. The regulator oversees the effectiveness of the systems.
- 4) the full potential of SMS will only be realized when the concept is adopted on a global basis by all Contracting States and, through States, by as many aviation organizations as possible. In order for this global implementation to take place, States need to be fully aware and informed about the SMS concept and the means and tools for its implementation; and
- 5) consideration should be given to the development of additional guidance material as well as to organizing seminars and workshops to assist States and operators to implement SMS. In order to facilitate this, advantage should be taken of experience existing within States and international organizations with expertise in the development and implementation of SMS.

b) *Study the development of a new Annex to the Convention on safety processes*

Consideration should be given to complement the set of Annexes to the Chicago Convention with a specific Annex on appropriate provisions on safety oversight, safety assessment and safety management; and

c) *Modernization of Annex 6, Part II*

the conference confirmed the need to modernize Annex 6 — Operation of Aircraft, Part II — International General Aviation — Aeroplanes.

2. RECOMMENDATIONS

2.1 The Conference agreed on the following recommendations:

a) *Safety management systems*

- 1) States should implement safety management systems across all safety-related disciplines;

- 2) States should engage in far-reaching cooperation with ICAO in the programme of training courses, by sponsoring one of the seven training courses and/or by providing experts in safety management to supplement ICAO delivery teams;
 - 3) States should engage in an exchange of information to progress in the implementation of SMS through the provision of expert advice, tools and other means;
 - 4) States should commit to the earliest possible implementation of SMS on a global basis, based on the related provisions adopted by Council; and
 - 5) the ICAO Council should continue work towards the development of training, guidance material and other enabling tools to help Contracting States expedite the implementation of SMS.
- b) *Study the development of a new Annex to the Convention on safety processes*
- ICAO should study further harmonization of safety management requirements, and consider the development of a new Annex dedicated to safety processes, including appropriate provisions on safety oversight, safety assessment and safety management
- c) *ICAO should continue its effort to modernize Annex 6, Part II.*

Topic 2.3 Unified strategy to resolve safety-related deficiencies

1. CONCLUSIONS

1.1 The Conference agreed to the following conclusions:

- a) *Assistance to States*
- 1) despite the audits and follow-up missions conducted by Universal Safety Oversight Audit Programme (USOAP) a significant number of States have not been able to implement their corrective action plans and fulfil their safety oversight obligations;
 - 2) The ICAO Unified Strategy Programme (USP) is valuable for coordinating assistance to Contracting States and establishing regional safety oversight initiatives; it could help ensure that optimum assistance is provided;
 - 3) special emphasis is placed on the importance of having autonomous civil aviation administrations, the absence of which is a serious obstacle to implementing safety oversight in certain States;
 - 4) regional partnerships and the regional safety oversight organizations or initiatives represent good vehicles for enabling States to fulfil their safety oversight obligations and, with the support of various stakeholders, would achieve long-term sustainable results;

- 5) IFFAS as a funding mechanism (not an implementation tool) and other international donor funding should coordinate for optimum results; and
- 6) there is a need for ICAO to improve the effectiveness of its technical assistance tools and to increase involvement of its Regional Offices so as to provide a more effective technical support and training of national experts.

b) *Information Exchange*

- 1) sharing of critical safety information among Contracting States performing safety oversight functions enhances standardization, improves implementation of safety measures, and reduces duplication of efforts; and
- 2) the Flight Safety Information Exchange (FSIX) which was launched by Organization as a portal website is a practical means to facilitate the sharing of safety-related information among member States as well as the industry.

2. **RECOMMENDATIONS**

2.1 The Conference agreed to the following recommendations:

a) *Assistance to States*

- 1) contracting States are encouraged to promote further development of regional and sub-regional organizations in support of the strengthening of States' safety oversight capabilities;
- 2) in order to fulfil their obligations under the Chicago Convention, Contracting States are encouraged to better cooperate both bilaterally and at the regional level to make appropriate arrangements to perform their safety oversight obligations when they do not individually possess adequate human, technical and financial resources;
- 3) Contracting States in need of assistance should coordinate with the Unified Strategy Programme Unit to validate that their action plans are likely to achieve desired results, and to identify the most appropriate assistance mechanisms. Assistance can be channelled through various options to include the Technical Cooperation Programme;
- 4) ICAO and States should improve the effectiveness and coordination of technical assistance tools and funding mechanisms for the correction of safety-related deficiencies, including the International Financial Facility for Aviation Safety (IFFAS);
- 5) ICAO should increase the involvement of its Regional Offices so as to provide a more effective technical support for Contracting States and promote further development of regional and sub-regional organizations that conduct safety oversight;

- 6) ICAO should adapt its working methods to allow full involvement of regional organizations that conduct safety oversight and technical work and request the Secretary General, in accordance with clause 7 of Resolution A35-7, to continue to foster coordination and cooperation between USOAP and audit programmes of other organizations related to aviation safety;
- 7) Contracting States should demonstrate the political will to address aviation safety shortcomings; this includes the establishment, where necessary and as soon as possible, of an autonomous Civil Aviation Authority which is empowered and adequately funded to provide effective safety oversight; and
- 8) States and other stakeholders as well as financial institutions and donors that are in a position to do so, make financial contributions and/or contributions in kind to support States in need of assistance to rectify their safety oversight deficiencies through the Unified Strategy Programme.

b) *Information Exchange (FSIX)*

Contracting States and associated industry and professional organizations are encouraged to provide guidance material and relevant safety-related information to the international civil aviation community through the ICAO Flight Safety Information Exchange (FSIX) website.

Topic 2.4 Mutual recognition

1. CONCLUSIONS

1.1 The Conference agreed to the following conclusions:

a) *Verification*

Before recognizing certificates and licences of other States as valid, there is a need for verification that the conditions for such recognition are met, i.e. that these documents were issued under requirements at least equal to the applicable ICAO Standards;

b) *Recognition and surveillance of foreign aircraft*

- 1) it is incumbent upon a State to ensure safety in the airspace within its territory, including the operation of aircraft of foreign operators;
- 2) harmonized processes for recognition of certificates and licences as valid, as well as a uniform approach to the surveillance of foreign aircraft operations are desirable. To this end, ICAO should develop guidelines and procedures as necessary; and
- 3) flags of convenience, illegal operations and criminal activities endanger civil aviation safety.

c) *Safety clause*

- 1) the inclusion of a safety clause in bilateral agreements, for which models are available, is advisable; and
- 2) ongoing dialogue, as well as surveillance of foreign air operators, would be required to maintain the validity of such agreements.

2. **RECOMMENDATIONS**

2.1 The Conference agreed to the following recommendations:

a) *Verification*

States should verify that the requirements under which other States issue or render valid certificates and licenses are at least equal to applicable Standards before recognizing the documents as valid.

b) *Recognition and surveillance of foreign aircraft*

- 1) ICAO should develop guidelines and procedures as necessary to assist States in securing the highest practicable degree of uniformity in the recognition of certificates and licences as valid and in the surveillance of foreign aircraft operations in their territory;
- 2) States should establish operating rules, in accordance with the Convention and on a non-discriminatory basis, governing the admission and surveillance of foreign air operators within their territories;
- 3) States should implement and strengthen their surveillance of foreign aircraft operations within their territory and take appropriate action when necessary to preserve safety; and
- 4) States should eliminate flags of convenience and prevent illegal operations as well as the possible export of such activities from one State or group of States to another, and exchange safety information to this end.

c) *Safety clause*

- 1) States should include a safety clause in their bilateral air service agreements, based on the model safety clause developed by ICAO; and
- 2) Unilateral activities by States or parties on the banning of operations should normally be preceded by a consultative process between the States and parties involved.

Topic 2.5 Enhancing safety oversight

1. CONCLUSIONS

1.1 The Conference agreed to the following conclusions:

a) *USOAP*

- 1) full cooperation by States is required for optimum functioning of USOAP. To this end, acceptance of on-site audits as scheduled by ICAO is essential; and
- 2) an additional mechanism to rapidly resolve significant safety concerns identified under USOAP should be developed to require States to address these concerns in a timely manner agreed by the Secretariat and the Generic Memorandum of Understanding (MOU) amended accordingly.

b) *Unified strategy*

The unified strategy to resolve safety-related deficiencies requires an ongoing effort by all stakeholders to ensure effective and sustainable safety oversight solutions and full compliance with safety-related provisions; and

c) *Direct assistance*

Interim measures are required to ensure that every Contracting State has a fair opportunity to operate international airlines. An active role is envisaged for ICAO to identify States where immediate action is required to initiate safety oversight enhancements and consult with the States concerned to implement an immediate interim solution for their air operators. A pool of international safety inspectors and other safety oversight experts could be established to this end. Generous cooperation by States and other stakeholders in a position to do so would be required. A scheme for ICAO to manage direct assistance to States and air operators could be developed accordingly.

2. RECOMMENDATIONS

2.1 The Conference agreed to the following recommendations:

a) *USOAP*

- 1) States should fully cooperate with USOAP, including acceptance of on-site audits as scheduled by ICAO; and
- 2) ICAO should develop an additional mechanism to rapidly resolve significant safety concerns identified under USOAP and amend the Generic Memorandum of Understanding (MOU) accordingly.

b) *Unified strategy and direct assistance*

- 1) ICAO should consider the feasibility of a scheme, to be approved by the next Session of the Assembly, for ICAO to manage direct assistance to States having inadequate safety oversight capability and to air operators of such States, based on a pool of international safety inspectors and other safety oversight experts made available by States and other stakeholders. Such a scheme should take into account issues raised in DGCA/06-WP/28 as well as possible legal and financial difficulties; and
- 2) ICAO should consider the allocation of funds for the unified strategy programme and direct safety oversight assistance within the Programme Budget for the triennium 2008-2009-2010.

THEME 3: BEYOND THE CURRENT FRAMEWORK

Topic 3.1 Safety framework for the 21st century

1. CONCLUSIONS

1.1 The Conference agreed to the following conclusions:

- a) economic liberalization has become one of the defining features of modern-day aviation and it is having a major impact on the aviation industry. There is a need to ensure that the safety framework continues to meet the requirement for the safe and orderly development of international civil aviation;
- b) there is a need to clarify the concept of the operator and the relationship with the State responsible for its safety oversight;
- c) the content, nature and structure of the Annexes to the Chicago Convention should be reviewed to ensure that ICAO Standards focus on safety objectives, while giving more flexibility to Contracting States in deciding the means of implementation;
- d) there is a need for a higher level of coordination in technical cooperation activities to reduce duplications in effort and benefit as many States as possible;
- e) there is a need to mobilize the resources of financial institutions and donors to help improve civil aviation safety; and
- f) flags of convenience exist in civil aviation today and should not be tolerated.

2. RECOMMENDATIONS

2.1 The Conference agreed to the following recommendations:

- a) the Council should consider amplification to the definition of “State of the Operator” and “operator” by further specifying the necessary correspondence between the

“principal place of business” and the location where “operational control” is exercised as a means to identify the State responsible for safety oversight;

- b) Contracting States should fulfil their obligation under Article 83 to register agreements in accordance with the *Rules for Registration with ICAO of Aeronautical Agreements and Arrangements* (Doc. 6685);
- c) ICAO should develop guidance material to be used by States to implement coherent economic and technical policies by their civil aviation authorities;
- d) ICAO should consider improvements in the process of developing and adopting Standards and Recommended Practice by:
 - 1) assessing systematically their impact on the industry and other interested parties;
 - 2) making more systematic use of recommendations published by accident investigation bodies; and
 - 3) developing criteria for determining which Standards are of critical importance for ensuring global safety and for which notifying differences would be acceptable only exceptionally and which Standards are of a detailed technical nature should be changed into Recommended Practices or removed from ICAO Annexes and turned into guidance material.
- e) all stakeholders engaged in devising and financing projects aimed at increasing aviation safety in low income countries, should strengthen their cooperation and exchange information and experience to avoid duplication of effort;
- f) the Council should study the issue of flags of convenience taking into account the experience gained by other international Organizations ; and
- g) ICAO should redouble its efforts to address the future evolution of safety oversight taking into account the globalization of international civil aviation.

Editorial Note.— The recommendation on the study to establish an Annex on safety processes in WP/46 has been consolidated with a similar recommendation contained in WP/42 appearing under Recommendation 2.1 b), Development of a Safety Annex to the Convention, under topic 2.2.

ALLPIRG/5 List of Conclusions

<p>Conclusion 5/1</p> <p>Increases Efficiency (Strategic Objective D). Relates to all GPIs</p>	<p>Workshops on the Global Plan for Regional Offices</p> <p>That, in support of the Global Plan, ICAO conduct workshops in the Regional Offices to provide training on planning tools and methodologies as well as strengthening the interaction between technical officers at Headquarters and Regional Offices.</p>
<p>Conclusion 5/2</p> <p>Increases Efficiency (Strategic Objective D). Relates to all GPIs</p>	<p>Implementation of Global Plan Initiatives (GPIs)</p> <p>That, recognizing that the evolution continues from a systems-based to a performance-based approach to planning and implementation of the air navigation infrastructure, the regional planning groups:</p> <ol style="list-style-type: none"> a) note that the Global Plan is a significant component in the development of regional and national plans and that, together with the global ATM operational concept, provide an effective architecture for achieving a harmonized and seamless Global ATM system b) identify GPIs that most closely align with the well established implementation plans of their respective regions; c) select GPIs that would be most effective in achieving the objectives of the region while ensuring continuation of the work already accomplished; d) implement GPIs that take into account the Initiatives across regions, to align work programmes and to develop national and regional plans that facilitate achieving a Global ATM system; e) utilize the planning tools as the common planning and implementation mechanism, thereby ensuring proper coordination and global integration; and f) review, at each PIRG meeting as a part of its regular agenda, the progress achieved and challenges identified in the implementation of GPIs using a common template.
<p>Conclusion 5/3</p> <p>Increases Efficiency (Strategic Objective D). Relates to all GPIs</p>	<p>Workshop on the business case model for communications, navigation, and surveillance/air traffic management (CNS/ATM) Systems</p> <p>That, in support of the development of business cases for the implementation of CNS/ATM Systems, ICAO convene a training workshop for States at the Regional Offices through an appropriate mechanism, such as Special Implementation Projects (SIPs).</p>

<p>Conclusion 5/4</p> <p>Increases Efficiency (Strategic Objective D). Relates to all GPIs</p>	<p>Application of the business case model for CNS/ATM</p> <p>That PIRGs, States and airspace users:</p> <ul style="list-style-type: none"> a) note that business cases for the implementation of CNS/ATM Systems leading to a global ATM system is a key element in the development of regional, sub-regional and national plans; b) consider the application of the model for the development of business cases in the formulation of national and sub-regional plans with a view to facilitating the achievement of a global ATM system; and c) establish, with ICAO’s assistance and within the limits of the programme budget, a network of experts on cost-effectiveness, cost-benefit analyses and business cases for the implementation of CNS/ATM Systems in order to share expertise and to provide assistance to the Regional Offices.
<p>Conclusion 5/5</p> <p>Increases Efficiency (Strategic Objective D). Relates to all GPIs</p>	<p>ICAO Global air navigation plan (ANP) database and geographic information system (GIS) portal</p> <p>Recognizing that access to an ICAO Global ANP database and associated planning services through an web-based ICAO GIS portal would constitute an invaluable tool in supporting, integrating and monitoring the planning and implementation of harmonized regional, interregional and global air navigation infrastructures, the regional planning groups:</p> <ul style="list-style-type: none"> a) note the progress made by the Secretariat in accordance with Recommendation 1/14 of AN-Conf/11 and the ICAO Global ANP database; b) note the ongoing efforts by the Secretariat in harmonizing formats of all the ANP tables together with the inclusion of temporal information in the tables that would assist the regional planning groups in monitoring and analysing the implementation progress; c) note the intent to expand the ANP tables to include Global Plan Initiatives (GPIs), as appropriate; and d) utilize, through the ICAO GIS portal, the ICAO Global ANP database and associated planning services so as to ensure the currency, coordination and implementation of regional air navigation planning and to contribute to the further development of air navigation plans as the framework for the efficient implementation of new air navigation systems and services at the national, regional, interregional and global levels.

<p>Conclusion 5/6</p> <p>Increases Efficiency (Strategic Objective D). Relates to all GPIs</p>	<p>Development of planning tools</p> <p>That ICAO, in the development of planning tools and services, should accommodate requirements established by the Regional Offices, as well as to take into account similar tools developed by other organizations such as EUROCONTROL.</p>
<p>Conclusion 5/7</p> <p>Minimizes environmental impact (Strategic Objective C)</p>	<p>Environmental benefits of CNS/ATM Systems</p> <p>That PIRGs and States:</p> <ul style="list-style-type: none"> a) use the Committee on Aviation Environmental Protection (CAEP) provided CO₂ conversion factor in the analysis of environmental benefits of implementing CNS/ATM Systems; b) prioritize the implementation of voluntary, operationally-based improvements in their air traffic management systems, with emphasis on fuel savings, emissions reductions and noise benefits, and also to mitigate costs to the industry; c) provide feedback to ICAO on studies conducted on the environmental benefits of implementing CNS/ATM Systems; and d) share air traffic data to improve future CAEP assessments, in line with State letter AN 1/17-03/86.
<p>Conclusion 5/8</p> <p>Increases Efficiency (Strategic Objective D). Relates to GPI 7</p>	<p>Globally coordinated air traffic services (ATS) routes</p> <p>That PIRGs:</p> <ul style="list-style-type: none"> a) establish a global consolidated, prioritized list of routes and terminal area (TMA) improvements in close coordination with airspace users; and b) work with neighbouring PIRGs/States/air navigation service providers (ANSPs) to accelerate international route improvements.
<p>Conclusion 5/9</p> <p>Increases Efficiency (Strategic Objective D). Relates to GPI 5</p>	<p>Terminal area (TMA) structure and area navigation</p> <p>That States:</p> <ul style="list-style-type: none"> a) employ area navigation in all TMAs, including appropriate arrival and departure procedures, to improve efficiency and reduce emissions in the vicinity of airports; and that, in special cases where there are particularly challenging obstacles and where air traffic density is very high and additional approach paths are possible, the more precise and contained required navigation performance (RNP) procedures be employed; and b) review operations, procedures and training of controllers to ensure the optimum management of air traffic services.

<p>Conclusion 5/10 Minimizes environmental impact (Strategic Objective C) Relates to GPI 2</p>	<p>Environmental benefits of RVSM introduction and regional expertise That ICAO:</p> <ul style="list-style-type: none"> a) undertake a study on the environmental benefits of the introduction of RVSM and to ensure that this information is transmitted to policy makers; and b) seek appropriate support from recognized expert organizations in its work on quantifying the environmental benefits of RVSM, noting the support offered by EUROCONTROL in this regard.
<p>Conclusion 5/11 Increases Safety (Strategic Objective A)</p>	<p>Air traffic management (ATM) safety management That ICAO:</p> <ul style="list-style-type: none"> a) urge States to give priority to the establishment and effective operation of their ATM safety management and safety regulatory functions; b) support the development of sufficient expertise levels in the industry through formal training in ATM safety issues and, by cooperation through regional bodies, promote collective means to optimize the effectiveness of training provision; and c) develop further measures to enable the implementation of a “just-culture” reporting environment to facilitate the reporting of ATM occurrences.
<p>Conclusion 5/12 Increases Efficiency (Strategic Objective D). Relates to GPI 2</p>	<p>Coordination between regional monitoring agencies (RMAs) That the ICAO EUR/NAT Office act as the initial focal point for the required coordination between RMAs in order to:</p> <ul style="list-style-type: none"> a) facilitate the exchange of monitoring and operational data between RMAs; b) facilitate the exchange information about best practices between RMAs; c) ensure that incident reports are correctly disseminated to the appropriate RMA; d) provide a forum to manage changes to monitoring requirements; and e) ensure the maintenance of the RMA Handbook.

<p>Conclusion 5/13</p> <p>Increases Efficiency (Strategic Objective D). Relates to GPI 5</p>	<p>Implementation of performance-based navigation concept</p> <p>That, to increase awareness and understanding of the performance-based navigation concept and its elements:</p> <ul style="list-style-type: none"> a) ICAO organize workshops and training activities; and b) where area navigation (RNAV) or required navigation performance (RNP) implementations are required, these will be implemented by PIRGs and States according to the performance-based navigation concept.
<p>Conclusion 5/14</p> <p>Increases Safety (Strategic Objective A)</p>	<p>A regional online database of air navigation deficiencies</p> <p>That, PIRGs consider establishing and maintaining a regional online database of air navigation deficiencies that ensures transparency and provides a secure access to authorized users.</p>
<p>Conclusion 5/15</p> <p>Increases Safety (Strategic Objective A)</p>	<p>Last resort action to resolve regional air navigation deficiencies</p> <p>That, when efforts to eliminate deficiencies prove unsuccessful after exhausting all alternatives, PIRGs adopt the following last resort action, which consists of the two parts:</p> <ul style="list-style-type: none"> a) propose the inclusion of an alternate facility/procedure in the air navigation plan (ANP); or b) when a corrective action as a) above cannot be recommended, provide the State(s)/Territory(ies)/users and ICAO with an analysis concerning risk associated with such a deficiency.
<p>Conclusion 5/16</p> <p>Increases Efficiency (Strategic Objective D). Relates to GPI 22</p>	<p>Implementation of very small aperture terminals (VSATs)</p> <p>That PIRGs:</p> <ul style="list-style-type: none"> a) discourage the proliferation of VSAT networks where one/some of the existing ones can be expanded to serve the new areas of interest; b) work towards integrated regional/interregional digital communication networks with a single (centralized) operational control and preferably based on the Internet Protocol (IP); and c) give due consideration to managed network services (e.g. a virtual private network (VPN)), subject to availability and cost-effectiveness.

<p>Conclusion 5/17 Increases Efficiency (Strategic Objective D). Relates to GPI 22</p>	<p>Provisions for digital communication networks</p> <p>That ICAO:</p> <ul style="list-style-type: none">a) expedite the development of provisions relating to the use of the Internet Protocol Suite (IPS) in the aeronautical telecommunication infrastructure; andb) initiate the development of provisions governing the end-to-end performance of digital communication networks, irrespective of the technologies and protocols utilized therein.
<p>Conclusion 5/18 Increases Efficiency (Strategic Objective D). Relates to all GPIs</p>	<p>Changes to the Regional Supplementary Procedures (SUPPs) (Doc 7030)</p> <p>That ICAO:</p> <ul style="list-style-type: none">a) restructure the SUPPs (Doc 7030) by the complete reordering and reorganization of the material;b) align the area of application of the SUPPs with the area of application of the regional air navigation plans (ANPs); andc) make SUPPs available on a CD as well as on the ICAO website.



International Civil Aviation Organization

**SEVENTEENTH MEETING OF THE
ASIA AND PACIFIC AIR NAVIGATION PLANNING AND
IMPLEMENTATION REGIONAL GROUP
(APANPIRG/17)**

Bangkok, Thailand, 21–25 August 2006

Agenda Item 2.4:

**FUNDING ARRANGEMENTS FOR REGIONAL
AIRSPACE SAFETY MONITORING**

(Prepared by RASMAG, Presented by the Secretariat on behalf of RASMAG)

SUMMARY

APANPIRG/16 requested that a study group develop a feasible and sustainable means to organize and finance the necessary safety monitoring mechanisms and to report through RASMAG. Subsequently, the Council of ICAO took note of difficulties in sustaining safety monitoring activities in other Regions and referred the matter to ALLPIRG/5 and ANSEP/6. With support from the ICAO Secretariat, a global approach has been accepted based on the designation of RMA activities as multinational facilities/services. RASMAG/5 considered these developments and prepared recommendations contained in this paper concerning implementation of the global approach to funding safety monitoring mechanisms in Asia/Pacific.

1. INTRODUCTION

1.1 APANPIRG/16 recognized the urgent need to develop feasible and sustainable funding solutions for regional safety monitoring so that on-going initiatives to carry out trials and to implement CNS/ATM systems in Asia/Pacific would not be delayed and that safety and efficiency were not compromised. It was recalled that APANPIRG's CNS/ATM technical experts had previously found it difficult to resolve the complex legal, financial and organizational issues involved in establishing a regional safety monitoring agency, and the meeting considered that this matter should be addressed by States' experts in these specialist fields. Accordingly, APANPIRG/16 adopted ***Conclusion 16/2 – Funding arrangements for regional airspace safety monitoring***:

That, a study group be convened to develop a feasible and sustainable proposal to equip States to organize and finance necessary safety monitoring mechanisms for the provision of safety services for the international airspaces in the Asia/Pacific region and that States be represented at that meeting by their appropriate legal, financial and organizational experts who would be best equipped and empowered to resolve any difficulties. The study group should report to RASMAG not later than the end of June 2006.

1.2 Parallel to this, the Council of ICAO had been considering difficulties in establishing sustainable approaches to funding safety monitoring activities in other ICAO Regions and had placed the matter on the agenda for the fifth meeting of the All Chairmen of the Planning and Implementation Regional Groups (ALLPIRG/5). The report of APANPIRG/16 drawing attention to difficulties experienced in Asia/Pacific prompted further action by the Council in pursuit of a global model and the matter was referred as well to the sixth meeting of the Air Navigation Services Economics Panel (ANSEP/6). Both ALLPIRG/5 and ANSEP/6 were held in Montreal in March 2006 and both bodies gave their support to an approach developed by the ICAO Secretariat which is based upon existing ICAO guidance and policies. The President of the Council referred the recommended approach and implementation procedure to Members of the Council, seeking their views, prior to consideration of the matter at the 178th Session of the Council.

1.3 In view of these on-going developments, the ICAO Regional Office did not convene the special study group requested by APANPIRG/16 and instead raised the matter at the earliest suitable opportunity at RASMAG/5 held in Bangkok from 4 to 8 June 2006. RASMAG/5 discussed the global experiences with funding regional safety monitoring activities and evaluated the options. It was decided that the need for the special study group had been obviated as a result of the global consensus on how best to organize and fund regional safety monitoring activities. RASMAG/5 discussed the implementation of the global approach in Asia/Pacific and prepared the advice contained in this paper that addresses APANPIRG's concerns underlying Conclusion 16/2. Recommendations are made for APANPIRG/17's consideration.

2. DEVELOPMENT OF A GLOBAL APPROACH

2.1 Upon considering the Air Navigation Commission's review of a report by the European Air Navigation Planning Group (EANPG/45), the Council of ICAO during its 172nd Session requested that the Air Transport Committee include in the Air Transport Program the development of a global method for cost recovery of the required RMA infrastructure. It was considered that the method should be based on existing ICAO guidance material on cost recovery of air navigation services.

2.2 Subsequently, during the 176th Session, the Council requested that the subject of a global approach for establishing, funding and determining the basis for cost recovery for regional monitoring mechanisms be placed on the agenda for ALLPIRG/5 after reviewing a report of the Middle East Air Navigation Planning and Implementation Regional Group (MIDANPIRG/9). The report of APANPIRG/16 also prompted further action by the Council at its 177th Session. Specifically, the Council urged the Secretary General to take action on the issue of funding arrangements for cost recovery of regional airspace safety monitoring mechanisms.

2.3 After consulting its Regional Offices, the ICAO Secretariat confirmed that there is a need to fund RVSM safety monitoring activities through a cost recovery mechanism. It was observed that, in some of the regions, the funding of these activities is the main obstacle for the continuation of monitoring operations. Present arrangements under which States on a voluntary basis absorb all costs were not considered to be sustainable in the long term. That some regions had established study groups to consider this issue was noted.

2.4 In a paper prepared for consideration by ALLPIRG/5 and subsequently by ANSEP/6, the ICAO Secretariat observed that international cooperative ventures in the provision of air navigation services have normally proven to be highly cost-effective for the provider States as well as the users, and in some instances have constituted the only means for implementing costly facilities and services which offer capacity that exceeds the requirements of individual States. By cooperating in such facility or service provision, the States concerned have been able to provide more efficient services and at lower cost than if they had to finance the facilities concerned themselves. In fact, *ICAO's Policies on Charges for Airports and Air Navigation Services* (Doc 9082/7) encourage international cooperation in the provision and operation of air navigation services where this is beneficial for the providers and users concerned

(paragraph 12), and States or their delegated service providers are particularly recommended to consider participating in joint charges collection agencies (paragraph 18).

2.5 The ICAO Secretariat pointed out that such international cooperation may take different forms. In its simplest form there is a coordination and harmonization process initiated as a sub-regional activity between a limited number of States. As a result it is possible to generate significant synergies and to achieve savings by coordinating the planning, implementation and operation of air navigation facilities and services across borders with neighboring States.

2.6 The ICAO Secretariat considered that the most obvious arrangement for the financing of an RMA is to establish it as a Multinational (ICAO) Air Navigation Facility/Service, for which guidelines are included in the regional air navigation plans (1) and which are provided herein at **Attachment A**.

2.7 The participation of States in the provision of a multinational facility/service is based on the assumption that any State, having supported and agreed to the implementation of such a facility/service and making use of it, should also shoulder its share of the costs involved. The participating States would need to formalize in an agreement the terms under which the multinational facility/service is to be provided. If the participating States were to assign the operation of a multinational facility/service to an international organization or an international agency, this would need to be covered in the agreement.

2.8 Considering the moderate costs involved and the interim nature of an RMA, the ICAO Secretariat argued that an “administrative agreement” would be preferable to an international treaty. An administrative agreement is at a lower level of requirement in respect of formalities and procedures than a treaty and can be signed by a minister, the Director General of Civil Aviation (DGCA) or some other authorized person (e.g. the Chief Executive Officer (CEO) of an air navigation services provider), and could be concluded by an exchange of letters or notes. It would also come into force with minimum delay, and would permit greater flexibility in cases where subsequent modifications are required.

2.9 Basic provisions that would normally have to be part of an agreement include, inter alia: definition and description of the facility/service; establishment and operation of the facility/service; managerial aspects (including governing bodies and decision making arrangements, organization, and staffing and consultation); financial aspects (including cost determination, cost sharing, budgeting, authority to approve the budget and financial auditing); procedures for settlement of disputes; and withdrawals, amendments to and termination of the agreement. The agreement should specify who will establish and operate the RMA concerned, namely whether this is to be done by a State or an existing international organization or agency.

2.10 The Secretariat advised that the agreement should outline the procedure to be applied for determining the cost share to be borne by each participating State. Any cost sharing method should, to the extent possible, be equitable, simple and easy to apply. The question of equity should not only be considered in the context of the participating States, but also with respect to the final users (aircraft operators) since it may be assumed that in most instances the participating States would include the costs they incur in the cost base for their air navigation services charges, where levied.

2.11 The ICAO Secretariat added that any method of cost sharing should, in principle, be based on the extent of the use of the multinational facility/service concerned by each participating State. Thus, the parameters or keys used to determine each State’s cost share should reflect the extent of such use. However, if the use made of a multinational facility/service can only be measured by applying complex

(1) In the case of Asia/Pacific, the general guidelines for the establishment and provision of such a mechanism are set out in detail in Doc 9673 – Facilities and Services Implementation Document (FASID) Asia and Pacific Regions, First Edition 2001. This concept is also described in Doc 9161/4, *Manual on Air Navigation Services Economics*, Chapter 3 – Part D – Multinational Facilities and Services.

procedures and at a cost which is not commensurate with the costs to be shared, other methods of cost sharing based on readily available and relevant statistical data could be applied. Whatever method is selected it must provide for the just and equitable sharing of the costs involved.

2.12 It would be up to each participating State to decide whether or not it wishes to recover its cost share from the users. A State could either include these costs in its cost base for route charges (if it levies such charges). As an alternative, the State could recover the costs by levying a separate charge (normally a more complex and costly procedure to administer). The Secretariat noted that users would probably find it easier to accept the former solution. It was suggested that the levying of a separate charge be avoided, considering also the limited costs involved and that the latter solution would increase the administrative burden for users as well as providers. However, this does not exclude that the funding required is technically collected as a surcharge (the cost is identified separately) but included in the ordinary route charge levied, since this would satisfy the users' requirements on transparency.

2.13 The ICAO Secretariat also drew attention to other options for the operation and cost recovery of RVSM monitoring. For example, it would be possible to establish a joint financing arrangement administered by ICAO, similar to the existing arrangements for traffic on the North Atlantic. In addition to addressing the recovery of costs of air navigation facilities and services operated by Denmark and Iceland, this arrangement also regulates cost recovery of the RVSM monitoring function in that region. Another option would be to establish a new agency specifically for the purpose to operate and recover the costs of the RVSM monitoring function. Both these options would, however, most likely lead to heavier administrative arrangements and more staff with related higher costs. They would also require more formal and complicated procedures in the establishment phase. Therefore, a simpler and less costly solution was advocated by the ICAO Secretariat.

2.14 Where a region (i.e. a Planning and Implementation Regional Group - PIRG) would not be able to find a State or an existing organization or agency willing to accept the responsibility to operate an RMA, a possibility would be to approach an RMA operator in a neighboring region to operate the RVSM monitoring functions for both regions, on a cost recovery basis.

2.15 ALLPIRG/6 noted the global approach to recovering the costs of RMAs as developed by the ICAO Secretariat and affirmed that the cost-recovery mechanism chosen should be simple but transparent and fair. Furthermore, it was noted that the proposed global approach would be discussed and finalized during the sixth meeting of the Air Navigation Services Economics Panel (ANSEP/6) (Montreal, 27 to 31 March 2006).

2.16 ANSEP/6 discussed the respective advantages of using the multinational (ICAO) air navigation facility/service model compared to the joint financing arrangement model or any other relevant model, but felt that the former was more appropriate in the case of RMAs. A step-by-step approach developed by the Secretariat for implementing cost recovery arrangements also was approved and is provided herein at **Attachment B**. The Panel also agreed that the current ICAO guidance on the subject was sufficient.

2.17 The Air Transport Committee will consider the ANSEP's review of cost recovery mechanisms during the 178th Session of the ICAO Council. The Panel invited the Committee to bring it to the Council's attention that the step-by-step procedure to cost recovery of RMAs proposed by the Secretariat was considered and accepted by both the ALLPIRG/5 and ANSEP/6 meetings. The President of the Council also invited the Members of the Council to provide comments on any views they might have concerning the recommended approach.

3. OPTIONS FOR CONSIDERATION BY APANPIRG

3.1 RASMAG/5 discussed the experiences of other ICAO Regions and noted that there are alternatives to the approach recommended by the ICAO Secretariat. For example, the functions of the EUR

RMA are carried out by EUROCONTROL. The NAT Region has a Central Monitoring Agency that performs the necessary safety monitoring for RVSM and RHSM. However, the mechanisms adopted in these regions take advantage of particular structures that would be difficult and costly to replicate in other regions.

3.2 For the most part, the predominant model adopted for the provision of RMA services relies on the voluntary support of a host State/organization. For example, the monitoring of RVSM operation in the CAR and SAM regions is carried out by the Caribbean and South American Monitoring Agency (CARSAMMA) hosted by Brazil with the assistance of CAR and SAM States. The AFI RMA (ARMA) is hosted by the Air Traffic and Navigation Services Company (ATNS) in South Africa.

3.3 ALLPIRG/5 considered that present arrangements under which States, on a voluntary basis, absorb all costs are not sustainable in the long term. The situation that emerged in the MID Region exemplifies the issues. The United Arab Emirates had, until 1 June 2004, provided full support, both financial and technical, to the activities of the Middle East Central Monitoring Agency (MECMA) in monitoring the height-keeping performance of aircraft operating in RVSM airspace in the Middle East Region.

3.4 Considering the notice of withdrawal of support by the United Arab Emirates to MECMA, the Air Navigation Commission, during its 165th Session in February 2004, expressed its concern and requested the Secretary General to take appropriate action on its early resolution. In April 2005, MIDANPIRG/9 developed an action plan, on the understanding that it would be further reviewed and finalized at the MID RMA Meeting to be held in June 2005 (MIDANPIRG, Conclusion 9/13 refers). The Secretary General of ICAO wrote to the States concerned in support of this action. He drew the attention of the States to Amendment 43 to Annex 11, regarding the mandatory requirement for instituting a programme, on a regional basis, for monitoring the height-keeping performance of aircraft operating in RVSM airspace, which became applicable on 24 November 2005. The Secretary General reminded the States of MIDANPIRG/9's concern that, in the interest of safety, unless a concrete action plan were developed and the MID RMA were reestablished, the withdrawal of RVSM operations from the MID Region would be considered by ICAO. Faced with this serious situation, an agreement subsequently was reached among the States concerned to appoint a supervisory Board for the MID RMA.

3.5 The approach adopted in the MID Region has the essential elements of the model recommended by ALLPIRG/5 and ANSEP/6. The PIRG played an active role in bringing the States together to establish a multinational facility/service that would ensure the sustained and equitable provision of regional safety monitoring services and the steps that brought it to fruition were along the lines of those recommended in Attachment B. Some notable features are that:

- a) The multinational facility/service is being established according to a Memorandum of Agreement signed by all participating States;
- b) The Board is empowered to enter a Custodian Agreement with the provider of the safety monitoring services (Bahrain) and a third party for collection and disbursement of funds (ICAO);
- c) The MID RMA shall be managed as a Regional programme, shall have legal personality and shall act through the MID RMA Board;
- d) The overall objective of the MID RMA is the promotion of safety of air navigation in the Middle East Region through the operation and management, on a sound and efficient basis, of a permanent MID Regional Monitoring Agency;
- e) The MID RMA Board, in which each Participating State is entitled to appoint one member, shall retain overall direction and responsibility for the supervision and operation of the MID RMA in accordance with the relevant obligations of the Participating States under the Convention on International Civil Aviation and its Annexes;

- f) The MID RMA's scope, duties and responsibilities will be those agreed by the Board's first meeting and could be revised by the Board. The MID RMA will be assigned clear tasks in a step-by-step approach starting with RVSM height monitoring and RVSM post-implementation safety assessment, having in mind the end objectives, which will include RNP/RNAV and SMS;
- g) The funding mechanism and consequent contributions of Participating States may be modified in subsequent years by decision of the Board;
- h) Any Participating State may withdraw from this Memorandum of Agreement by giving a prior notice of six (6) months to other Participating States;
- i) The hosting of the MID RMA by Bahrain may be terminated at the request of Bahrain, with two years advance written notification to the MID RMA Board to allow sufficient time for selection of an alternative location and necessary arrangements for transfer of the MID RMA;
- j) The contributions for the first year shall be set on an equal basis between member States based on the estimation of total costs for the set up, the operation of the agency (US\$300,000) and the number of members States; and
- k) The funding arrangements will be kept under review and amended if necessary.

3.6 The MID RMA Board held its second meeting in Bahrain from 27-28 February 2006, during which the Memorandum of Agreement (MOA) to establish the MID RMA was reviewed and agreed upon. Eight States signed the MOA and the ICAO MID Regional Office is to follow up with the remaining States. The RMA Board accepted Bahrain's offer to host the RMA and authorized the Chairman of the RMA Board to negotiate an agreement with ICAO and Bahrain specifying ICAO's role as the custodian of the funds collected for the purpose of this agreement, in compliance with ICAO's Financial Regulations and Rules. A copy of this MOA is provided for information in **Attachment C** to this paper.

3.7 Considering the various options and the recent experience in the MID Region, ANSEP/6 concluded that the multinational (ICAO) air navigation facility/service model was more appropriate in the case of RMAs when compared to the joint financing arrangement model or any other appropriate model. It was concluded as well that current ICAO guidance for the establishment and financing of such mechanisms is adequate.

4. APPLYING THE RECOMMENDED MODEL IN ASIA/PACIFIC

4.1 The funding arrangements considered by ALLPIRG/5 and ANSEP/6 address a specific requirement for States to undertake safety monitoring on a regional basis with reference to Standard 3.4.1 contained in Annex 11 which concerns the selection of separation minima for application within a given portion of airspace in accordance with the provisions of the PANS-ATM and the Regional Supplementary Procedures as applicable under the prevailing circumstances.

4.2 RASMAG/5 acknowledged with appreciation that the RMA functions are being performed in Asia and Pacific Regions with Australia (Airservices Australia), Thailand (AEROTHAI) and the United States (FAA) voluntarily shouldering the costs. However, it was also noted that the experience worldwide is that such voluntary funding arrangements are not sustainable and they are not equitable. Accordingly, RASMAG/5 highlights the global consensus emerging on the most appropriate model to apply for consideration by APANPIRG.

4.3 That consensus is that voluntary funding models are not sustainable and that the obvious way to organize for the required regional safety monitoring services is through a multinational (ICAO) facility/service for which general guidelines on the establishment and provision of such a mechanism are set out in the FASID (refer Attachment A). APANPIRG is reminded that, pursuant to Article 28 of the Convention and in line with the ICAO policies concerning the formulation of regional plans and their

implementation, any multinational facility/service would be set forth in the Regional Plan as established by the Council. Attention also is drawn to the specification in the FASID that the purpose of a multinational facility/service is to serve international air navigation in airspace extending beyond the airspace serviced by a single State.

4.4 The FASID sets out the steps to be followed by APANPIRG in establishing any multinational facility/service and it recalls that APANPIRG is at all times expected to take an active posture in the process which encompasses thorough evaluations and consideration of the viewpoints of the States, the international organizations concerned, and any particular providers/hosts of the required facilities/services. The outcome of the process is that APANPIRG develops a complete proposal for amendment of the ASIA/PAC Regional Plan for processing in accordance with the procedure approved by the Council. In the case of regional safety monitoring, APANPIRG has already played an active role and any step forward to formalize the funding arrangements can be made in recognition of the arrangements already in place while addressing those matters yet to be resolved in a sustainable way.

4.5 In this context it should be noted that RASMAG/5 was concerned that the voluntary funding approach is not addressing all of the needs for safety monitoring services recognized by APANPIRG as SMAs and CRAs as well as RMAs. The MIDANPIRG Member States in establishing their arrangements allowed scope to address these requirements under the one agreement. RASMAG/5 therefore urges APANPIRG to consider adoption of the global model to ensure that States have the option of an equitable, effective, harmonized and technical regional capability to meet all of the safety requirements for future regional airspace planning, including the implementation and operation of reduced separation minima (including horizontal), communications, navigation, surveillance and air traffic management (CNS/ATM) systems and related airspace changes. As illustrated in the case of the MID Region, an appropriately designed Memorandum of Agreement between the various parties can empower the Board to undertake the necessary actions to provide for the RMA as well as to take any appropriate actions to centralize and harmonize the various monitoring activities.

4.6 The action proposed for APANPIRG therefore is to agree to take steps to formalize the organization and funding of needed regional safety monitoring functions applying the model of the multinational ICAO air navigation facility/service in accordance with the FASID and other ICAO guidelines.

4.7 Considering the scale and diversity of Asia and Pacific and considering the existing arrangements for provision of RMA services, it is further proposed that APANPIRG consider establishment of two Multinational ICAO Air Navigation Services – one for Asia and one for the Pacific. APANPIRG could proceed by calling meetings of the States concerned with each and encouraging them to sign appropriate Memoranda of Understanding. RASMAG/5 considered that these should be called the “Regional Safety Monitoring Board - Asia” and the “Regional Safety Monitoring Board – Pacific”.

4.8 Noting that both Asia and Pacific Regions encompass extensive international airspace that is being served by particular States as allocated by the Council pursuant to the Chicago Convention, ICAO should be considered in the design of the arrangements agreed to under the Memoranda of Understanding and included as a Member of each Board.

4.9 As noted, a considerable amount of work has been undertaken in Asia/Pacific to establish arrangements for safety monitoring to be undertaken on a regional basis. RASMAG/5 recommends that, in developing a sustainable framework, these effective working arrangements be utilized as the essential “building blocks”. For example, the task for APANPIRG of finding and assigning a State or an existing organization or agency to establish and operate the RMA, in accordance with the requirement in Annex 11, has been attended to with the RMA functions being performed by the Airservices Australia RMA, Monitoring Agency for the Asia Region (MAAR) and Pacific Approvals Registry and Monitoring Organization (PARMO). Similarly, actions have been taken to establish SMAs and CRAs with Asia/Pacific regions, albeit with less success in devising sustainable funding mechanisms.

4.10 Accordingly, many of the steps required to put agreements in place to establish a Regional Safety Monitoring Board - Asia and a Regional Safety Monitoring Board – Pacific and to make it possible

for APANPIRG to incorporate these multinational services into the Regional Plan have already been undertaken. RASMAG/5 considered that the critical step now that must be undertaken is for APANPIRG to invite the States concerned with each of the two Regional Safety Monitoring Boards to meet with the purpose of developing appropriate Memoranda of Agreement (MOA) incorporating specific mechanisms to provide necessary safety monitoring services and means of collecting the necessary funds. In that respect, APANPIRG is invited to note the recent success achieved in the MID Region in this regard. Notably, if the MOAs are maintained as administrative agreements, it is possible for the DGCA's (or CEOs of air navigation services providers or other appropriate organizations) in the participating States to sign the document. This does not appear to have been an impediment in the case of the MID Region. Whereas not all of the States concerned signed the agreement at the outset, a sufficient number of participating States committed themselves and additional States have joined since.

4.11 RASMAG/5 considered that many of the points of detail that must inevitably be attended to, including any estimation of costs involved and cost sharing arrangements, can be dealt with in accordance with existing ICAO guidance in the process of formalizing the MOAs in the light of the particular circumstances and the functions to be performed.

4.12 RASMAG/5 also noted that as safety monitoring is an admissible charge there should be no grounds to argue that funds are not available to perform the required safety monitoring services. However, it would be for each Board to decide how best to allocate the costs involved, whether to collect the funds from States or directly from airspace users, and on what basis to allocate the costs. It would then be at the discretion of the States whether to meet any costs incurred or whether to recover them from the users in accordance with ICAO guidance and policies.

4.13 RASMAG/5 recognized that APANPIRG and the States that would become parties to any MOAs would be in the best position to resolve many of these types of matters. However, RASMAG/5 draws APANPIRG's attention particularly to the following considerations:

- a) Boards should not be so large that they are unwieldy. It was noted in the case of the MID RMA Board that all ten States that were considered likely to be members were each to be permitted one place on the Board (the United Arab Emirates was invited to become an eleventh member).
- b) A related issue is to decide on the States that would be invited to participate. A view was expressed by a representative at RASMAG/5 that only those States that have a responsibility for an FIR associated with the monitoring activities of each of the respective Boards should be invited initially. RASMAG/5 noted that the matter could be kept under review and additional States could be permitted to join at a later stage if appropriate.
- c) RASMAG/5 considered that ICAO should be permanently represented on the Board in an appropriate capacity, recognizing as well that Asia and Pacific Regions encompass extensive international airspaces under the responsibility of the Council of ICAO. RASMAG/5 was reminded that ICAO Standards and Recommended Practices should apply strictly in these international airspaces and that the approaches taken to safety monitoring should reflect this.
- d) RASMAG considered it appropriate that the Boards should report on their safety monitoring work to APANPIRG through RASMAG;
- e) The Memoranda of Agreement should provide a capacity for the safety monitoring activities conducted under the authority of the Regional Safety Monitoring Boards to evolve according to requirements over time. However, a view was expressed that it is likely that, while the nature and scope of the safety monitoring tasks can be expected to change, it is likely that there will be an on-going need for regional safety monitoring mechanism.

- f) It should be recognized that capabilities for performing the various safety monitoring tasks are being developed by several States/organizations and that it is important that the process of allocating any particular regional safety monitoring task to a provider should become a transparent one in which all parties are given equal opportunities to participate.

5. ACTION BY APANPIRG

5.1 The meeting is invited to:

- a) Note the requirement to ensure that there is a regional mechanism to provide safety monitoring services related to the implementation of RVSM;
- b) Consider the global consensus that voluntary funding arrangements are not considered to be sustainable in the long-term and that the most appropriate funding mechanism for RMAs is to establish a multinational (ICAO) facility/service;
- c) Recognize that the RMA mechanism can be implemented through the action of APANPIRG defining the RMA Asia and RMA Pacific as multinational (ICAO) facilities/services in accordance with the guidance provided in the FASID;
- d) Initiate actions towards formalizing arrangements for the RMAs by inviting the States concerned to meet for the purpose of agreeing on appropriate Memoranda of Understanding to establish the RMAs on a formalized basis as per (b) above;
- e) Recommend further that the States concerned address additional, recognized safety monitoring requirements for SMAs and CRAs under these arrangements by urging States to adopt Memoranda of Agreement that provide adequate scope to perform these functions and that they consider naming the bodies so established as the Regional Airspace Monitoring Board – Asia and the Regional Airspace Monitoring Board – Pacific, respectively; and
- f) Consider the closure of Conclusion 16/2 on the basis that the intent of the Conclusion has been met and a study group is no longer required.

- END -

**GENERAL GUIDELINES ON THE ESTABLISHMENT AND
PROVISION OF A MULTINATIONAL ICAO ASIA/PAC AIR NAVIGATION
FACILITY/SERVICE**

1. **INTRODUCTION**

1.1 These guidelines were developed by the ASIA/PAC Planning and Implementation Regional Group (APANPIRG) for incorporation in the ASIA/PAC ANP and for use in the ASIA/PAC Regions to facilitate State's collective efforts for cost effective implementation.

1.2 They reflect relevant ICAO provisions and established policies of the Organization's regional planning for and implementation of facilities/services required for air navigation applicable in the ASIA/PAC Regions. They also recognize the principle that costs may be recovered for facilities and services provided for and implemented under the ASIA/PAC Regional Plan as approved by the Council.

2. **DEFINITION**

Multinational ICAO Air Navigation Facility/Service

2.1 The meeting considered that multinational facilities/services would now be required to facilitate implementation of the ASIA/PAC Air Navigation Plan, especially the new ICAO CNS/ATM systems implementation Plan. Because of their uniqueness, their impact on the system as a whole as well as their implications for users and providers of the multinational facilities/services, they would need early identification. The following definition of a multinational ICAO ASIA/PAC air navigation facility/service would permit this in a rational manner:

"A facility/service specifically identified as such and included in the ICAO ASIA/PAC Regional Plan for the purpose of serving international air navigation in airspace extending beyond the air space serviced by a single State in accordance with the ASIA/PAC Regional Plan."

Applicability of ICAO provisions

2.2 Pursuant to Article 28 of the Convention and in line with the ICAO policies concerning the formulation of regional plans and their implementation, any multinational facility/service would be set forth in the Regional Plan as established by the Council. In turn, when establishing the cost basis for route facility charges the council approved principles are to be applied, i.e. the costs to be taken into account should be those assessed in relation to facilities and services provided for and implemented under the ASIA/PAC Regional Plan.

Multinational character

2.3 In ICAO rules and procedures the term "facility/service" for air navigation is well understood. Contrary to the term "project" or any other term which may relate only to certain segments or phases of an undertaking it does not exclude research, development, operation and eventually the phasing out of a joint venture. In this context, there is therefore no need to depart from the well known term "facility/service" for air navigation. There is, however, room for amplifying the definition by additional elements in order to dissociate the common undertaking from those facilities/services which are provided by one State only.

2.4 The purpose of a multinational facility/service to serve international air navigation in airspace extending beyond the airspace serviced by a single State is a useful and qualifying element. It is a crucial criterion in that it unambiguously discards other possibilities which the machinery for regional planning and implementation of requirements for facilities/services provides for under Article 28 of the Convention, in accordance with Standards and Recommended Practices and relevant Assembly Resolutions, e.g. delegation of airspace, operating agencies, bi- and multilateral agreements or as a last resort, joint financing under Chapter XV of the Convention. While in any such case States would individually remain responsible under Article 28 for the provision of facilities/services within the area of their jurisdiction a "multinational" facility/service by its very

nature would extend beyond the individual airspace of a State.

3. DEVELOPMENT AND PROCESSING OF A PROPOSAL FOR A MULTINATIONAL ICAO ASIA/PAC AIRNAVIGATION FACILITY/SERVICE

3.1 The following constitutes the step by step development and processing of a proposal for a multinational ICAO ASIA/PAC air navigation facility/service. Comments on individual steps are set forth in subsequent paragraphs.

- a) Proposals for a multinational ICAO ASIA/PAC air navigation facility/service might originate from:
 - APANPIRG
 - a State or a group of States
 - an international organization recognized by ICAO
- b) Proposals for such a facility/service should be supported by material relating to the following aspects:
 - purpose of the proposal and operational and technical justifications;
 - financial implications and cost-effectiveness;
 - managerial implications; and
 - alternative solutions.
- c) The proposal will be evaluated by APANPIRG particularly in respect of requirement, acceptability and cost-effectiveness.
- d) APANPIRG will then, if in preliminary agreement, through the regional office(s) concerned:
 - consult with States which would directly be concerned with the provision of the potential multinational facility/service, as well as those States who would be utilizing it; and as necessary concerned international organizations; and
 - re-evaluate the proposal in the light of comments made by

these States and international organizations and to decide either to proceed or to discontinue the proposal.

- e) APANPIRG develops, in consultation with all concerned, a complete proposal for amendment of the ASIA/PAC Regional Plan for processing in accordance with the procedure approved by the Council.

Comments on the process

3.2 In the light of the basic elements as contained in the definition and their obvious consequence of fully integrating the proposal for a multinational ASIA/PAC facility/service into the ICAO planning and implementation processes for the ASIA/PAC Regions, it follows that:

- A) proposals for a multinational ICAO ASIA/PAC air navigation facility/service might originate from:
 - APANPIRG or
 - a State or a group of States.
 - an international organization recognized by ICAO

3.3 In this context it is recalled that APANPIRG at all times takes an active posture. For the permanent and co-ordinating machinery this is a prerequisite to remain responsive to the specific requirements of the ASIA/PAC Regions and is reflected in the objectives of the group, namely to:

- a) ensure the continuous and coherent development of the ASIA/PAC Regional Plan as a whole taking into consideration the effect of such development on the regional plans of adjacent regions; and
- b) identify specific problems in the air navigation field and propose, in appropriate form, action aimed at resolving these problems.

3.4 The ASIA/PAC planning processes and the working methods of APANPIRG as reflected in its Procedural Handbook ensure continued intensive information of and co-ordination with States members of the ASIA/PAC Regions. Although maximum transparency is inherent in these procedures, specific attention is required from the outset when dealing with multinational projects which may have far reaching

implications for all concerned. This would include the financial problems which are a major cause of deficiencies in the implementation of the ASIA/PAC Regional Plan.

3.5 The procedures for the amendment of approved regional plans and the management of the ASIA/PAC Regional Plan on a continuous basis are described in the Introduction to the ASIA/PAC Regional Plan.

3.6 At the time a proposal is originated within APANPIRG or submitted for its consideration by a State/group of States, basic information must be available to permit preliminary evaluation. Therefore, as a principle:

a) Proposals for such a facility/service should be supported by material relating to the following aspects:

i) purpose of the proposal and operational and technical justifications

This material should include the overall plan and targets for the development and the establishment of the facility/service. The likely implications if any, on regulations, working-routines, equipment, premises and maintenance should be included in the supporting documentation. Information on the expected consequences on the overall ASIA/PAC air navigation system or any part thereof should also be included.

ii) financial implications and cost-effectiveness

Related information should include estimates of the total costs of the multinational facility/service covering, as required, research and development, implementation, operation and maintenance, administration, and capital costs; how all costs incurred prior to the operational phase will be financed; assessing savings which may accrue from the implementation of the facility/service (these can be measured in monetary and/or physical terms for example air traffic controller positions, communications facilities, etc.) and comparing these savings to the total cost estimates; proposals as to how cost shares of States participating in the provision of the project are to be

determined. Also, assessment needs to be provided on impact on users from charges for the facility/service concerned.

c) managerial implications

As a minimum, information on the organizational infrastructure (operational and administrative) and on staff should be included.

d) alternative solutions

Although it may not normally be expected that all proposals from the outside submitted to APANPIRG for consideration will contain relevant information to the extent necessary for preliminary assessment, APANPIRG itself should at all times have due regard to any possible alternative which may satisfy the operational requirement in a more cost/effective manner. Such information should be part of the information provided to those who are to be consulted.

3.7 Once necessary information is available, the consequential next phase to be initiated with minimum possible delay is that:

a) The proposal will be evaluated by APANPIRG particularly in respect of requirement, acceptability and cost-effectiveness.

b) The APANPIRG will then, if in preliminary agreement, through the ICAO regional offices in Cairo, Dakar, Nairobi and Paris:

i) consult with States which would directly be concerned with the provision of the potential multinational facility/service, as well as those States who would be utilizing it; and

ii) re-evaluate the proposal in the light of comments made by these States and decide either to proceed or to discontinue the proposal.

3.8 APANPIRG terms of reference, as well as the procedures adopted for the conduct of its activities, enable it to receive advice in the field of economics as necessary and appropriate. APANPIRG would be in the very best position to establish the need for and the form such assistance should take when considering a proposal for a specific multinational facility/service.

3.9 After completion of the above-mentioned preparatory work the process of including a multinational facility/service in the ASIA/PAC Regional Plan requires that:

- a) APANPIRG develops in consultation with all concerned, a complete proposal for amendment of the ICAO Regional Plan for processing in accordance with the procedure approved by the Council.

4. FINANCIAL, MANAGERIAL AND OTHER CONTRACTUAL ASPECTS

Introduction

4.1 The participation of States in the provision of a multinational facility/service is based on the assumption that any State having supported and agreed to the implementation of such a facility/service and making use of it, should also shoulder its respective share of the costs involved (paragraph 4.27 refers). The participating States would need to formalize the terms under which the multinational facility/service is to be provided in an agreement. A primary aim of the agreement should be to ensure that the costs involved are shared amongst the participating States in a fair and equitable manner.

4.2 This part of the guidelines is concerned with the main contractual aspects, financial, managerial and other, that should normally be considered when initiating work on a potential multinational facility/service. The basic provisions that would need to be considered for incorporation in such an agreement are outlined, including provisions concerning cost sharing and cost determination. However, the guidance does not extend to the presentation of a draft model agreement or clauses, since circumstances related to the planning, implementation and operation of individual multinational facilities/services may vary considerably.

Note: The guidelines generally refer to "agreement" as a generic term covering one or more agreements as the case may be.

Types of agreement

4.3 An agreement covering the development, implementation, operation and maintenance of a multinational facility/service could either take the form of a formal international treaty or an "administrative agreement". Both forms establish an international obligation but a treaty requires the signature of the head of state or government and will also require the ratification or approval of the national legislative assembly, which, as a rule, is a time-consuming process. An "administrative agreement", on the other hand, is at a lower level of requirement in respect of formalities and procedures than a treaty, can be signed by a minister or director of civil aviation or some other authorized person, and could be concluded by an exchange of letters or notes.

4.4 It is recommended that, whenever possible, the agreement be established in the form of an "administrative agreement" rather than a formal international treaty because this would allow the agreement to come into force with minimum delay and also permit greater flexibility in incorporating any subsequent modifications required. It is recognized, however, that in some States constitutional or legal circumstances may require the approval of the legislative assembly for financial obligations to be accepted by the State, particularly if these are of a substantial magnitude and/or extend over a period of time. Whatever form is used, the agreement(s) should be structured to provide for easy subsequent amendments as developments may require. To this end, material of detail which is more likely to require modifications, and which will not affect the basic provisions of the agreement, should be contained in annexes or appendices.

4.5 It is further recommended that whenever possible only one general agreement (treaty/"administrative agreement") be adopted covering all aspects of the facility/service concerned through all its phases. However, this may not always be possible. In certain circumstances it might be necessary or preferable to have more than one agreement (treaty/"administrative agreement") differing in scope and content. In those circumstances the aim should be to cover as many aspects as possible in the "administrative agreement" and limit the use of the treaty to those aspects for which this form of agreement is essential for the States concerned. Recognizing this, one agreement for example, might cover the activities, including prefinancing, to be undertaken by those States that accept the responsibility for bringing the facility/service up to operational status, with another agreement to be concluded between all the States (including the first group of States aforementioned), which would use or be served by the facility/service

once it became operational. In such circumstances the former agreement would be important because the first group of States would have to ensure the provision of funds from their own resources to ensure the implementation of the facility/service, since no inflow of revenues from charges on users (aircraft operators) would take place until the multinational facility/service becomes operational.

4.6 Another possible approach, if required by circumstances, would be for all the participating States to conclude an agreement covering, in general terms, their commitment to participate in the provision of the multinational facility/service, and then developing a separate agreement covering all aspects relating to the financing and operation of the multinational facility/service.

4.7 The various basic provisions that would normally have to be covered in an agreement of this nature are addressed below in the sequence they would usually appear, as follows:

- a) Objective of the agreement
- b) Obligations of States party to the agreement
- c) Definition and description of the facility/service
- d) Establishment and operation of the facility/service
- e) Legal responsibility
- f) Liability aspects
- g) Managerial aspects:
 - i Governing bodies and decision-making arrangements
 - ii Organization and staffing
 - iii Consultation
- h) Financial aspects:
 - i) Cost determination
 - ii) Cost sharing
 - iii) Budgeting
 - iv) Authority to approve the budget
 - v) Financial auditing
- i) Taxation and other government levies
- j) Procedures for settlement of disputes

- k) Accessions, withdrawals, amendments to and termination of agreement.

Basic contractual provisions

a) Objective of the agreement

4.8 In its introductory text the agreement should set out the objective underlying the participating States' decision to jointly arrange for the provision of the multinational facility/service concerned.

b) Obligations of States party to the agreement

4.9 The agreement should at the outset briefly set forth the basic obligations of the participating States. These include the obligation (by a participating State or group of States individually or collectively or as assigned to an organization or agency) to establish and operate the facility/service concerned; the obligation of each participating State to pay its share of the costs involved; the obligation to observe ICAO policies and practices, including those addressing cost recovery by States from aircraft operators, etc.

c) Definition and description of the facility/service

4.10 The agreement should contain a clear and accurate definition and description of the multinational facility/service to be provided and the functions it is to perform, including to the extent possible and desirable, the supporting services required. It may be advisable in certain cases to make specific reference to functions which the multinational facility/service will not be performing.

d) Establishment and operation of the facility/service

4.11 The agreement should specify who will establish and operate the facility/service concerned, namely whether this is to be done by one State, two or more States, an existing international organization, an existing national or international agency, or a new agency to be established specifically for this purpose.

Note: The decision as to who should provide the facility/service could be influenced, in particular, by the anticipated capital investment and annual costs involved, as well as the extent to which the alternative providers (i.e. a participating State or States, international

organization or agency) have been engaged in the function(s) concerned.

e) **Legal responsibility**

4.12 If an international organization or agency (as referred to in Assembly Resolution A22-19) is to establish and/or operate the facility/service concerned, it will have to be endowed with proper legal responsibility to have the capacity to contract, to acquire and dispose of property and to institute and answer legal proceedings.

f) **Liability aspects**

4.13 Closely related to legal responsibility are the liability aspects which may have to be addressed in the agreement. This involves such aspects as the determination of the extent to which liability is to be assumed in connexion with the provision of the multinational facility/service. Other aspects also include whether the entity providing the facility/service concerned, whether an international organization agency or State(s), should alone assume such responsibility or whether this should be shared amongst all the participating States.

g) **Managerial aspects**

a) **Governing bodies and decision making arrangements**

4.14 The nature of the governing body or bodies required to administer the agreement needs to be established and a description of their functions provided. Should a new agency be established to operate the multinational facility/service, this would need to be stipulated in the agreement, where reference should also be made to the functions and responsibilities of the executive head of the agency and to whom he or she would be responsible.

4.15 Voting arrangements should be specified. It would need to be decided whether each participating State should have equal voting power (as is for example the practice of ICAO). Alternatively, each State's vote may be weighed in accordance with a predetermined formula, which would need to be specified, for example, by determining the voting power according to that participant's share of total contributions to the facility/service or agency concerned. A maximum and/or a minimum limit may be set for the number of votes that can be assigned to any individual participant regardless of that participant's share of total contributions.

4.16 Another voting aspect which has to be decided on, and specified in the agreement, is whether a simple majority would apply in all cases or whether for particular issues a large majority vote (to be specified) or even unanimity would be required. Where different degrees of majority voting would apply depending on the matter or subject being voted on, these would also need to be clearly identified in the agreement.

b) **Organization and staffing**

4.17 The agreement should refer to the manner in which the entity actually operating the facility/service would structure or organize its functions. This would apply in particular if the operation is to be assigned to a new agency.

4.18 Various aspects of staffing (nationality, numbers and type etc.) will also need to be addressed and, as appropriate, incorporated in the agreement (or an annex to it). If the participating States agree that the multinational facility/service is to be provided by one State or by two or more States (each providing separate components or parts of the project involved), the nationality of staff should not give rise to any problems, and need not be covered in the agreement. However, operation by an international organization or agency may require that certain stipulations be included in the agreement concerning the selection of qualified staff from participating States. Other aspects to be considered, aside from the number and types of staff, are the various elements of conditions of service including status to be accorded to any expatriate staff, tax exemptions, etc., which will reflect on the over-all costs of the venture.

c) **Consultation**

4.19 Provision should be made in the agreement to ensure adequate consultation with States being party to the agreement but not represented on the governing body, and appropriate aircraft operators organizations. Such consultations should at least be undertaken in advance of any developments that could materially affect cost share to be allocated to these States, user charges, and the quality of the services provided.

h) **Financial aspects**

a) **Cost determination**

Pre-implementation considerations

4.20 The determination and presentation of the costs attributable to the provision of the multinational facility/service concerned should proceed in a manner

acceptable to all the participating States. In this context it should be noted that bringing the facility/service up to implementation status can involve the costs of implementation being financed by one or more of the participating States. However, once the facility/service has been implemented, these costs would be capitalized and then included as depreciation (together with accumulated interest) in the over-all cost base to be shared among the States participating in the provision of the facility/service concerned.

Determination of costs

4.21 In order to formalize the manner in which the costs to be shared should be arrived at, the agreement between the States participating in the provision of a multinational facility/service should contain clauses referring to the determination of the related costs. The agreement should also stipulate that the approach towards cost determination be based on that recommended in Chapter 1 of the ICAO Manual on Route Air Navigation Facility Economics (Doc 9161). Should more comprehensive instructions, based on Doc 9161, be required, it is preferable that these be presented in an annex in view of their relative volume and detail, and also because it may be expected that they would need to be updated and modified more frequently than the main text of the agreement. (Amendments to the annexes to the agreement would normally be subject to the approval of the governing body of the multinational facility/service).

4.22 In line with the approach adopted in Doc 9161, the annex would normally contain an inventory of the various components of the multinational facility/service (e.g. buildings, equipment, number of staff by function, etc.). It would also cover the determination of annual costs, i.e. costs of operation and maintenance, administrative and common costs, and capital costs (depreciation and interest) as well as special capital outlays. Finally, where a multinational facility/service or any of its components serve other than the multinational functions specified in the agreement (i.e. functions serving one State only, or non- aeronautical functions), instructions should be provided to ensure the accurate determination of the "multinational" costs to be shared among the participating States.

Presentation of costs

4.23 The agreement would also need to specify, normally in an annex, the basic format to be used for the presentation of the annual costs for approval. The scope and detail of the format will depend on the particular circumstances involved.

b) Cost sharing

Responsibility for the sharing of costs

4.24 As stated in 4.1 above, once a State has supported and agreed to the implementation of a multinational facility/service and making use of it, it would be expected to assume responsibility for its share of the costs involved. This basic obligation should be reflected in the agreement between the participating States.

Determination of cost share of each participating State

4.25 The agreement should outline the procedure to be applied for determining the cost share to be borne by each participating State. Any cost sharing method should, to the extent possible, be equitable, simple and easy to apply. The question of equity should not only be considered in the context of the participating States, but also with respect to the final users (aircraft operators) since it may be assumed that in most instances the participating States would include the costs they incur in the cost base for their air navigation facility charges, where levied.

4.26 In general, it does not appear feasible to recommend one specific method or approach to cost sharing because the situation will vary, depending particularly on the technical and operational characteristics of the multinational facility/service involved, the views or policies of the participating States on how costs should be shared, and the volume of these costs.

4.27 In the interest of equity, however, any method of cost sharing should, in principle, be based on the extent of the use of the multinational facility/service concerned by each participating State. Thus, the parameters or keys used to determine each State's cost share should reflect the extent of such use. However, if the use made of a multinational facility/service can only be measured by applying complex procedures and at a cost which is not commensurate with the costs to be shared, other methods of cost sharing based on readily available and relevant statistical data could be applied. Whatever method is selected it must provide for the just and equitable sharing of the costs involved.

Tangible national benefits to the State(s) actually operating the multinational facility/service

4.28 A multinational facility/service might be operated by one or more States with other States contributing their share of the costs involved. In such

circumstances, all the States concerned must decide whether or not the total costs should be subject to sharing or if any allowances should be made to reflect any tangible benefits accruing to the State(s) engaged in the actual operation of the facility/service concerned. Such benefits would usually be in the form of employment of nationals, contracts awarded to national companies, etc. with their associated multiplier effect on the economies of the State(s) concerned. It should be noted that the States actually operating the facility/service would, like other State(s) using it, be obliged to pay its (their) share of the total costs to be shared.

Recovery of costs from users

4.29 As a rule, a multinational facility/service would have to be "multinationally" financed or prefinanced by a State, group of States or, by an agency as established under the authority of an agreement by States. However, any of these could recover the costs so incurred from users once the facility/service has been implemented. Nevertheless, States may also choose to recover less than full costs in recognition of local, regional or national benefits (Doc 9082, paragraph 29 refers). Where an agency has been authorized to recover its costs through charges, the authorizing States would nevertheless need to make up for revenue shortfalls where, for example, the States had decided certain flights should either be exempted from or pay reduced charges.

4.30 It would be up to each participating State to decide whether or not it wishes to recover its cost share from the users (aircraft operators). A State could either include these costs in its cost base for route facility charges (if it levies such charges), or, alternatively, recover the costs by levying a separate charge (normally a more complex and costly procedure to administer). While the recovery of such cost shares from users might normally not be referred to in an agreement on a multinational facility/service, the agreement could include a provision to the effect that such recovery must be based on Article 15 of the Chicago Convention as well as the principles and recommendations in Doc 9082.

4.31 If the participating States were to assign the operation of a multinational facility/service to an international organization or an international agency and decide that it should levy charges on aircraft operators for the purpose of full or partial cost recovery, this would need to be covered in the agreement. In such instances the agreement would usually also stipulate (probably in a separate annex) the charging formula to be used, reductions and

exemptions granted, billing and payment arrangements, etc. Such procedures would, of course, need to conform with the provisions of Article 15 of the Chicago Convention and Doc 9082.

c) Budgeting

4.32 Proper financial control will require costs and revenues to be estimated in advance. The itemization of the costs should basically correspond with that used for the presentation of costs (see 4.23 above). This will enable actual costs to be compared with estimated costs, and actual revenues with those estimated.

d) Authority to approve the budget

4.33 The agreement should also stipulate who has the authority to approve the budget and thus authorize the use of funds to meet operating expenses and capital expenditures. This authority would normally be vested in the governing body of the multinational facility/service concerned.

e) Financial auditing

4.34 The financial audit function forms an integral part of the determination of the costs to be shared and the cost share to be borne by each participating State as well as of proper financial control. The agreement between States participating in the provision of a multinational facility/service should therefore specify that an annual financial audit be performed by a certified independent external auditor.

f) Taxation and other government levies

4.35 The subject of tax exemptions and other aspects related to taxation will need to be addressed in the context of the over-all operations of the multinational facility/service. Similarly, with regard to other government levies such as custom fees and duties, value added tax, etc., it may also need to be considered whether the import or export, purchase or sale of any equipment, supplies, etc. required for the operation of the multinational facility/service concerned should be exempted from all such levies in the participating States. The inclusion of clauses to that effect would be likely to require an agreement subject to ratification, such as a treaty.

g) Procedures for settlement of disputes

4.36 The agreement should contain stipulations setting out the procedures to be followed for settlement or disputes between the participating States arising

from the provision of the facility/service concerned. Regarding the settlement of disputes arising from different interpretations being given to the agreement, the States concerned would have to agree on the procedures for negotiation or arbitration and on the body to which an appeal for a final ruling could be made.

h) Accessions, withdrawals, amendments to and termination of agreement

4.37 The agreement should contain provisions, including those describing the financial implications involved, to:

- a) cover the subsequent accession by any additional qualifying State(s) after the agreement is in force; and
- b) specify the procedure to be applied when a signatory State wishes to withdraw from the agreement as well as procedures to follow in the event of termination of the agreement.

4.38 Similarly, the agreement should specify the procedures to be followed if amendments are to be made to the main text or to any annexes (for which different procedures would normally apply).

Summarized from ALLPIRG/5 Working Paper 10

IMPLEMENTATION OF AN RMA: A STEP-BY-STEP PROCEDURE

On the basis of the approach described in section 2 above [in ALLPIRG/5-WP/10] and existing guidelines on the establishment of a multinational ICAO air navigation facility / service, the implementation of an RMA could include the following steps:

1. define, at a PIRG meeting, the reduced vertical separation minimum (RVSM) monitoring function as a Multinational ICAO Air Navigation Service in accordance with the existing guidelines, on the establishment and provision of a multinational ICAO air navigation facility / service, included in the regional air navigation plan concerned;
2. agree to a cost sharing arrangement based on, for example, distance flown or number of flights within the airspace for which each of the respective States has assumed responsibility, it being understood that distance flown may offer more precision while allocation based on the number of flights is simpler to administer;
3. find and assign a State or an existing organization or agency to establish and operate the RMA, in accordance with the requirement in Annex 11 (the PIRG's responsibility);
4. develop and establish an administrative agreement to regulate the establishment and operation of the RMA, including the cost sharing arrangement and procedures for collection of contributions from the participating States (the PIRG, assisted by the ICAO Regional Office);
5. sign the administrative agreement (DGCAs or some other authorized person in the participating States);
6. establish and operate the RMA as a Multinational ICAO Air Navigation Service in accordance with the administrative agreement (the assigned operator); and
7. recover the contributions to the financing of the RMA through additions to the cost bases for route charges and transfer the amounts to the RMA operator (each State).



**MIDDLE EAST REGIONAL MONITORING AGENCY
(MID RMA)**

**MEMORANDUM
OF AGREEMENT**

Bahrain- 27 February, 2006

**MEMORANDUM OF AGREEMENT
ON THE ESTABLISHMENT, OPERATION AND MANAGEMENT OF THE
MIDDLE EAST REGIONAL MONITORING AGENCY (MID RMA)
AND ITS FUNDING BY THE PARTICIPATING STATES**

1. PARTIES

1.1 The Parties to this memorandum of agreement are: Bahrain, Egypt, Iran, Jordan, Kuwait, Lebanon, Oman, Saudi Arabia, Syria and Yemen.

2. AGREEMENT

- CONSIDERING the urgent need to institute a programme, on a regional basis, for monitoring the height-keeping performance of aircraft operating in RVSM airspace;
- CONSIDERING the Parties' earlier decision that the Middle East Regional Monitoring Agency (MID RMA) will be funded entirely by the participating States and that the budget estimate for the first year, be paid by the Parties on equal basis;

The Parties have agreed as follows:

1. The Parties to this memorandum of agreement, referred to hereunder as Participating States agree to establish the Middle East Regional Monitoring Agency (MID RMA) and undertake to become its members;
2. The MID RMA shall be managed as a Regional programme; shall have legal personality and shall act through the MID RMA Board;
3. The overall objective of the MID RMA is the promotion of safety of air navigation in the Middle East Region through the operation and management, on a sound and efficient basis, of a permanent MID Regional Monitoring Agency;
4. The MID RMA Board, in which each Participating State is entitled to appoint one member, shall retain overall direction and responsibility for the supervision and operation of the MID RMA in accordance with the relevant obligations of the Participating States under the Convention on International Civil Aviation and its Annexes. The Board shall elect its chairman. It shall inter-alia, supervise and direct the MID RMA, follow-up its activities and reports and assign its priorities. It shall also secure the commitment of Participating States for funding the MID RMA in accordance with agreed funding mechanism and for provision of necessary data for the MID RMA;
5. The MID RMA's scope, duties and responsibilities will be those agreed by the Board's first meeting and could be revised by the Board. The MID RMA will be assigned clear tasks in a step-by-step approach starting with RVSM height monitoring and RVSM post-implementation safety assessment, having in mind the end objectives, which will include RNP/RNAV and SMS. The MID RMA duties and responsibilities will include, but will not be limited to the following:
 - collecting and analysing RVSM data received from MID States as well as from Eurocontrol/FAA, IATA and airlines;
 - collecting data on aircraft approved by various States for operation within RVSM airspace in the MID Region and enter such data in the MID RMA database;
 - verification of the effectiveness of the approval process by States;

- establishing a database for reporting height deviations of aircraft;
 - verification that the target level of safety on implementation of RVSM is met and maintained;
 - monitoring the effectiveness of the altimetry system modifications to enable aircraft to meet the required height keeping performance criteria;
 - evaluation of the stability of altimetry system error;
 - undertake monitoring missions to States as required;
 - determine in the light of analysis made of data received and of missions conducted, whether compliance with required safety standards is maintained and initiate corrective action as needed in each case; and
 - submit a report to each Board meeting on MID RMA activities, its analysis of data and any identified departure from RVSM Safety limits, for its consideration and action as appropriate.
6. The Participating States have accepted Bahrain's offer to host the MID RMA in Bahrain to enable the early establishment and functioning of the MID RMA;
 7. Bahrain will provide the offices, equipment and local personnel needed for the MID RMA operations and pay for the initial set up of the MID RMA without waiting for MID States' contributions. The advance payment made by Bahrain shall be recovered through States' contributions in compliance with the agreed funding mechanism;
 8. Based on the agreed funding mechanism for the first year of operation of the MID RMA, the cost for the establishment of the MID RMA, its operation and management for the first year shall not exceed the estimated amount of US\$ 300,000, which shall be borne by the Participating States on equal basis;
 9. The funding mechanism and consequent contributions of Participating States may be modified in subsequent years by decision of the Board;
 10. The MID RMA staff shall be composed of:
 1. MID RMA Manager/Team Leader (Part Time)
 2. One Assistant MID RMA Officer (Full Time)
 3. Database Specialist (Part Time)
 11. The MID RMA Manager/Team Leader shall manage the project on day-to-day basis and effect coordination with the Chairman of the MID RMA Board. He shall submit the MID RMA reports to the Board with copies to the ICAO Regional Office in Cairo;
 12. Bahrain shall monitor the progress of the MID RMA, maintain financial accounting and provide general support and timely reporting;
 13. Participating States authorize the MID RMA Board Chairman to negotiate on behalf of the MID RMA an agreement with ICAO and Bahrain specifying ICAO's role as the custodian of the funds collected for the purpose of this agreement, in compliance with ICAO's Financial Regulations and Rules;
 14. This Memorandum of Agreement shall come into effect on the date it has been signed by the Participating States;
 15. Any amendment to this Memorandum of Agreement, shall be carried out by the parties to this agreement;

16. Any dispute arising out of or relating to this Memorandum of Agreement, shall be settled by direct consultation between the Participating States concerned;
17. Any Participating State may withdraw from this Memorandum of Agreement by giving a prior notice of **six (6) months** to other Participating States. The obligations assumed by the Participating States under this Memorandum of Agreement shall continue to exist after the withdrawal from this Memorandum of Agreement to the extent necessary to permit the orderly finalization of activities, the withdrawal of personnel, the distribution of funds and assets and the settlement of contractual obligations. Additional funds, if necessary, to cover the above mentioned expenditures shall be provided by the Participating States.
18. The hosting of the MID RMA by Bahrain may be terminated at the request of Bahrain, with two years advance written notification to the MID RMA Board to allow sufficient time for selection of an alternative location and necessary arrangements for transfer of the MID RMA.
19. All correspondence relating to the implementation of this Agreement, shall be addressed to:

MID RMA

Chairman of the MID RMA Board
C/o Ministry of Transportation
P.O. Box 586
Bahrain International Airport
Manama - Bahrain

With copy to the:

ICAO Regional Director

ICAO Middle East Regional Office
Egyptian Civil Aviation Complex, Airport Road
P.O Box 85, Airport Post office, Terminal One
11776, Cairo, Egypt

DRAFT GUIDANCE MATERIAL
FOR ADS/CPDLC/AIDC GROUND SYSTEMS
PROCUREMENT AND IMPLEMENTATION

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CHAPTER 1 INTRODUCTION

This material has been developed under an initiative of the Regional Airspace Safety Monitoring Advisory Group (RASMAG) of the Asia Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG) to assist air traffic service (ATS) providers with the implementation of datalink-based air traffic management (ATM) systems.

For the purposes of this document, a datalink-based ATM system is one which supports automatic dependent surveillance (ADS), controller-pilot datalink communications (CPDLC) and ATS interfacility datalink communications (AIDC).

Integrated datalink systems such as ADS, CPDLC and AIDC are playing an increasingly important role in air traffic management. As the use of these systems spreads, so more ATS providers must equip with the appropriate facilities.

The material covers two main aspects of implementation: specification and deployment.

Technical systems must be well specified from both the technical and operational aspects, and at the right level of detail: enough to ensure that the requirements are met, but not so much as to shut out good solutions.

The deployment of a new system involves a number of vital steps, such as testing, training, integrating and commissioning.

This material offers guidance, rather than solutions, with the emphasis on specifying systems supporting ADS, CPDLC and AIDC.

It is not the intention of this document to provide the detailed technical information required to specify datalink applications: this information may be found in the various ICAO and other documents referenced.

1.1 OBJECTIVE

The objective of this document is to provide guidance on the specification, procurement and implementation of datalink systems for States and service providers unfamiliar with these systems.

It is important that air traffic controllers, as the users of integrated datalink systems, play a positive and active role throughout the procurement and implementation activities.

The clear and complete definition of operational requirements and the final testing in an operational environment are both critical and are unlikely to be completed successfully without significant user input. Clearly defined system requirements and specifications are vital in order for potential vendors to be able to offer a suitable system.

1.2 SCOPE

The material is divided into three sections. The first covers the generalities of procuring and implementing a new system, the second is concerned with the

requirements of a datalink-based ATM system, and the third gives guidance on specifying a system.

1.2.1 Procurement and Implementation

Procurement and implementation includes:

- Planning and contracting
- Supervision and inspection
- Preparation for operation
- Operational transfer

1.2.2 Requirements

The Requirements section covers general requirements for datalink systems and specific requirements for:

- Datalink Initiation Capability (DLIC)
- ADS
- CPDLC
- AIDC

1.2.3 Specification

The Specification section offers guidance on the specification of:

- System configuration
- Interfaces
- Functionality
- Human-Machine Interface
- Capacity and parameters
- Recording and data analysis

1.3 SYSTEMS OVERVIEW

1.3.1 ADS

Automatic Dependent Surveillance is a surveillance technique in which aircraft automatically provide, via a data link, data derived from on-board navigation and position-fixing systems, including aircraft identification, four-dimensional position, and additional data as appropriate.

The ADS data link application allows the implementation of reporting agreements, or “contracts”, which, with the exception of an aircraft in an emergency situation, are established exclusively by the ground. An ADS contract is an ADS reporting plan which establishes the conditions of ADS data reporting (i.e. the data required by the ATC system and the frequency of the

ADS reports which have to be agreed upon prior to the provision of the ADS services). ADS information may be exchanged between the ground system and the aircraft by means of a single contract or a series of contracts. An ADS contract specifies under what conditions an ADS report would be initiated, and what data groups will be included in the reports.

There are three types of contract:

- *Periodic contracts* provide a report at a regular periodic interval determined by the ground system.
- *Event contracts* provide a report when or if a specified event or events take place.
- *Demand contracts* provide a single report when requested by the controller.

Note: Throughout this document, ADS refers to ADS Contract. ADS Broadcast, where used, is abbreviated to ADS-B.

1.3.2 CPDLC

Controller Pilot DataLink Communications is a data link application that provides a means of communication between controller and pilot, using data link for ATC communications.

Sending a message by CPDLC consists of selecting the addressee, selecting and completing, if necessary, the appropriate message from a displayed menu or by other means which allow fast and efficient message selection, and executing the transmission. The messages include clearances, expected clearances, requests, reports and related ATC information. A “free-text” capability is also provided to exchange information not conforming to defined formats. Receiving the message will normally take place by display and/or printing of the message.

CPDLC overcomes a number of the shortcomings of voice communication, such as voice channel congestion, misunderstanding due to bad voice quality and/or misinterpretation, and corruption of the signal due to simultaneous transmissions.

1.3.3 AIDC

ATS Interfacility Datalink Communications is a data link application that provides the capability to exchange data between ATS units in support of critical ATC functions.

AIDC defines messages which are related to three phases of coordination as perceived by an ATSU.

- *Notification*, in which the aircraft trajectory and any changes may be conveyed to an ATSU from the current ATSU prior to coordination.

- *Coordination*, in which the aircraft trajectory is coordinated between two or more ATSU's when the flight approaches a common boundary.
- *Transfer*, in which communications and executive control authority is transferred from one ATSU to another.

Other AIDC messages support ancillary ATC data changes between ATSU's, including the exchange of free-text messages.

1.4 APPLICATION OF THE GUIDANCE MATERIAL

The application of this Guidance Material is not mandatory. It is recommended for use as a reference manual for specifying ADS/CPDLC/AIDS systems, and to find feasible and suitable processes or as a check-list for the various steps in procurement and implementation. Any selected parts of the Guidance Material may be applied on a case-by-case basis.

1.5 DEFINITIONS

Meanings of words used in this Guidance Material are as follows:

- "Shall" or "must" are used where there is a specific requirement for a feature to be included or process to be followed.
- "Should" is used to indicate that, while not imperative, it is an important feature or process that should not be omitted without good reason.
- "May" indicates an optional feature or process.
- "Approval" means the official approval process of the State or service provider.
- "Organization" is the organization acquiring the datalink system.
- "Users" includes controllers and communicators of the organization.

Abbreviations have the meanings indicated in Appendix A.

CHAPTER 2 PROCUREMENT AND IMPLEMENTATION

2.1 GENERAL

2.1.1 Elements of System Quality

Design Quality is an index to express how well the design process has translated the operational requirements into product specifications. Design Quality depends upon both the definition of operational requirements by the organization and the system design skills of the vendor.

Production Quality is an index expressing how exactly the products match the specifications through production quality control. In general, the vendor is responsible for Production Quality.

Operational Quality expresses how accurately the actual operation of the system realizes the operational objectives. Operation Quality is mainly influenced by the operational management of the organization.

Total System Quality is the product of Design Quality, Production Quality and Operational Quality. In general, these three quality elements should be improved simultaneously to improve Total System Quality.

It is clear from this quality structure that good understanding and well organized cooperation between the organization and the vendor are essential to achieve a high total system quality.

Example: $1.0 \times 1.0 \times 1.0 = 1.000$ (Ideal case)

$0.7 \times 1.0 \times 1.0 = 0.700$ (Design Quality is poor)

$1.0 \times 0.6 \times 1.0 = 0.600$ (Production Quality is poor)

$1.0 \times 1.0 \times 0.7 = 0.700$ (Operation Quality is poor)

$0.7 \times 0.6 \times 0.7 = 0.294$ (All quality elements are poor)

2.1.2 Roles and Responsibilities of the Organization

The responsibility for successful system implementation lies with the organization. The organization should take a positive role in all critical processes of the system procurement and implementation.

The responsibility of the vendor is only to develop or integrate a system to the organization's specific requirements or to produce a standard system to the vendor's own specification.

System users are responsible for defining operational requirements, for helping vendors in their design, development and integration activities, and for confirming whether or not the system meets operational requirements.

2.1.3 Relationships between Requirements, Specification and Test/Evaluation

The figure below shows the relationship between operational requirements, system requirements, specification, design and test/evaluation. Only the combination of a complete and feasible definition of the requirements, consistent design, quality assured development and adequate review, testing and evaluation at each stage can provide a quality system.

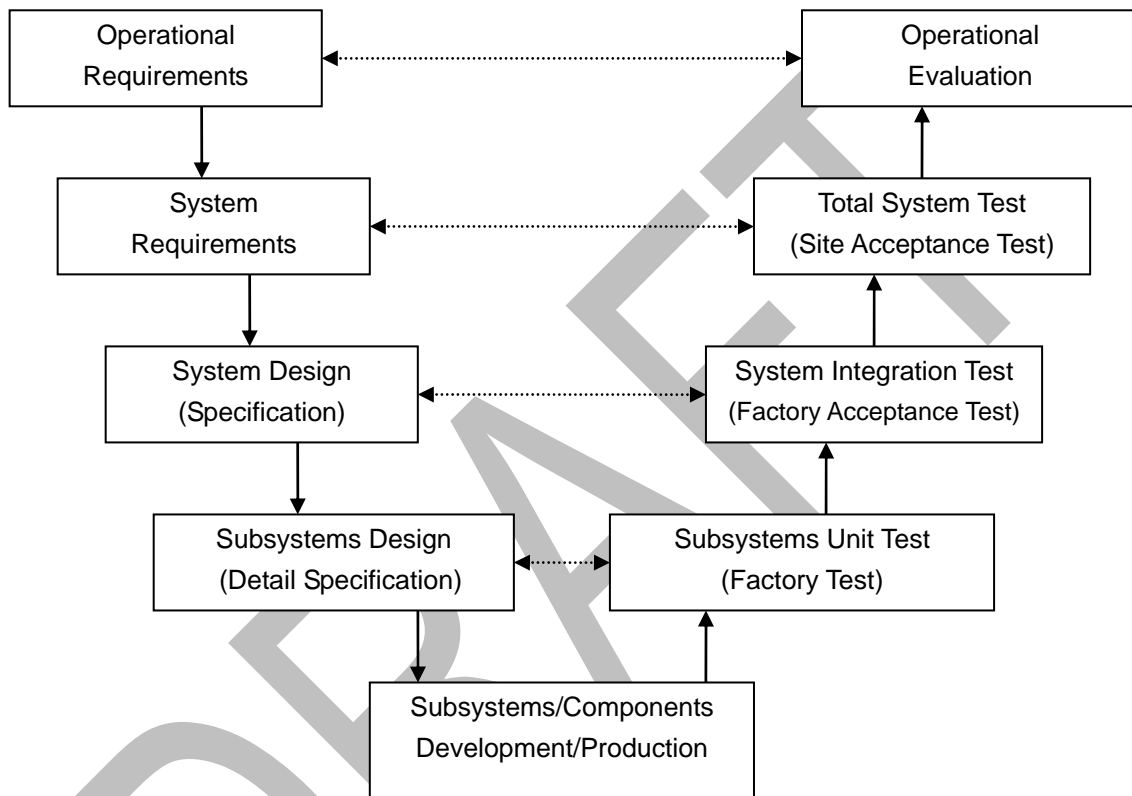


Figure1. Relationship between Requirement, Specification and Test/Evaluation

2.2 PLANNING AND CONTRACTING

2.2.1 Operational Requirements

The first, and perhaps most critical, stage of the planning and contracting phase is the definition of the ATS Operational Requirements; these must be based on the professional knowledge and experience of controllers and must encompass all aspects of the ATS operation. Ideally, the operational requirements are determined by a small team of experienced controllers, supported by engineers and planners.

2.2.1.1 Studies of Existing Systems

The operational requirements team must have an appreciation of how datalink systems work in the operational environment; this is best

achieved by studying existing systems and talking to experienced controllers, engineers and managers in other ATS facilities. The study should cover operational and technical practices and should pay particular attention to problems encountered and lessons learnt.

Controllers using these systems will be well aware of any features that do not work well or are not user-friendly, and will have suggestions for how the system could be improved. This is valuable information that can be used when developing the specification or during the contract negotiation phase; in the latter case, a supplier could be invited to change such features in an otherwise satisfactory system.

2.2.1.2 Confirmation of Service Environments

The operational requirements team should establish the current ATS environment as the baseline, taking into account:

- Airspace structure and major airports.
- Sector configuration and VHF/radar coverage.
- Traffic flows (routes, number, flight levels, etc.).
- ATS procedures.
- Related ATS facilities.

2.2.1.3 Operational Requirement Analysis

From the baseline, the team should analyse trends to determine the likely changes in the operational environment over the projected life of the system. This analysis can then be used to define the operational requirements as follows:

- Required services
- Peak and mean traffic levels, etc
- Required sector configuration and relations between them
- Required operational functions.

2.2.2 Design and Review

The team, helped by analysts or consultants if necessary, should define the system concept in terms of both operational requirements and technical feasibility, perhaps using other facilities as a base reference. The concept should be reviewed by controllers and managers who are not part of the team and modified as necessary.

2.2.2.1 Conceptual Design

The conceptual design must be documented clearly and should include the following:

- ATS functions needed (e.g. ADS reports, traffic display).

- Performance goals for the targeted airspace.
- Sector configuration.
- Physical configuration and layout.
- New operational procedures required (e.g. use of ADS reports).
- System operation (e.g. redundant parallel operation, automatic recovery, etc.).
- Standards to be applied (e.g. ARINC-745, RTCA DO-219, DO-258).
- Interface requirements for related ATS facilities.
- Datalink Service Provider and its interface.
- Human Machine Interface (e.g. display size, symbols, font size, use of colour)

2.2.2.2 Technical Feasibility Study

The team may then determine the technical feasibility of meeting the Operational Requirements, particularly in terms of the functionality required, the characteristics and performance of existing systems and the available budget. The team can then decide which of the following would be the most appropriate procurement option:

- Vendor's "off-the-shelf" system.
- Customized off-the-shelf system.
- Custom-built system.

The criteria to be used in evaluating systems in the market will include:

- Functionality meeting the requirements.
- Adequate performance and capacity to handle future traffic.
- User-friendly and intuitive operation.
- High reliability under all anticipated service conditions.
- Simple connection with related systems and facilities.
- Required standards are met.

2.2.2.3 Specification

From the Operational Requirement and the feasibility studies, the specification can be developed. This is discussed in detail in Chapter 4.

2.2.2.4 Design Review

The Design Review team, which should be independent of the requirements team, should comprise controllers, engineers and managers. The review may take the form of a walk-through of

Conceptual Design documents or a desk-top simulation.

Expected results of the design review will be as follows:

- Adaptability to Operational Requirements.
- Connectivity with related systems and adjoining facilities.
- Flexibility and expandability in the future.
- Issues on both technical and operational points of view.

2.2.3 Request for Proposal (RFP)

A fully-documented and approved Request for Proposal (RFP) should be submitted to prospective vendors, whether for an off-the-shelf system, a customised off-the-shelf system or for development of a new system.

2.2.3.1 Objective

The objective of RFP is to secure fully compliant proposals from a number of competent vendors.

2.2.3.2 Content

The RFP should contain all the information required for prospective vendors to make a complete and compliant proposal. Any omissions will result in enquiries from vendors, which will take time and effort to respond to. The RFP should contain:

- The specification.
- Maintenance support requirements.
- Training requirements.
- Warranty requirements.
- A draft contract, to allow vendors to see what contract requirements they will have to meet, and what arrangements they may have to make to meet them.
- Bidding conditions, including:
 - Submission of separate technical and financial bids.
 - Confidentiality.
 - The enquiry process.
 - The closing date for enquiries.
 - The closing date for bids.
 - Notification of short-listed bidders.
 - Notification of preferred bidder.

- Financial conditions, including
 - Bid bonds (if required).
 - Requirements for financing (if necessary).
 - Proposed payment schedule.
- The proposal evaluation process, including the evaluation criteria.

2.2.3.3 Enquiry Process

It is inevitable that some bidders will ask for clarification of details or for additional information. To avoid giving advantage to any particular bidder, there should be a formal process to ensure that all bidders receive the same information. This may be done by sending all bidders copies of each question received and the response given.

2.2.4 Evaluation of Proposals

Proposals must not be opened before the stated closing date.

The evaluation of proposals must be, and be seen to be, fair and traceable. All stages of the evaluation process should be clearly documented and the reasons for each decision recorded.

Ideally, the evaluation team will include all the members of the team that drew up the specification, complemented by other personnel as necessary. It is good practice to isolate the evaluation of the financial proposal from the rest of the process. Besides maintaining the confidentiality of the financial bids, this avoids any influence of the technical evaluation on the financial and *vice versa*.

The evaluation process and criteria stated in the RFP must be strictly followed: this should avoid any protest by unsuccessful bidders.

Proposals are not always perfect, nor do they always fully cover every item of the RFP, and so there may be a need for clarification during the evaluation phase. It may be necessary to request additional technical or financial information in order to complete the evaluation; this should take the form of a simple request for the specific information required. However, there should be no negotiation at this stage, of either technical or financial elements.

2.2.5 Contract Negotiation

There should be no negotiation with bidders before the selection process has been completed. Once the preferred bidder has been determined, negotiations on the detailed conditions are acceptable. Negotiations may be by correspondence or face-to-face, and should involve the appropriate experts from the organisation. The negotiations must be clearly documented.

2.3 SUPERVISION AND INSPECTION

2.3.1 Organization and Timetable

Supervision and inspection plan, including what, when, by whom and how to supervise, shall be negotiated with vendor first, and then documented and approved before start of deployment. Supervision and inspection may be done by team work, if the system is large and complex. Supervisor(s) shall not be the same person(s) of inspector(s) for fair achievements of each responsibility.

2.3.2 Procedures and Criterion

Standards and criteria to be applied in supervision and inspection shall also be clearly defined in the supervision plan and approved before the start. Acceptance Test may be major part of Inspection. Confirmation of vendor test results and quality management records may be assumed as parts of inspection.

2.3.3 Recording and Corrective Action

Results of supervision activities shall be recorded and reported periodically. If the progress is not in time, the revised schedule and proper actions shall be negotiated. If the results don't meet specified standards or criteria, the facts, possible reason and corrective actions to be taken shall be recorded and reported as soon as possible.

2.4 PREPARATION FOR OPERATION

Most of preparation works for the integrated datalink system such as ADS/CPDLC/AIDC operation are user's role. The basic requirements shall be clearly specified in RFP, and details will be proposed by vendors. After vendor selection, the organization shall negotiate the details of preparations with the vendor and define the roles and responsibilities of both parties. Some of the preparations will take so long time and so many human resources of the organization that special workload consideration shall be planned.

2.4.1 Preparation of Safety Case

2.4.2 Standardization of Service and System Operation

2.4.2.1 Service Operation

ATS Operation Manual shall be prepared and educated to the key users before Total System Test, and be confirmed of its validity in the test. The operation manual shall include exceptional and emergency procedures as follows:

- Weather deviation.
- Route change.
- Lost communication.

- Emergency descent.
- Confliction.
- System familiar.

2.4.2.2 System Operation

System operation procedures should be clearly defined in operation manual which contains emergency procedures such as system failure and recovery. System operation manual shall be prepared and educated to the system operators before the Total System Test, and be confirmed of its validity in the test.

2.4.2.3 System Management

System management procedures should be clearly defined in management manual, maintenance guide, trouble reporting procedure and recording system. System Management Guide shall be prepared and educated to the system managers before the Total System Test, and be confirmed of its validity in the test.

2.4.2.4 Automatic Tools

Automatic system operation, monitoring and management tools are very effective, reliable and efficient, especially for communication subsystem.

2.4.3 Education and Training

2.4.3.1 Controllers Training

Controllers should be educated with good knowledge of functions, performance, limitations, operational and emergency procedures of the system before start of training. Controllers should be familiar enough through training with system operations and service procedures using the system before start of real operation.

2.4.3.2 Operators/Managers Training

Operators and managers also need to be educated and trained before start of real operation. System operators and managers should have detail knowledge of configuration, functions, performance, limitations, operational and emergency procedures.

2.4.3.3 Operation Manual

Operators should be trained to work according to authorized operation manual which contains emergency procedures such as system failure and recovery. Managers also should be trained to work according to system operation manual, maintenance guide, trouble reporting procedure and recording system.

2.4.3.4 Training Plan

Basic training requirements for operation, system operation and management are specified in RFP, and details will be proposed by the vendors. The organization shall plan details of training, including target audience, time and duration, objectives, goal to achieve, course contents and materials. Training shall include real-time simulator based training, using real ATS operation cases in targeted airspace environment with peak traffic.

2.4.3.5 Simulator Based Training

Simulator based controller training is very effective and shall include possible exceptional and emergency cases such as overload traffic situation, weather deviation, route change, emergency descent, confliction and system failure.

2.4.4 Total System Test and Rehearsal of Transfer

2.4.4.1 Test Components

Total System Operation Test is the final and only one way to certify the system is proven in a real ATS operational environment in targeted airspace from controller to pilot. The test should be planned to confirm that the deployed ADS/CPDLC/AIDC system meets the Operation Requirements by the organization's point of view. The test should include the following tests:

- Function Test.
- Performance Test (Including overload test).
- Reliability Test.
- Failure and Recovery Test.
- Simulated Operation Test.

2.4.4.2 Test Bench

Proven test bench for Simulated Operation Test of ADS/CPDLC would be available by commissioning to aircraft manufacturers.

2.4.4.3 Test Plan

The test plan shall be based on the assumption that every designed function was already tested and performance goal was confirmed by the vendor before the test.

2.4.4.4 Resources

The preparation and test itself will take a certain long time and need huge amount of human resources. The organization shall consider special assignment of controllers.

2.4.4.5 Evaluation Criteria

Evaluation criteria to GO/NOGO for several milestones shall be determined in the test plan. In case of NOGO, the system shall be returned to the vendor to fix or improve.

2.5 OPERATIONAL TRANSFER

2.5.1 Principle of Transfer

Operation transfer process from current ATS operation to ADS/CPDLC/AIDC based operation shall be planned carefully by safety first principle. In general, there are two typical transfer scenarios as follows:

- **Phased Approach**
Start small and then extend coverage such as operation hours, functions and airspace.
- **Parallel Operation**
Operate new ADS/CPDLC/AIDC system/subsystem with the current system or manual operation simultaneously. More human resources are needed for the redundant operation.

2.5.2 GO/NOGO Criteria

Evaluation criteria to GO/NOGO shall be clearly defined in advance. If the transfer is planned in step-by-step phased approach, GO/NOGO is decided at each milestone. In case of trouble, the operation shall be resumed to current system or to the last successful step according to predefined contingency plan.

2.5.3 Preparation and Contingency

2.5.3.1 Preparation

Prior coordination in detail with related facilities, education and training of controllers and operators/managers, manuals preparation and transition rehearsals should be done before starting operation transition.

Prior rehearsal of operational transition to new system is mandate. Phases and steps of transition, data integrity, prerequisite knowledge and readiness of personnel should be confirmed in the rehearsal. Experience is the most important key for safe transition of mission-critical system such as ADS/CPDLC/AIDC.

2.5.3.2 Contingency

Initial troubles of new system are inevitable and to be overcome properly. Trouble tendency of a system looks like a bath tub, high at the beginning, low during middle and high again at the end. This is called as Bath Tab Model.

Parallel Operation

Parallel Operation is to maintain operation with both old and new systems simultaneously. It needs extra resources according to the duplicated operations in this case. In case of trouble in the new system, the service will be covered by the old proven system.

Phased Transition

Step-by-step functional expansion, operational hour expansion or operational sector expansion are also typical ways of sound transition. In case of troubles in the new phase or step, the service will be covered by going back to one step before.

2.5.4 Trouble Analysis

If any disorder of the system is found, it is important to classify the reasons as production, programming error (bug), specification mismatch or insufficient requirement. Trouble recording and statistic analysis is an effective way to estimate the possible errors unfound. Do not ignore any small trouble or question.

CHAPTER 3 DEPLOYMENT

3.1 ACCEPTANCE TESTING

3.2 TRAINING

3.2.1 Operational Training

3.2.2 Technical Training

Commissioning

CHAPTER 4 REQUIREMENTS

4.1 GENERAL REQUIREMENTS

The integrated ATS datalink system (“the datalink system”) will have the capabilities of AFN, ADS, CPDLC and AIDC.

The datalink system will be linked with other automated systems. The FDP system provides the flight plan data, such as the flight identification and flight path. The ATS operation will be enhanced if the datalink system has the ability to feedback current aircraft positions to the FDP system to update the flight data.

The datalink system will be linked to aircraft by a datalink communication service provider (CSP).

The datalink system will be capable of transmitting and receiving AFN, ADS and CPDLC messages complying with RTCA/DO258A-EUROCAE/ED-100 and AIDC messages complying with the Asia/Pacific Regional Interface Control Document for AIDC (ICD).

The datalink system will be capable of ACARS Convergence Function (ACF) to convert the messages between the character-oriented data of ACARS and the bit-oriented data used in ADS and CPDLC.

The datalink system will provide air traffic controllers with:

- Display of message exchanges.
- Display of updated aircraft positions and maps.
- Tools for measuring separation in distance or time.
- Tools for measuring angles between aircraft flight paths.
- Information on aircraft flight status.
- HMI tools for composing ADS and CPDLC messages.
- Alerts for exception conditions (e.g. expected message not received, coordination overdue).
- Conflict probe capability, and resolution capability if available.
- Electronic flight progress strips, and paper strips if required.
- Presentation of emergency status for both air and ground.
- Other pertinent information to ATS operations.

The system capacity will be determined from:

- Traffic density at the peak hours.
- Frequency and size of messages per aircraft.
- Airspace size and number of waypoints.

- Number of FANS capable aircraft operating in the airspace.
- Growth of FANS operation in future.
- Number of displays.
- Number of connections for terminal systems.

4.1.1 Notification of Error Messages

The datalink system will be capable of performing the cyclic redundancy check (CRC) on each message.

The datalink system will be capable of format and validity checks appropriate to each message.

Controllers will be notified when the datalink system detects:

- A message error.
- A message sequence error.
- A duplicate message identification number.
- Message non-delivery.
- An expected response not received.

4.1.2 Time Stamps and Timers

CPDLC and AIDC messages will be time-stamped; however, the form of some timestamps is actually set differently from that specified in Doc 9694.

By setting/deactivating various timer values for the messages received in response to transmitted messages, the datalink system will monitor whether or not aircraft responses arrive within a specified time limit.

Timers are generally based on the operational requirements for each ATSU. However, the timers for sending messages relating to the automatic transfer of CPDLC connection and to AIDC will be set according to bilateral agreements with adjacent ATSUs.

A timer file will be provided in the datalink system for:

- Timeout settings for delayed response.
- Timing to initiate actions in ADS/CPDLC operations for:
 - Connection request (CR).
 - ADS periodic, event and demand requests.
 - Automated transfer of connection to the next ATSU.
 - Sending Next Data Authority (NDA) message.
 - Sending AFN Contact Advisory (FN_CAD): at least 30 minutes prior to FIR boundary message.

- Sending End Service message prior to the aircraft crossing the FIR boundary (e.g. 5 minutes before).
- Timer to trigger actions for sending AIDC messages.
- Timer for re-transmission of the message when no response is received within a specified time.

4.1.3 Industry Standards

The industry standards for ATS datalink systems are described in the following documents.

- ARINC 622: ATS Datalink Applications over ACARS Air-Ground Network (end-to-end).
- RTCA DO-258: Interoperability Requirements for ATS Applications Using ARINC 622 Data Communications.
- ARINC 620: Datalink Ground System Standard and Interface Specification (ground-to-ground).
- ARINC 619: ACARS Protocols for Avionics End Systems (Airborne).
- ARINC 429: Mark 33 Digital Information Transfer System (DITS).

Note: It should be noted that some message parameters for avionics are categorized as 'option' data, but provide information useful for ATS operations.

4.1.4 Data Recording

The contents and timestamps of all messages will be recorded by the system. There will be a facility to retrieve, display and printout the recorded data.

4.1.5 System Performance Monitoring Tool

In accordance with the FANS 1/A Operation Manual, ATSU's must produce monthly statistics of end-to-end system performance in daily operations. The datalink system should have appropriate tools for analysing the performance data for reporting to the appropriate monitoring agency.

4.2 DLIC (DATALINK INITIATION CAPABILITY)

4.2.1 AFN Logon Functions

The AFN logon functions provide the necessary information to enable ADS and CPDLC communications between the datalink system and aircraft avionics systems for:

- Logon.
- Forwarding logon information to the next ATSU.

Note: DLIC (Datalink Initiation Capability) functional capabilities are provided in Doc 9694 Part 2.

The required capacity for AFN logons will be determined from the operational requirements, such as estimated number of FANS aircraft at the peak hours and anticipated growth of FANS traffic.

The datalink system must be capable of accepting or rejecting AFN logon requests.

The datalink system will be linked with the FDPS to correlate the AFN logon data automatically with the aircraft flight plan..

The controller's workstation should be capable of displaying the following data:

- Address and version number of the aircraft applications, if required.
- Response from the aircraft with timestamp.
- Status of correlation of the aircraft with its stored flight plan.
- Indication of 'Acceptance' or 'Rejection' to the logon request from aircraft.

When an aircraft downlinks its supported applications and their version numbers in an FN-CON message, the ground system response must indicate whether or not it supports those version numbers.

The datalink system must be capable of sending the 'Acceptance' message or 'Rejection' message with reason as appropriate.

4.2.2 Use of AIDC for Forwarding AFN Message

The ATS datalink system should be capable of sending the FANS application message (FAN), in accordance with the ICD. When possible, the system should use the AIDC FAN message for address forwarding in preference to the AFN application.

4.3 CPDLC

4.3.1 General

The required capacity of the CPDLC function will be determined by taking account of the operational policy and procedures and the airspace characteristics, such as the number of FANS-capable aircraft, airspace size and number of waypoints, the communications necessary in ATS operations, and of the estimated future growth of datalink operations.

The datalink system will be capable of processing the specified number of message exchange with each of the aircraft.

Down-linked CPDLC messages will be displayed to controllers. Tools must be provided to allow simple and intuitive initiation of, or response to, CPDLC messages.

Note: The size of the free text field is limited to 80 characters instead of 256 for some specific aircraft types.

CPDLC position reports should be used to display aircraft positions when no ADS report is available.

The datalink system will have the capability of terminating CPDLC connection with the aircraft.

4.3.2 Transfer of CPDLC between ATC Sectors

The datalink system will allow transfer of CPDLC between sectors of an ATSU without changing the data authority and with the same CPDLC link.

4.3.3 CPDLC Message Exchange Requirements

The datalink system will be capable of handling the message set and the standardized free text messages defined in the FANS 1/A Operation Manual, as well as free text.

The datalink system will allow controllers to review uplink messages prior to sending.

4.3.4 Message Handling Order

Messages will be handled in order of priority.

Messages with the same priority will be processed in the time order of receipt.

The controller will be alerted to unsuccessful receipt of the required response in the specified time or receipt of Message Assurance Failure (MAF).

4.3.5 Responses

The datalink system will allow controllers to send any response messages linking with the reference number of the message received. The relationship between the message and its intent and the response requirement is defined in the FANS 1/A Operation Manual.

4.3.6 Message Closure

A CPDLC dialogue will not be closed until an appropriate closure response for that message with same reference number is received.

When the closure response message is sent, the dialogue is closed and the datalink system will reject any further attempt to send a response message.

The capability of closing a CPDLC dialogue, independent of CPDLC closure message receipt, will be provided.

4.4 ADS

4.4.1 General

The capacity of the ADS function will be determined from the operational policy and procedures and the airspace characteristics, including number of FANS capable aircraft, periodic reporting rate, airspace size, waypoint event report frequency, usage of event and demand contracts, and projected traffic growth.

The datalink system will be capable of initiating periodic, event and demand contracts.

The datalink system will be able to support a demand, an event and a periodic contract simultaneously with each aircraft.

It should be noted that the time used in ADS reports consists of minute/second/millisecond.

The datalink system will apply validation checks to incoming data by referring flight plan data, in relation to time, altitude, direction and geographical point which compose the basic and fix intent data,.

The datalink system will be capable of processing ADS reports to display aircraft positions, tracks and altitude. Between ADS reports, aircraft positions will be extrapolated and displayed automatically at specified intervals (e.g. one minute).

Air and earth reference data of ADS reports will be provided for controllers if required.

The types of ADS contract are described at 5.3.1 ADS.

4.4.2 Message Handling

ADS messages will be processed by the datalink system in the following order:

1. ADS emergency mode.
2. Demand/event reports.
3. Periodic report.

Within these categories, messages will be handled in the order received.

The following errors will be notified to controllers:

- Message validation error.
- Message sequence error detected with time stamp.
- Time-out of ADS report in response to request.
- Periodic and waypoint event report failure.

4.5 AIDC

4.5.1 General

The general descriptions on AIDC applications, requirements, functional capabilities, and message contents are provided in the latest version of the ICD.

The AIDC application exchanges ATC coordination information between ATSU's.

Bilateral agreements between ATSUs are necessary to determine the operational and system requirements for both ATSUs, before developing the systems. These agreements should cover:

- The ICD to be applied – Asia/Pacific or other ICD.
- message set to be used.
- usage of messages (e.g. timing of transmission).

The AIDC application requires that:

- messages are generated and sent in time-ordered sequence.
- messages are delivered in the order in which they are sent.

When an ATSU queues received messages, messages with the highest urgency type will be placed at the beginning of the queue. Messages will be assigned one of the following urgency attributes:

- Normal.
- Urgent.
- Distress.

The time used in the AIDC application will be accurate to within 1 second of UTC.

A timestamp will be generated when the message is dispatched and will consist of the date (YYMMDD) and time (HHMMSS).

Where an AIDC message is linked to a previously sent message, the message will contain reference information, including the ID of the referenced message.

4.5.2 Asia/Pacific Interface Control Document (ICD)

The Asia Pacific ICD for AIDC provides the standardized procedures for inter-facility message exchanges.

(The purpose of the ICD is to ensure that inter-facility message exchanges between ATSU equipped with automated ATS systems in the Asia/Pacific Region are harmonized to a common based standard.)

Until ATN becomes available, the engineering details needed to implement the exchange of messages described in Appendix A of the ICD will need to be agreed to bilaterally.

4.5.3 Message Header

Every message will contain an AFTN header. The AFTN IA-5 message header, including the use of the Optional Data Field defined in Annex10, will be employed for the exchange of data. AFTN priority indicator FF will normally be used for all data exchanges.

A message header consists of the optional data field (ODF), addressing, message/data identification number, reference information, time stamp and cyclic redundancy check (CRC).

4.5.4 ATS Coordination Messages

AIDC provides the means by which data is exchanged between and within ATSUs for the notification of flights approaching FIR boundary, the coordination of boundary crossing conditions and the transfer of ATC services.

AIDC messages are also used to exchange emergency, track definition, and application management information as well as for transfer of surveillance data.

4.5.5 Detailed Information Provided in ICD

The appendices to the ICD describe:

- ATS coordination messages (Appendix A).
- Error codes (Appendix B).
- ATM application naming conventions (Appendix C).
- Implementation Guidance Material – IGM (Appendix D).
- Relationship to ICAO AIDC messages (Appendix E).

4.5.6 Performance Requirements

The performance requirements for the trip time of messages need to be specified and agreed to with neighbouring ATSUs to ensure effective use of AIDC. Recommended performance figures are specified in Appendix D of the ICD.

The methodology for monitoring AIDC performance is provided in Appendix A of the Guidance Material for End-to-end Safety and Performance Monitoring of ATS datalink system in the Asia/Pacific Region.

CHAPTER 5 SPECIFICATION

The development of the specification should, wherever possible, be a team effort, with operational and technical personnel working together to achieve the optimum result. Specifications produced by technical personnel often concentrate on technical features at the expense of operational suitability, when the whole purpose of the system is to support operational activities!

In developing a specification for any technical system, it is important to achieve the right level of detail. Too little detail leaves the purchaser at the mercy of potential suppliers, while too much may preclude suppliers from offering very suitable equipment. In general, it is probably appropriate to specify requirements in great detail only where those requirements are essential to the operation, and otherwise to leave the supplier a reasonable amount of freedom. An off-the-shelf system can be expected to be less expensive than one that is custom-designed.

It is also important to get the specification right. Proposals will be priced on the specification, and any changes required later, particularly after the contract is signed, will be costly in terms of price and completion time.

This section on specification covers the system configuration, its interfaces with other systems, its functionality, human factors implications, system parameters and recording and data analysis tools.

5.1 SYSTEM CONFIGURATION

The system configuration depends upon the operational environment. In specifying the configuration, a number of issues must be considered:

- Is it to be a stand-alone ADS/CPDLC/AIDC system, part of an integrated system or interfaced with a separate ATM system?
- How many sectors are required?
- How many workstations are required per sector? If more than one, why?
- What contingency configuration is required?
- Complete duplication of the system?
- Main/standby computers and independent contingency workstation(s)?
- Duplication of communications bearers? If so, which ones?

Assuming the normal operational configuration is one workstation per sector, how many contingency workstations are required?

5.2 INTERFACES

The System must have a number of interfaces to send and receive data; some of these are essential, others may be useful or just nice to have. This section concentrates on the essential and the useful.

5.2.1 Communication Service Provider

In the current FANS 1/A environment, ADS and CPDLC messages are passed between aircraft and the System using the ACARS data messaging system. ACARS was developed by the communication service providers (CSP) to pass information between the airline operating centre (AOC) and the aircraft. ADS and CPDLC required an air-ground datalink and, in the absence of the Aeronautical Telecommunication Network (ATN), the ACARS system was used.

Access to the ACARS datalink is available only from the CSPs; ARINC and SITA are the major CSPs; they provide global coverage and complete management of the signal between the ATSU and the aircraft, including selection of most appropriate datalink path (VHF, satellite or HF). There are also some national or regional CSPs, such as AVICOM Japan.

It is essential therefore to specify the appropriate interface port(s) to connect to the chosen CSP. This is typically an RS232 serial port, but the exact requirement should be confirmed with the CSP.

5.2.2 ATN

It is intended that the ADS and CPDLC functions will eventually be carried by the ATN. The purpose of the ATN is to “provide data communication services and application entities in support of the delivery of air traffic services (ATS) to aircraft; the exchange of ATS information between ATS units; and other applications such as aeronautical operational control (AOC) and aeronautical administrative communication (AAC).” [Annex 10, Vol III, 3.3]

It is important, therefore, that any new system should either include provisions for, or have a defined upgrade path to provide, interfacing with the ATN.

ICAO Doc 9705 - Manual of Technical Provisions for the Aeronautical Telecommunication Network (ATN) is the appropriate source of interface data for the ATN.

At present, the ATN is under development and trials are being carried out in several ICAO Regions.

5.2.3 AFTN/AMHS

At present, the AFTN is the carrier for ground-ground messaging between ATC units and carries AIDC messages in the FANS 1/A environment. The AHMS (Aeronautical Message Handling System) is the ground-ground messaging

application of the ATN. The AMHS is also referred to as the ATSMHS (ATS Message Handling System).

AIDC messages will be passed via the AFTN until the ATN is operational. However, AFTN/AMHS gateways will increasingly be used to provide a transition between the AFTN and ATN. These gateways transpose AFTN messages into AMHS format and vice versa.

Any new system should include at least one AFTN/AMHS gateway. AIDC messages generated in AMHS structure can then be transmitted via the AFTN and incoming messages from the AFTN will be transposed to AMHS structure. After the ATN becomes operational and the AFTN is no longer used, the gateway can be removed.

5.2.4 ATS systems

In many cases, interfaces to other ATS systems will be necessary. This may be because an ADS/CPDLC system will use the flight data or other processing capability of another system or because the new system will be directly connected to another system.

5.2.4.1 Flight Data Processing System

Where an ADS/CPDLC system is to rely on an existing system to provide flight data, the interface required will depend on the data to be passed. The ADS/CPDLC system may have no flight data processing capability and merely require flight plan information for identification purposes, or it may have some capability to up-date flight plans received from the other system and return the up-dated information.

In either case, the interface may need to transform data formats between the 2 systems. It is therefore essential that the data formats used by the existing system are detailed in the specification so that they are allowed for in proposals; otherwise, costly contract variations may be required.

5.2.4.2 Radar Data Processing System

Data imported from a separate radar data processing system will take the form of track data or possibly plot data. As with interfaces for flight data, it is most important to detail the radar data formats in the specification.

If ADS data is to be exported to a separate radar data processing system or display system, the formats required by those systems also must be detailed.

5.2.4.3 Direct Connection between Systems

When a full system (with FDPS and perhaps RDPS as well as ADS/CPDLC/AIDC) is to be connected directly to an existing system for full data interchange, details of all the data formats of the existing system should be included in the specification.

5.2.5 Radar Data

If the System is to receive direct radar feeds from existing radars, the output data format of each radar must be detailed.

Most new systems are designed around the ASTERIX radar data formats; specifying ASTERIX where possible will allow the greatest flexibility for the future. Information on ASTERIX may be found at:

http://www.eurocontrol.int/asterix/public/subsite_homepage/homepage.html

The “Regional Supplement to the ASTERIX Interface Control Document for the Asia/Pac Region” gives details of location-specific ASTERIX coding.

Inputs from military radars may be non-standard or require additional processing; any available details should be included.

5.2.6 Meteorological Data

Many modern systems make provision for the use of meteorological data for updating predicted waypoint times in near-real time. However, this type of prediction may require very large amounts of data and may not be justified if experience shows that weather variations have very little effect on the routes concerned or where the weather patterns are such that occasional manual input would suffice.

If there is a requirement for regular automatic data input, the available sources of data should be investigated and the appropriate formats should be specified.

5.3 FUNCTIONALITY

This section covers the core applications of the system, ADS, CPDLC and AIDC, and their supporting functions, AFN and ACF.

5.3.1 ADS

ADS is a means of surveillance in which an aircraft reports its current position, intent and other pertinent information via the datalink function to an ATSU.

ADS is detailed in ARINC 745-2.

The ADS reporting rate and the types of data to report are determined by ADS contract requests from an ATSU. An aircraft can report to up to four ATSUs simultaneously.

There are three types of ADS contract: the periodic contract, the event contract and the demand (“one-shot”) contract.

5.3.1.1 Periodic Contract

The ATSU sets up a periodic contract with the aircraft to obtain regular position reports; the contract specifies to the aircraft the reporting rate, any optional data groups be added to the basic ADS report, and the frequency at which the optional groups are to be included in the reports.

Only one periodic contract can be established between an ATSU end system and a particular aircraft at any one time. The periodic contract normally remains in effect until the contract is cancelled by the ATSU.

The system must be capable of pre-defining the reporting rate as a system parameter and of allowing the controller to change the rate, on a case by case basis, to meet operational requirements.

The system must also allow the controller to include any of the permissible additional data groups in a periodic contract request.

Some systems have the capability of automatically changing the reporting rate from one area to another; however, this could increase system cost and complexity.

5.3.1.2 Event Contract

An event contract specifies a request for reports whenever a defined 'event' occurs. Only one event contract can be established between a ground system and a particular aircraft at any one time; however, the event contract can contain multiple event types. There are four event types.

The **Vertical Rate Change Event** is triggered when the aircraft's vertical rate is either less than or greater than a parameter defined in the contract.

The **Lateral Deviation Change Event** is triggered when the aircraft's actual position exceeds a lateral distance parameter from the aircraft's expected position on the active flight plan.

The **Altitude Range Change Event** is triggered when the aircraft's altitude exceeds the altitude ceiling or floor defined in the contract by the ground system.

Once a vertical rate, lateral deviation or altitude range event trigger has occurred, a recurrence of this event no longer triggers an event report. If required, a new event contract must be initiated each time one of these specific events occurs.

The **Waypoint Change Event** is triggered by a change to the next or the next-plus-one waypoints. Such a change normally occurs due to routine waypoint sequencing. However, it will also be triggered by occurrences such as a change to a non-ATS waypoint entered by the pilot for operational reasons, or execution of a new route affecting the next or next-plus-one waypoints. Unlike the other event contracts, the waypoint change event trigger remains in effect for all waypoint changes.

Once an event contract has been established, it remains in effect until the specific event requests are fulfilled, or it is cancelled by the ground system.

The system must be capable of pre-defining the event trigger parameters and of allowing the controller to change the event parameters as required.

5.3.1.3 Demand Contract

The demand contract is a “one-off” request from the ground system for an ADS report containing specific data as defined in the request. A demand contract can be requested by the ground system at any time. The demand contract request does not affect any existing contracts.

The system must allow the controller to initiate a demand contract, including optional data fields.

5.3.1.4 Emergency Mode

The emergency mode can only be activated by the pilot and is normally cancelled by the pilot. While it is possible for some ground systems to cancel the emergency mode status, most ground systems do not have this capability although some ground systems allow the controller to modify the “display” of the emergency mode status.--

The system must recognise the emergency flag and display the emergency status to the controller.

5.3.2 CPDLC

CPDLC provides a two-way message system between controller and pilot. It comprises a number of pre-defined up-link and down-link messages, some of which are complete in themselves, while others require data (such as time flight level, etc) to be added. There are also two free-text messages available in each direction, one reserved for emergency use.

To send a message, the controller selects the required message and enters any required data. (Options for selecting messages and entering data are discussed below under Human-Machine Interface.) The system then automatically codes the message in bit-oriented format and presents it for transmission.

On reception of a down-link message, the CPDLC application decodes the message and presents it to the controller.

The current message set is detailed in the FOM, and the system must provide the complete up-link message set and be capable of accepting and decoding the complete down-link message set.

Some message sequences require “closure”:

- A message requiring a response remains open until a referenced response is received.

- A message is closed when either a response is not technically required, or after a referenced response other than STANDBY or REQUEST DEFERRED has been received.

The system must manage message closure protocols in accordance with the requirements of the FOM.

5.3.3 ACF

ADS and CPDLC both operate on bit-oriented data, while ACARS is character-oriented. The ACARS Convergence Function converts the bit-oriented data of ADS and CPDLC to the character-oriented data used by ACARS, and vice versa.

If the system is to operate over ACARS, the ACF must be specified as an essential requirement.

(The ACF is not required where the ATN is the carrier.)

5.3.4 AFN

The AFN function provides the transfer of information required to support the initiation of datalink connectivity between an aircraft and an ATSU. The AFN is a character-oriented application.

Because it is essential to ADS and CPDLC operation over ACARS, the AFN function as detailed in ARINC 622-4 must be a requirement of the system specification.

5.3.5 AIDC

The AIDC application supports information exchanges for notification, coordination, and the transfer of communications and control functions between automated ATS systems located at different ATSUs.

The AIDC message set is defined in the ICD. This message set was based on ICAO agreed methods and messages wherever possible; elsewhere, new messages used existing ICAO field definitions to the extent possible.

5.4 HUMAN MACHINE INTERFACE

5.4.1 Displays

One or more displays are required to handle the ADS, CPDLC and AIDC messages. Most systems now incorporate message handling into the situation display.

Modern displays use LCD technology and may be as large as 600 x 600mm, with typical resolution of 2048 x 2048 pixels. Smaller displays may be more appropriate for some uses, particularly if there are 2 displays at a controller position: a second display is often used for flight data handling. However, the arrangement of displays will largely depend on the extent to which the new system is to be integrated with existing systems.

While colour displays offer great advantages in differentiating between different categories of data, the choice of colours for the various categories can be very contentious. If colour displays have not been used before, it is strongly recommended that colour allocation is not arbitrarily decided, but is based upon the experience of other users. Controllers at units with colour displays will be able to provide useful information on colour choices. “Ownership” is an important reason why engineers should not specify colours!

Symbols for ADS tracks should differ from radar track symbols: there should probably be separate symbols for ADS only tracks and for ADS + radar tracks. Using different track symbols to indicate CPDLC status will probably lead to a confusing number of symbols; CPDLC status is best included in the track label.

5.4.2 Information Processing

Specific – menus, message sets,

The language for all menus and message sets should be English: English is the de facto language for radiotelephony within the Asia-Pacific Region. While it may seem attractive for menus and CPDLC messages to be displayed in a local language, this will inevitably lead to loss of English language proficiency and so will work against the new ICAO language proficiency provisions in Annexes 1, 6, 10 and 11. These require that from March 2008, pilots, aeronautical station (radio) operators and air traffic controllers shall demonstrate the ability to speak and understand the language used for radiotelephony communications to specified levels.

5.4.3 Input Devices

The controller input devices include the text input device and the pointing device.

The text input device is normally a keyboard and there are various types of keyboard (standard, ergonomic, etc). The type should be specified if it is considered important; however, it is worth noting that controllers do not have to input large amounts of text in an ADS/CPDLC system. Touch panels may be offered instead of keyboards.

The mouse is the most common and probably most flexible pointing device; others include the track-ball and the light pen. It is difficult to locate a track-ball and keyboard so that they are well-placed for both left- and right-handed people, and light pens have been poorly received by many controllers.

Wireless connections for the input devices will reduce the clutter on the workstation working surface and allow more freedom of movement for the pointing devices. However, electro-magnetic compatibility with nearby equipment must be carefully considered.

5.5 CONTROLLER TOOLS

Controller tools include such items as:

Conflict probe

Conflict alert

What else?

5.5.1 Conflict Probe

Conflict Probe is a tool to determine whether a proposed flight plan will come into conflict with another during a specified period.

The Conflict Probe is normally initiated by the controller for a particular aircraft. The probe compares the proposed trajectory with the current planned trajectories of other aircraft information and displays the position and time of calculated conflicts to the controller. The period covered by the probe is typically fairly long (up to several hours), as the main use of Conflict Probe is when a routing change is proposed under a flexible track regime.

Conflict Probe is a very complex function, requiring considerable computer power, and consequentially can be expected to be expensive.

5.5.2 Conflict Alert

Conflict Alert provides the controller with an indication that two (or more) aircraft will come into conflict if they maintain their current planned trajectories. The alert is calculated from flight plan information as updated by the system from aircraft and other information.

Typically, a Conflict Alert function will give a warning when the conflict becomes apparent, and an alert when it reaches a pre-determined condition (based on time or distance to predicted point of conflict). There are various means of alerting the controller, generally by some combination of track label change and some indication of the position of the predicted conflict point.

It should be noted that Conflict Alert does not provide the controller with conflict resolution advice.

Conflict Alert, operating generally over a much shorter time frame, is rather less complicated than Conflict Probe.

5.6 SYSTEM CAPACITY

The required system capacity is directly related to the number of ADS, CPDLC and AIDC messages, the number of radar tracks, the number of active flight plans, the

number of workstations and so on. These, in turn, are directly related to the volume of traffic, particularly the peak traffic volume.

The system capacity is normally expressed as the number of active flight plans that the system can handle at one time; in this context, “active” means that the system is using or processing the flight plan information in some way.

5.6.1 Traffic Volume

It is clearly important that the system capacity should allow for traffic growth over the projected life of the system, which for modern systems is typically 5 to 7 years between major upgrades or replacement. The anticipated growth should therefore be carefully assessed using the best projections available, and should allow for daily and seasonal traffic peaks.

However, it is also important not to set the capacity requirement too high, as this will almost certainly result in increased cost.

Some growth rates over those periods are shown below to give an indication of future capacity requirements based on current traffic:

Anticipated Annual Growth	Total Growth over		
	5 years	6 years	7 years
5%	28%	34%	41%
7.5%	44%	54%	66%
10%	61%	77%	95%

APPENDIX A GLOSSARY

ACARS	Aircraft Communications Addressing and Reporting System
ACAS	Aircraft Collision Avoidance System (ICAO)
ADS	Automatic Dependent Surveillance
AEEC	Airline Electronic Engineering Committee
AFN	ATS Facilities Notification
AFTN	Aeronautical Fixed Telecommunication Network
AIDC	ATC Inter-Facility Data Communications
AIP	Aeronautical Information Publication
AMHS	Aeronautical Message Handling System
AOC	Airline Operational Communications
APANPIRG	Asia/Pacific Air Navigation Planning and Implementation Regional Group
ARINC	Aeronautical Radio Incorporated
ATC	Air Traffic Control
ATM	Air Traffic Management
ATN	Aeronautical Telecommunication Network
ATS	Air Traffic Services
ATSMHS	ATS Message Handling System
ATSU	ATS unit
AVICOM	AVICOM Japan Co. LTD
CAA	Civil Aviation Authority
CNS	Communications, Navigation, Surveillance
CPDLC	Controller Pilot Data Link Communications
CRA	Central Reporting Agency (for datalink)
CRC	Cyclic Redundancy Check
DL	Downlink message
EUROCAE	European Organization for Civil Aviation Equipment
FANS	Future Air Navigation System
FIR	Flight Information Region
FIT	FANS Interoperability Team (IPACG, ISPACG) FANS Implementation Team (FIT-BOB, FIT-SEA)
FMC	Flight Management Computer
FMS	Flight Management System
GES	Ground Earth Station (satellite)
GPS	Global Positioning System (USA)
HF	High Frequency (3-30 MHz)
IATA	International Air Transport Association
ICAO	International Civil Aviation Organisation
IFATCA	International Federation of Air Traffic Controllers Associations
IFALPA	International Federation of Air Line Pilots' Associations
IPACG	Informal Pacific ATC Coordinating Group
ISPACG	Informal South Pacific ATS Coordinating Group

MAS	Message Assurance (data message)
MCDU	Multipurpose Control Display Unit (ACARS & FMC)
MU	Management Unit (ACARS)
NDA	Next Data Authority
NOTAM	Notice To AirMen
RASMAG	Regional Airspace Safety Monitoring Advisory Group
RMA	Regional Monitoring Agency (for RVSM)
RNP	Required Navigation Performance
RTCA	RTCA Inc.
RVSM	Reduced Vertical Separation Minima
SATCOM	Satellite Communication
SATVOICE	Satellite Voice Communication
SITA	Société Internationale de Télécommunications Aéronautiques
SMA	Safety Monitoring Agency (for RNP)
SR&O	System Requirements and Objectives (FANS-1 document)
TCAS	Traffic Alert and Collision Avoidance System (USA)
TMU	Traffic Management Unit
UL	Uplink message
VHF	Very High Frequency (30-300 MHz)

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APPENDIX B GENERAL FEATURE OF INTEGRATED SYSTEM

System Life Cycle Management

Every system has its life cycle from the planning to the end of operation. The total life cycle cost, including the operational and maintenance cost, is more important than the initial procurement cost, and is known as the Total Cost of Ownership (TCO). A typical system life cycle consists of the following phases:

1. Concept.
2. Validation.
3. Development.
4. Production.
5. Installation and Test.
6. Operation and Support.
7. Termination.

Concept Phase and Validation Phase are included in planning, and are done by both the organization and the vendor. Development Phase and Production Phase are mainly done by vendors, but some activities such as design review and provision of test cases are done by the organization. Installation and Test Phase is also done by both the organization and the vendor.

If the organization is going to buy a ready-made system with no modification, phase a) and phase d) would be skipped by the organisation. In case of modification, the phases from a) to d) should be followed briefly.

Project Management

Many kinds of human resources, equipments, tools, money and time are managed in a system planning, design and development. Standard methodologies are used in management of project. The Project Manager plans, follows, checks and corrects the project progress by work definition, resource requirement analysis, scheduling, quality management and cost control. Program Evaluation and Review Technique (PERT) chart shows its critical paths, time minimum path and cost minimum path of the project activities.

The organization should understand the methodology used in the project, involve the project management planning and follow the project management processes as one of the most important members of the project.

APPENDIX C ROLES OF THE ORGANIZATION IN DEVELOPMENT

If the system is to be newly designed or modified from an existing standard system, the organization should be involved in the design and development processes. Typically, a new system is developed according to the following steps:

1. Basic Design.
2. Preliminary Design Review.
3. Detail Design.
4. Critical Design Review.
5. Program Coding & Module Checkout.
6. Program Test.
7. System Integration & Quality/Verification Tests.
8. System Test & Evaluation (Simulated environment in factory).
9. Installation.
10. Total System Operation Test (In real operational environment).

The organization should play main roles in the Preliminary Design Review and the Total System Operation Test.

The organization also should help vendors in Basic Design, Detail Design, Critical Design Review and System Test & Evaluation.

APPENDIX D CONTENTS OF REQUEST FOR PROPOSAL (RFP)

1. Contents and Procedures

RFP shall contain the following information for vendors to be met in the proposal:

- Proposal Preparation Instruction.
- Model Contract.
- Attached documents and References.

2. Proposal Preparation Instruction

Proposal Preparation Instruction in RFP should include the following items:

- Objectives.
- Table of Contents.
- Due Date.
- Number of copies.
- Contacts.
- Questions and Answers, etc.

3. Model Contract

Model Contract in RFP should include the following items according to the government procurement process:

- Subject.
- Scope.
- Due date.
- Terms and Conditions, etc.

4. Attached Documents and References

The following Documents and References should be asked to attach to the RFP:

- Statement of Work (SOW).
- Function/Performance Specification.
- List of Applied Standards.
- Work Breakdown Structure (WBS).
- Engineering Instructions.
- Education and training requirements.

Note: Training requirements, such as number of personnel, subjects, contents, duration and number of times, should be clearly defined in the RFP.

5. Applied Specifications or Standards

If a standard ready made system is proposed, mismatching of interface or difference of standard is very critical to connect with related systems. Or if assumed ATC service procedure is different, you should change the procedure. To prevent these difficulties, applied specifications or standards should be confirmed or coordinated with related ATS facilities or existing system vendors before submitting the RFP.

Examples:

- The latest standards to be applied.
- Interface specification with related ATC facilities.
- ATC service procedures how to use the systems.
- Datalink Service Provider and its interface.

APPENDIX E REFERENCES

Annex 10, Volume III, Communication Systems		ICAO
Procedures for Air Navigation Services, Air Traffic Management	Doc 4444	ICAO
Manual of Technical Provisions for the Aeronautical Telecommunication Network (ATN)	Doc 9750	ICAO
Basic Air Navigation Plan – Asia and Pacific Regions	Doc 9673	ICAO
Manual on Airspace Planning Methodology for the Determination of Separation Minima	Doc 9689	ICAO
Manual of Air Traffic Services Data Link Applications	Doc 9694	ICAO
Asia/Pacific Regional Plan for the new CNS/ATM Systems		ICAO Asia Pacific Office
Regional Supplement to the ASTERIX Interface Control Document (ICD) for the Asia/Pac Region		ICAO Asia Pacific Office
Asia/Pacific Regional Interface Control Document (ICD) for ATS Inter-facility Data Communications (AIDC), version 2		ICAO Asia Pacific Office
Guidance Material for End-to-End Safety and Performance Monitoring of ATS Datalink Systems in the Asia Pacific Region		ICAO Asia Pacific Office
FANS 1/A Operations Manual		
Interoperability Requirements for ATS Applications using ARINC 622 Data Communications	DO-258A / ED-100A	RTCA and EUROCAE
Air-Ground Character-Oriented Protocol Specification	618-5	ARINC
Data Link Ground Systems Standard and Interface Specification (DGSS/IS)	620-5	ARINC
ATS Data Link Applications Over ACARS Air-Ground Network	622-4	ARINC
Aircraft Communications Addressing Reporting System (ACARS)	724B-5	ARINC
Air Traffic Services Systems Requirements & Objectives (ATS SR&O)		Boeing

APPENDIX F PERFORMANCE CRITERIA

Criteria	Definition	Values
Performance	End-to-end round trip time for uplinks. (from sending of the uplink until reception of the MAS)	Round trip time of 2 minutes, 95% of messages. Round trip time of 6 minutes, 99% of messages.
	End-to-end one way time for downlinks. (comparison of message time stamp and receipt time)	One way time of 1 minute, 95% of messages. One way time of 3 minutes, 99% of messages
	Uplink messages only: Undelivered messages will be determined by: <ul style="list-style-type: none"> • Message assurance failure is received. After trying both VHF and SATCOM. Depending on reason code received, the message might, in fact, have reached the aircraft. • No message assurance or flight crew response is received by ATSU after 900 seconds 	Less than 1% of all attempted messages undelivered
Availability	The ability of the network data link service to perform a required function under given conditions at a given time:	99.9%
	The maximum allowed time of continuous unavailability or downtime should be declared (MTTR)*	TBD
Reliability	The ability of a data link application/system to perform a required function under given conditions for a given time interval: it can be expressed in MTBF (Mean Time Between Failure) *	TBD
Integrity	The probability of an undetected failure, event or occurrence within a given time interval.	10 ⁻⁶ /hour

* Availability = $MTBF \times 100 / (MTBF + MTTR)$

Note: RTCA SC189/EUROCAE WG 53 defines the performance requirements for specific operational environments.

APPENDIX G RECORDING AND DATA ANALYSIS REQUIREMENTS

ADS/CPDLC system shall have automatic Performance Data Collection and Performance Data Analysis function to monitor the system performance level. The required data format and algorithm of analysis shall be specified in RFP. The following statistics shall be reported to Central Reporting Agency monthly, and the first month report should be one of the most important GO/NOGO criteria:

- Round trip delay time.
- Down-link delay.
- Number of lost messages.
- Unavailability of systems.
- Connection success and failure.

The system should record all incoming and outgoing ADS, CPDLC and AIDC messages for use in incident and accident investigations. It is imperative that all recordings are time-stamped. Messages are typically recorded onto a tape cartridge or DVD, and the system should allow change-over of the cartridge or DVD with no interruption to the recording.

Annex 10 Vol II and Annex 11 require communications, including AIDC and CPDLC, to be recorded and the recordings to be retained for at least 30 days for accident/incident investigation purposes. Chapter 3 of the FOM details some specific recording requirements for both safety investigation and performance monitoring.

The recording system should allow replaying of the situation and identification of messages were sent or received by the system.

Provision should also be made for recording data for use by the agencies monitoring RNP, RVSM and datalink performance. These are the Safety Monitoring Agency (SMA), the Regional Monitoring Agency (RMA) and the Central Reporting Agency (CRA) respectively. Generally, the data required by RMAs and SMAs is captured by the FDPS.

To meet CRA requirements, the specification should include a requirement for datalink performance monitoring tools and analysis software. The analysis software should, at the least, be capable of extracting time-stamps, addressees and message types from all incoming and outgoing messages.

The table below shows the datalink monitoring requirements for ATS providers taken from the “Guidance Material for End-to-End Safety and Performance Monitoring of ATS Datalink Systems in the Asia Pacific Region”.

Table -1 Local Data Collection Requirements

Requirements	Who/What
Operational Procedures	Time stamped ATS messages with identification and reference numbers
	Message Assurance
	Anomaly event report
Performance	Availability
	Transit times
Safety (i.e. operational, performance, interoperability requirements which are used to mitigate the effect of a failure condition)	Time stamped ATS messages with identification and reference numbers/MAS
	Anomaly event reports
Interoperability	Time stamped ATS messages with identification and reference numbers/MAS

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TERMS OF REFERENCE

REGIONAL AIRSPACE SAFETY MONITORING ADVISORY GROUP (RASMAG)

Terms of Reference of the RASMAG

The objectives of the Group are to:

- a) facilitate the safe implementation of reduced separation minima and CNS/ATM applications within the Asia and Pacific Regions in regard to airspace safety monitoring; and
- b) assist States to achieve the established levels of airspace safety for international airspace within the Asia and Pacific Regions.

To meet these objectives the Group shall:

- a) review airspace safety performance in the Asia and Pacific Regions at the regional level and within international airspace;
- b) review and develop as necessary guidance material for airspace safety monitoring, assessment and reporting activities;
- c) recommend and facilitate the implementation of airspace safety monitoring and performance assessment services;
- d) review and recommend on the competency and compatibility of monitoring organizations;
- e) review, coordinate and harmonize regional and inter-regional airspace safety monitoring activities;
- f) review regional and global airspace planning and developments in order to anticipate requirements for airspace safety monitoring and assessment activities;
- g) address other airspace safety related issues as necessary;
- h) facilitate the distribution of safety related information to States, and
- i) provide to APANPIRG comprehensive reports on regional airspace safety and coordinate with other contributory bodies of APANPIRG as appropriate.

Task List

To review the safety monitoring programmes in the Asia and Pacific Regions for implementation and operation of:

- a) reduced vertical separation minimum (RVSM);
- b) reduced horizontal (lateral and longitudinal) separation minima using RNP; and
- c) aircraft separation applications using data link, e.g. ADS and CPDLC.

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(last reviewed RASMAG/5 June 2006)

MAAR SMA

PROVISIONAL AGENDA FOR THE FIRST SMA TRAINING

1. **Date:** 19-23 June 2006
2. **Location:** FAA Technical Center Atlantic City, New Jersey, USA
3. **Trainees:**
 - Dr. Paisit Herabat
 - Mr. Nuttakajorn Yanpirat
 - Ms. Saifon Obromsook

4. **Proposed Agenda:**

Agenda Item	Description
1	Safety Monitoring Agency (SMA): Overview <ul style="list-style-type: none">• Concept of Area Navigation (RNAV) and Required Navigation Performance (RNP)• SMA duties and responsibilities• Review MAAR structure supporting the RMA and SMA works
2	SMA Requirements <ul style="list-style-type: none">• Required Data• Required Forms and Templates• Database Structure and Data Sharing Procedure
3	Safety Assessment Procedures <ul style="list-style-type: none">• Know Your Airspace Analysis for Horizontal Safety Assessment• Collision risk model (CRM) and methodology supporting the use of an Horizontal-Plane Separation Minimum where Required Navigation Performance (RNP) is applied• Estimation of CRM parameters• Required data for the lateral safety assessment, including<ul style="list-style-type: none">• Traffic Sample Data (TSD)• Gross Navigational Error reports and reporting mechanism• RNP safety goal: the Target Level of Safety (TLS)
4	Aircraft Performance Monitoring in RNAV and RNP Airspace (if applicable) <ul style="list-style-type: none">• Monitoring process for aircraft operated in the RNAV and RNP airspace• Review the AGHME Systems
5	Any Other Business (AOB)

5. Proposed Schedule:

- Day 1: 19 June 2006 Agenda 1 and 2
- Day 2: 20 June 2006 Agenda 3
- Day 3: 21 June 2006 Agenda 3
- Day 4: 22 June 2006 Agenda 3
- Day 5: 23 June 2006 Agenda 4 and 5

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APANPIRG Asia/Pacific Airspace Safety Monitoring

RASMAG LIST OF COMPETENT AIRSPACE SAFETY MONITORING ORGANIZATIONS

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

- RMA – Regional Monitoring Agency – safety assessment in the vertical plane (i.e. RVSM);
- SMA – Safety Monitoring Agency – safety assessment in the horizontal plane (i.e. RHSM, RNP10, RNP4); and
- CRA – Central Reporting Agency – technical performance of data link systems (i.e. ADS/CPDLC)
- FIT – FANS 1/A Interoperability/Implementation Team – parent body to a CRA.

(last updated 8 June 2006)

Organisation <i>(including contact officer)</i>	State	Competency	Status	Airspace assessed
Airservices Australia (Mr Robert Butcher, Manager Human Factors and Analysis, Safety Management Group, email robert.butcher@airservicesaustralia.com)	Australia	RMA	Current	Brisbane & Melbourne FIRs not including oceanic airspace east of Australian mainland.
		SMA	Current	Brisbane & Melbourne FIRs

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Organisation <i>(including contact officer)</i>	State	Competency	Status	Airspace assessed
FIT/BOB (ICAO Regional Office email icao_apac@bangkok.icao.int & Mr. Bradley Cornell, Boeing Engineering, email Bradley.D.Cornell@Boeing.Com)	ICAO Regional Office & Boeing USA	FIT & CRA	Current	Bay of Bengal FIRs
CRA Japan (Mr. Yoshiro Nakatsuji, Director, Air Traffic Control Association Japan, email: naka@atcaj.or.jp)	Japan	CRA	Current	Fukuoka FIR for IPACG/FIT Ho Chi Minh, Manila, Singapore FIRs for FIT-SEA
IPACG/FIT (Mr. Hideo Watanabe, JCAB Co-Chair, email: watanabe-h2pt@mlit.go.jp & Mr. Reed Sladen, FAA Co-Chair, email reed.b.sladen@faa.gov)	Japan & USA	FIT & CRA	Current	North & Central Pacific (Oceanic airspace within Fukuoka FIR, and Anchorage & Oakland FIRs)
ISPACG/FIT (Mr. Bradley Cornell, Boeing Engineering, email Bradley.D.Cornell@Boeing.Com)	Boeing USA	FIT & CRA	Current	South Pacific

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Organisation <i>(including contact officer)</i>	State	Competency	Status	Airspace assessed
FIT/SEA (ICAO Regional Office email icao_apac@bangkok.icao.int & CRA Japan (Mr. Yoshiro Nakatsuji, Director, Air Traffic Control Association Japan, email: naka@atcaj.or.jp)	ICAO Regional Office & Japan	FIT & CRA	Current	South China Sea
Japan Civil Aviation Bureau (JCAB) (Mr. Takashi Imuta, Chief of Airspace Safety Monitoring Section, email: imuta-t2in@mlit.go.jp)	Japan	RMA	Available fourth quarter – 2006	Fukuoka FIR
		SMA	Available fourth quarter – 2007	Fukuoka FIR

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Organisation <i>(including contact officer)</i>	State	Competency	Status	Airspace assessed
Monitoring Agency for the Asia Region (MAAR) (Dr. Paisit Herabat Executive Officer, Systems Engineering, Aeronautical Radio of Thailand Ltd. Email: paisit@aerothai.co.th)	Thailand	RMA	Current	Bangkok, Calcutta, Chennai, Colombo, Delhi, Dhaka, Hanoi, Ho Chi Minh, Hong Kong, Jakarta, Karachi, Kathmandu, Kota Kinabalu, Kuala Lumpur, Lahore, Male, Manila, Mumbai, Phnom Penh, Sanya FIR, Singapore, Taibei, Ujung Pandang, Vientiane, Yangon FIRs
		SMA	Available third quarter-2006	Bangkok, Calcutta, Chennai, Colombo, Delhi, Dhaka, Hanoi, Ho Chi Minh, Hong Kong, Jakarta, Karachi, Kathmandu, Kota Kinabalu, Kuala Lumpur, Lahore, Male, Manila, Mumbai, Phnom Penh, Sanya FIR, Singapore, Taibei, Ujung Pandang, Vientiane, Yangon FIRs
Pacific Approvals Registry and Monitoring Organization (PARMO) (Mr Brian Colamosca Manager, Separation Standards Analysis Group, FAA, email: brian.colamosca@faa.gov .)	USA	RMA	Current	Anchorage Oceanic, Auckland Oceanic, Brisbane (east of Australian mainland), Honiara, Incheon, Melbourne (east of Australian mainland), Nadi, Nauru, Oakland Oceanic, Port Moresby, Tahiti FIRs
Civil Aviation Authority of Singapore (CAAS) (Mr. Kuah Kong Beng, Chief Air Traffic Control Officer, email: KUAH_Kong_Beng@caas.gov.sg)	Civil Aviation Authority of Singapore (CAAS)	Monitoring Authority for Gross Navigation Error (GNE)	Current	Hong Kong, Ho Chi Minh, Manila, Sanya, Singapore FIRs,

State Focal Point for Safety Related Activities

(Last Update: 22 March 2006)

	Name	Title/Organization	TEL/FAX Number	E-mail
1.	AUSTRALIA			
	Mr. Jason Harfield Submission date 9 Jan 2006	General Manager, Safety Management Group Airservices Australia PO Box 367 Canberra, ACT 2601 Australia	Tel +61-2-6268-4601 Fax +61-2-6268-5695	jason.harfield@airservicesaustralia.com
2.	BANGLADESH			
3.	BHUTAN			
4.	BRUNEI DARUSSALAM			
	Ali HJ Mohammad Yusof	Operations Officer-Airworthiness Department of Civil Aviation Ministry of Communications Brunei International Airport Bandar Seri Begawan BB2513 Negara Brunei Darussalam	Tel: (673)(2)2330142, 2332741 Fax: (673)(2)2331706, 2345345	alex_keasberry@civil-aviation.gov.bn aliyhms@yahoo.com
5.	CAMBODIA			
	Mr. Keo Sivorn	Director of Flight Operations and Air Safety, Directorate General of Civil Aviation State Secretariat of Civil Aviation No. 62, Preah Norodom Blvd, Phnom Penh, Kingdom of Cambodia	Tel 855 12 810 330 Fax 855 23 725 938	k_sivorn@yahoo.com SITA : PNHCAYA AFTN: VDPPYAYC

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	Name	Title/Organization	TEL/FAX Number	E-mail
6.	CHINA			
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7.	COOK ISLANDS			
	Aukino Tairea	Secretary of Transport Ministry of Transport PO Box 61 Rarotonga, Cook Islands	Tel : 682 28810 Fax : 682 28816	transport@oyster.net.ck
8.	DPR KOREA			
	Mr. Kim Ryong Ho	Director, Flight Safety Standard Department GACA Sunan District, Pyongyang, DPR of Korea	Tel 850-2-18111 Ext – 8109 Fax 850-2-3814410 Ext-4625	gaca@silibank.com
9.	FIJI			
	Mr. Robert Y Fong Submission Date 11 Jan 2006	Controller Ground Safety Civil Aviation of the Fiji Islands Private Mail Bag NAP 0354 Nadi Airport, Nadi Fiji Islands	Tel 679-672-1555 EXT 3371 Fax 679-672-1500	cgs@caaf.org.fj
10.	FRENCH POLYNESIA			
11.	HONG KONG CHINA			
	Alva Chi-wing FUNG	Senior Operations Officer Hong Kong, China/ Civil Aviation Department 46/F Queensway Government Offices 66 Queensway Hong Kong, China	Tel 852 2867 4214 Fax 852 2877 8542	acwfung@cad.gov.hk

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	Name	Title/Organization	TEL/FAX Number	E-mail
12.	INDIA			
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13.	INDONESIA			
14.	JAPAN			
15.	KIRIBATI			
16.	LAO PDR			
17.	MACAU,CHINA			
18.	MALAYSIA			
	1 Accident/Incident Ahmad Nizar Zolfakar	Director ATS Inspectorate DCA Malaysia	Tel 603-8871-4000 Fax 603-8871-4290	nizar@dca.gov.my
	2 Safety related Chew Lam Leong	Assistance Director, Safety Management Unit Air Traffic Services Division Department of Civil Aviation 4 th floor , podium block B Lot 4G4 Precint 4 Federal Government administrative Centre 62570 Putrajaya, Malaysia	Tel 603-8871-4210 Fax 603-8871-4290	chew@atsdca.gov.my chewll@dca.gov.my

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	Name	Title/Organization	TEL/FAX Number	E-mail
19.	MALDIVES			
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20.	MARSHALL ISLANDS			
	Mr. Stanley Myazoe	Director, Directorate of Civil Aviation P.O. Box 1114 Majuro, Marshall Islands MH 969690	Tel 011 (692) 625-6179, 455-3330 Fax 011 (692) 625-6170	rmidca@ntamar.net , SMS-4553330@cell.ntamar.net
21.	MICRONESIA			
22.	MONGOLIA			
23.	MYANMAR			
	Mr. U YOA SHU	Deputy Director (Air Traffic Services) Department of Civil Aviation Yangon International Airport Airport Road, DCA Headquarter Building Yangon, Myanmar	Tel : 951 665838, 665144, 665637 Fax : 951 665124	dca.myanmar@mptmail.net.mm dca.myanmar@mptmail.net.mm (ATB)
24.	NAURU			
25.	NEPAL			
26.	NEW CALEDONIA			

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	Name	Title/Organization	TEL/FAX Number	E-mail
27.	NEW ZEALAND			
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28.	PAKISTAN			
	Mr. Nusrat Ullah Khan	Director Operations Civil Aviation Authority - Pakistan, HQ Civil Aviation Authority, Terminal 1, Operations Directorate, JIAP Karachi 75200, Pakistan	Tel : 92-21-9248745 Fax : 92-21-9248744	dops@caapakistan.com.pk
29.	PALAU			
	Mr. Cordino Soalablai	Civil Aviation Specialist Koror, Palau/Ministry of Commerce & Trade P.O. Box 1471 Koror, Republic of Palau 96940	Tel : 680 488-2111/587-2115 Fax : 680 488-3207	mincat@palaunet.com c.soalablai@palaunet.com
30.	PAPUA NEW GUINEA			
31.	PHILLIPPINES			
32.	REP. OF KOREA			
	Mr. Choi Hoo Yung Assistant Director, Flight Standards Division	Flight Standards Division Civil Aviation Safety Authority 274 Gwahe-dong Gangseo-gu Seoul Republic of Korea	Fax : 82-2-6342-7249 Tel : 82-2-2662-2169	hooychoi@moct.go.kr

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	Name	Title/Organization	TEL/FAX Number	E-mail
33.	SAMOA			
34.	SOLOMON ISLANDS			
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35.	SINGAPORE			
	Heng Cher Sian Edmund	Project Officer (Airspace) Civil Aviation Authority of Singapore P.O. Box 1 Singapore Changi Airport Singapore 918141	Tel : 65-6541-2457 Fax : 65-6545-6516	edmund.heng@caas.gov.sg
36.	SRI LANKA			

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	Name	Title/Organization	TEL/FAX Number	E-mail
37.	THAILAND			
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	2. Mr. Choochart Mainoy	Air Traffic Services Advisor Airport Standards and Air Navigation Facilitating Division	Tel : 662 286 8159 Fax : 662 286 8159	cmainoy@hotmail.com
38.	TONGA			
	Viliami Ma'ake	Director of Civil Aviation Ministry of Civil Aviation P.O. Box 845 Salote Road Fasi Ministry of Civil Aviation, Tonga	Tel : + 676-24144 / 23401 Fax : + 676 24145 / 24296	vmaake@mca.gov.to
39.	UNITED STATES			
40.	VANUATU			
	Max Foon	Assistant Director – Flight Standard Private Mail Bag 9068 Port Vila Republic of Vanuatu	Tel : (678) 22819/23301 Fax: (678) 23783	civav@vanuatu.com.vu
41.	VIET NAM			

TERMS OF REFERENCE

Oceanic Separation Reduction Working Group (OSRWG) Scrutiny Group (OSRWG/SG)

- a) To assemble subject matter experts, as needed, including those experienced in: air traffic control; aircraft operations and airworthiness; regulation and certification; data analysis and risk modeling and communications, navigation and surveillance
- b) To coordinate collection of relevant data, such as traffic flow data, communication logs, and equipment availability
- c) To analyze and evaluate reports of deviations and anomalies in oceanic airspace where data link services are relied upon to support reduced lateral and longitudinal separation
- d) To quantify the magnitude and duration of deviations from cleared route of flight
- e) To identify any new hazards associated with application of reduced separation minima
- f) To produce estimates of the likelihood or rate of occurrence, and of the severity of the new hazards inferred from the deviations and anomalies observed in operational data acquired from the system in use
- g) To identify adverse trends in performance and recommend remedial actions to improve safety and reduce risk; to identify beneficial trends in system performance and promote practices that ensure continued safe operations
- h) To accomplish other tasks as might be required for safe implementation of reduced horizontal separation minima in oceanic airspace
- i) To report results to the OSRWG to assist in determining the safety of implementation of oceanic separation reduction

OSRWG Scrutiny Group Action Items

	Item	Status
1	Identify specific safety targets or indicators (numeric values) that contribute to the TLS	WIP
2	Determine the number of flights per day filing data link; periodic contract vs. contract (27min/1600sec vs. 14min/832sec)	Complete
3	Determine the number of flights that are approved for data link operations as evidenced by filing the data link equipment suffix	Complete
4	Determine the number of flights utilizing data link	Complete
5	Identify operator/aircraft type combinations utilizing data link and verify RNP 4 approval status	Complete
6	Analyze BAS messages – determine cause of anomalies; separate the “knowns” from the “unknowns”	Complete
7	Determine a typical number of missing BAS messages for a nine day period	Complete
8	Break out data link performance by media type (VHF, SATCOM, HF)	WIP
9	Obtain direct access to Systems Analysis Recording (SAR) data	WIP
10	Determine the number of missing waypoint crossing (WPC) messages	WIP
11	Develop classification of errors	Complete
12	Measure deviations between waypoint crossings	Complete
13	Establish method for Scrutiny Group to share information and exchange data	WIP
14	The boundary crossing should be the first report via CPDLC for all aircraft. The data show that boundary entry reporting is less than 100%. Breakdown these reports by location to identify the problem areas.	
15	Identify simultaneous CPDLC and ADS reporting	

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	Item	Status
16	Compare equipment codes filed in the flight plan to aircraft type. The AFN table is the optimal location to extract accurate equipment information for each aircraft. One report is filed per aircraft with an ADS connection.	
17	When determining the number of flights filing data link vs. utilizing data link, break the analysis down by operator (ref. agenda item 10, slide #8)	
18	Characterize uplink transit time as a function of traffic during no outage periods	
19	Identify the cause for negative transit times without a corresponding SATCOM outage	
20	Present anomalies by day and by hour	
21	Delineate between planned and unplanned SATCOM outages	
22	Provide more detail for non-outage periods (operator, aircraft type, time of day)	
23	Determine that the aircraft generated the LDC report. Some LDC reports could be erroneous. This could be an avionics issue.	
24	Reemphasize that pilots are required to request a clearance when deviating off of track.	
25	Investigate whether using strategic lateral offsets will generate a LDC message.	
26	Investigate flights with multiple LDC contracts (6+). This could be an avionics issue. A LCD report is a one time occurrence and the event is reset.	
27	It is speculated that an Airbus, when in “managed” mode and a new route is entered; a LDC contract is generated. The same is potentially true for Boeing when operating in “LNAV” mode. Contact Airbus and Boeing regarding this issue.	
28	Determine the magnitude of each LDC event	

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	Item	Status
29	Include the above action item into the agenda. This is an item that requires further scrutiny prior to the consideration of the expansion of 30/30 beyond OC3.	
30	Determine whether an increase in reporting interval results in an increase of missing BAS messages.	
31	Identify the geographic location of all “missing” (late) BAS messages.	
32	SITA and Boeing should investigate all of the missing BAS message events of category “C”	
33	Acquire SITA quarterly reports for the past two years.	
34	Develop objectives and goals for the report	
35	Invite a member of Boeing to participate in the next OSRWG/SG meeting	

SASP-WG/WHL/9-WP/28
12/05/2006



**SEPARATION AND AIRSPACE SAFETY PANEL (SASP)
NINTH MEETING OF THE WORKING GROUP OF THE
WHOLE**

Montreal, Quebec, CANADA, 22 May – 2 June, 2006

Agenda Item 2: En-route separation minima and procedures – vertical

**Progress In Developing Long-Term Height-Keeping Performance Requirements To Support
Continued Safe Use of the Reduced Vertical Separation Minimum**

Presented By The United States

Summary

This paper describes the progress in developing long-term height keeping performance requirements to support the continued safe use of RVSM. The paper recalls the work of the North Atlantic Operations and Airworthiness Sub -Group in addressing the issue of altimetry system error and in considering long-term monitoring requirements. The meeting is invited to consider the material in this paper toward progressing long-term monitoring requirements.

1. INTRODUCTION

1.1 An amendment, with effect from 24 November 2005, added the following paragraphs to Annex 11:

3.3.4.1 For all airspace where a reduced vertical separation minimum of 300 m (1 000 ft) is applied between FL 290 and FL 410 inclusive, a programme shall be instituted, on a regional basis, for monitoring the height-keeping performance of aircraft operating at these levels, in order to ensure that the implementation and continued application of this vertical separation minimum meets the safety objectives. The coverage of the height-monitoring facilities provided under this programme shall be adequate to permit monitoring of the relevant aircraft types of all operators that operate in RVSM airspace.

Note.-- The number of separate monitoring programmes should be restricted to the minimum necessary to effectively provide the required services for the region.

3.3.4.2 Arrangements shall be put in place, through inter-regional agreement, for the sharing between regions of data from monitoring programmes.

1.2 The force of the amendment is to require that monitoring take place in any portion of global airspace where the Reduced Vertical Separation Minimum is applied. The amendment furnishes the overall goal of such monitoring – “to ensure that the implementation and continued safe application of this vertical separation minimum meets the safety objectives.” Paragraph 3.3.4.1 of Annex 11 also provides some guidance in regard to the specific objectives of monitoring: “monitoring of the relevant aircraft types of all operators that operate in RVSM airspace.”

1.3 As will be noted, the new material in Annex 11 calls for establishment of the monitoring program “on a regional basis.” As will also be noted, however, the new material in Annex 11 does not provide specific requirements for the long-term monitoring program within a region.

1.4 The Panel has been pursuing development of such requirements through its Project Team 2. Reference 1 informed the Seventh Meeting of the Panel’s Working Group of Whole about progress, which was updated at the Panel’s last working group of the whole meeting.

1.5 The purposes of this working paper are to provide further update on development of these requirements to the Meeting and to propose action leading to the completion of this work.

2. BACKGROUND

2.1 The North Atlantic Operations and Airworthiness Sub-Group (Ops/Air) of the North Atlantic Systems Planning Group (NAT/SPG) is composed of State airworthiness and flight standards authorities, aircraft and avionics manufacturers, aircraft design organizations, representatives of international industry and flight crew organizations and specialists working in several relevant areas, including aircraft height-keeping performance monitoring. A major item of the Sub-Group’s work program has been the review and interpretation of RVSM monitoring results, especially as such results pertain to the long-term stability of altimetry system error (ASE).

2.2 *NAT Ops/Air Review of ASE Stability*

2.2.1 As will be recalled, a principal assumption is that application of the RVSM State approval process to an aircraft will lead to a value of airframe ASE which is essentially constant over a long time period. The Sub-Group's interest in the topic of ASE stability began because of evidence from NAT and EUROCONTROL monitoring results indicating examples of apparent time-dependent change in the ASE of a number of airframes. The most recent meeting of the Sub-Group (reference 2) considered both the latest monitoring information and also the results of investigations conducted by aircraft manufacturers and other relevant organizations based on apparent lack of ASE time stability previously reported to the Sub-Group.

2.2.2 With regard to monitoring data, the group examined EUROCONTROL results focused on the examining whether the ASE of more than 2 300 airframes for which at least 500 estimates of ASE were collected during 2004 and 2005. The study concluded that these data support the premise that ASE in European airspace is not stable over time, with the change in ASE continuing at the same of annual rate as had been observed in previous EUROCONTROL monitoring results. The study also concluded that, if the rate of ASE change of airframes persists at the currently observed rate, they would fail to meet performance requirements at some point.

2.2.3 These same data provided evidence of abrupt changes in the ASE of some airframes, apparently associated with painting fuselage areas around static sources.

2.2.4 The Sub-Group agreed that monitoring, rather than the results of applying of continuous airworthiness requirements set out in the RVSM approval process, uncovered these anomalies in ASE.

2.2.5 All the airframe manufacturers noted above reported the results of work undertaken to investigate the stability of ASE. Boeing provided information stating that suspected problems with the air-data-system component of altimetry systems had been confirmed through further analysis conducted in conjunction with the component supplier. Boeing stated that such problems would not likely be identified with the 2-year interval tests forming part of the continuing airworthiness requirements recommended for its aircraft types, indicating that 4 years would be a much more appropriate interval in light of those tests. An aircraft design organization with considerable experience in producing RVSM airworthiness packages agreed with the Boeing premise, stating that RVSM-specific checks of air data system drift recommended to its customers for application at 2-year intervals would be effective at finding such problems.

2.2.6 The Sub-Group reviewed the advanced-draft form of a letter being prepared by FAA which, after coordination with other aviation authorities, will be sent to aircraft manufacturers and approved design organizations. The purpose of the letter is to these notify these entities of the observation of ASE drift and to request information concerning the error tolerance allocated to each altimetry system component, and the associated time interval over which the tolerance pertains, in the data packages submitted to airworthiness authorities for purposes of obtaining RVSM airworthiness approval of aircraft types.

2.3 *NAT Ops/Air Consideration of Long-term Monitoring Requirements*

2.3.1 The Sub-Group recalled the purposes agreed for NAT monitoring:

Aircraft Types	establish a ‘track record’ of performance for a manufacturer that can be used to establish monitoring goals for new aircraft types introduced;
Operator Fleets	determine that group performance meets RVSM requirements (MASPS); establish that an operator’s programme is consistent with his peers, and can identify airframes with unusual performance; determine that the performance of airframe groups does (not) vary over time (if it does, to measure the extent of the variation);
Airframes	support initial approval of airframes, confirming airworthiness was accomplished correctly; capture non-standard performance (i.e., aberrant and non compliant measurements) of the population, so that airframes can be identified for follow-up action in a timely manner; determine that the performance of airframes does (not) vary over time, (if it does, to measure the extent of the variation).

2.3.2 The Sub-Group recalled further that each Region had adopted a set of minimum monitoring requirements (MMR) associated with initial approval of an operator and its fleet for RVSM operations, noting that the MMR requirements for all Regions were, materially, the same.

2.3.3 In a working paper (reference 3) presented to the meeting, EUROCONTROL proposed the following set of long-term monitoring requirements for global application:

- i. New operators, or operators with new aircraft, are to comply with the Minimum Monitoring Requirements as soon as possible but no later than 6 months after the issue of RVSM approval
- ii. Operators are to ensure that the required numbers of aircraft are monitored to comply with the Minimum Monitoring Requirements over a 2-year period.
- iii. The maximum time between measurements on individual aircraft should not exceed 4 years.
- iv. Only measurement taken on the current operator/aircraft combination can be used for compliance with item i and ii.

2.3.4 While recognizing that Europe is the only Region which has adopted asset of long-term monitoring requirements, the Sub-Group agreed that it was not in a position to recommend this, or any alternative, set of monitoring requirements to support continued safe use of the RVSM in the long term. The Sub-Group did agree that development of any set of long-term monitoring requirements should proceed under the assumption that it would be necessary to examine operator/aircraft-type ASE performance.

2.3.5 Noting that only monitoring results had uncovered the problems associated with ASE stability, the Sub-Group did agree that monitoring should continue until the long-term stability of ASE would be confirmed. In addition, the Sub-Group recommended that steps be taken to adopt a set of long-term monitoring requirements with global applicability.

3. DISCUSSION

3.1 Reference 3 also includes a series of questions which should be addressed when developing any final set of long-term monitoring requirements:

- Is it necessary to ensure that, over some period of time, each aircraft operating in RVSM airspace is monitored at least once?
- What interval of time, fixed (24 months) or variable, is appropriate?
- What interaction is there between an independent monitoring check of ASE and operator-conducted maintenance-type check?
- How long can a measurement on any given aircraft be considered to be valid?
- Is a measurement of an airframe applicable only to the current operator?
- What percentage of aircraft from a given operator is required to ensure sufficient and accurate data?

3.2 Given the regional-focus of the long-term monitoring paragraphs included in Annex 11 as from 24 November 2005, additional questions suggest themselves:

- What is the minimum monitoring infrastructure required of a Region?
- Should the vertical occupancy or passing frequency within a Region affect the long-term monitoring requirements applicable to the Region?
- How should the percentage of intra- and inter-regional operations within a Region's airspace affect monitoring requirements, if at all?
- How should the annual traffic volume, in comparison to other regions, affect monitoring requirements within a Region, if at all?
- What is the expected role, if any, of emerging new technology, such as ADS-B and multilateration systems, in contributing to a Region's monitoring system infrastructure?

3.3 Formulating answers to these questions requires that cooperation among established regional monitoring agencies (RMAs), with assistance from experts such as those of the NAT Ops/Air Sub-Group. Such cooperation should allow development of draft long-term monitoring requirements for consideration by the Panel and other interested bodies.

3.4 A portion of this development process requires that RMAs produce a comprehensive analysis of current worldwide aircraft monitoring status and an overall plan for conducting long-term monitoring.

4. ACTION BY THE MEETING

4.1 The Meeting is invited to note NAT Ops/Air progress in identifying and resolving the causes of ASE drift.

4.2 As a means of appreciating the possible effect of adopting global requirements, the Meeting is invited to note the scope of the long-term monitoring specification proposed by EUROCONTROL to the most recent NAT Ops/Air meeting.

4.3 The Meeting is invited to review the questions raised in the Discussion section of this working paper.

4.4 Further, the Meeting is invited to adopt a position regarding the need for current RMAs to initiate a cooperative effort aimed at developing draft long-term monitoring requirements for presentation to SASP/WG/WHL/10.

4.5 Finally, assuming that a cooperative RMA effort aimed at developing long-term monitoring requirements is deemed useful, the Meeting is invited to call upon ICAO to support a meeting of all RMAs to formulate such requirements and a plan for implementing such requirements.

References

1. “Status of the Development of Long-Term Monitoring Requirements to Support Continued Safe Use of the Reduced Vertical Separation Minimum,” WP/30 to SASP/WG/WHL/7, Montreal, May 2005.
2. Summary of Discussions of the NAT Operations/Airworthiness (Ops/Air) Sub-Group, Washington DC, 14-16 February 2006.
3. “RVSM Long-Term Monitoring Requirements,” WP/03, Meeting of the North Atlantic Operations/Airworthiness (Ops/Air) Sub-Group, Washington DC, 14-16 February 2006.

DRAFT REPORT OF PROJECT TEAM 2 RVSM

Participants: Chairperson: B. Colamosca, R. Butcher, G. Moek, D. Anderson, B. Flax, C. Gerhardt-Falk, B. Lebedev, V. Mkhitaryan, M. Fujita, P. Som, R. Miller

1. Height Keeping Performance Below Flight Level 290

1.1 Mr. Colamosca presented WP/6 on behalf of the member from EUROCONTROL. The paper discussed the ongoing work on the evaluation of aircraft height keeping performance below FL 290. The paper notes that approximately 60 aircraft are observed in an hour by the Geneva height monitoring unit (HMU). The Geneva HMU was modified six months ago to produce data for aircraft operating below FL 290. The number of observations made below FL 290 averaged at most 10 aircraft per hour over the 6 month sample period. This relatively low sample yield results in average times for tracks in storage well in excess of those for monitoring above FL 290 and has a potential effect on the accuracy with which the HMU would estimate altimetry system error (ASE) below FL 290. The meeting discussed the method of ASE calculation employed by the HMU including the estimation of the height of the flight level. It was noted that in addition to reduction in measurement accuracy due to the greater variation of in the contours of meteorological slope mentioned in paragraph 4.5 of WP/6, the ability of the HMU to estimate the ASE of aircraft below FL 290 would also be affected by the relative degradation in estimation of the geometric height of aircraft at lower altitudes. The meeting expressed its appreciation to EUROCONTROL for continuing to pursue this unique and very valuable analysis.

2. Status of Development of Long-Term Requirements for Monitoring Aircraft Height-Keeping Performance

2.1 Mr. Colamosca presented WP/28, which described the progress toward developing long-term monitoring requirements. The paper discussed the monitoring provisions in Annex 11 and the North Atlantic Operations and Airworthiness (OPS/AIR) Sub-Group work relating to assessment of ASE stability and establishment of long-term monitoring requirements. The paper also posed questions for the development of long-term monitoring requirements and proposed a plan for completing this work.

2.2 Monitoring Provisions in Annex 11

2.2.1 The paper recalled the Amendment to Annex 11 that was effective from 24 November 2005. The Amendment added the following paragraphs:

3.3.4.1 For all airspace where a reduced vertical separation minimum of 300 m (1 000 ft) is applied between FL 290 and FL 410 inclusive, a programme shall be instituted, on a regional basis, for monitoring the height-keeping performance of aircraft operating at these levels, in order to ensure that the implementation and continued application of this vertical separation minimum meets the safety objectives. The coverage of the height-monitoring facilities provided under this programme shall be adequate to permit monitoring of the relevant aircraft types of all operators that operate in RVSM airspace.

Note.-- The number of separate monitoring programmes should be restricted to the minimum necessary to effectively provide the required services for the region.

3.3.4.2 Arrangements shall be put in place, through inter-regional agreement, for the sharing between regions of data from monitoring programmes.

2.2.2 It was noted that the new material in Annex 11 calls for establishment of the monitoring program “on a regional basis.” As will also be noted, however, the new material in Annex 11 does not provide specific requirements for the long-term monitoring program within a region.

2.3 *OPS/AIR Sub-Group Review of ASE Stability*

2.3.1 Working Paper 28 also described outcomes from the meeting of the North Atlantic Operations and Airworthiness (OPS/AIR) Sub-Group held in February 2006. The principal purpose of the meeting was to review issues associated with ASE stability. In previous meetings, the OPS/AIR Sub-Group had concluded that monitoring results provided by EUROCONTROL and the NAT Central Monitoring Agency (CMA) showed that the ASE of specific airframes is not stable.

2.3.2 These same data provided evidence of abrupt changes in the ASE of some airframes, apparently associated with painting fuselage areas around static sources. The Sub-Group agreed that monitoring, rather than the results of applying of continuous airworthiness requirements set out in the RVSM approval process, uncovered these anomalies in ASE.

2.4 *OPS/AIR Sub-Group Consideration of Long-Term Monitoring Requirements*

2.4.1 The Sub-Group recalled the purposes agreed for NAT monitoring:

Aircraft Types	a) establish a ‘track record’ of performance for a manufacturer that can be used to establish monitoring goals for new aircraft types introduced;
Operator Fleets	b) determine that group performance meets RVSM requirements (MASPS); c) establish that an operator’s programme is consistent with his peers, and can identify airframes with unusual performance; d) determine that the performance of airframe groups does (not) vary over time (if it does, to measure the extent of the variation);
Airframes	e) support initial approval of airframes, confirming airworthiness was accomplished correctly; f) capture non-standard performance (i.e., aberrant and non compliant measurements) of the population, so that airframes can be identified for follow-up action in a timely manner; g) determine that the performance of airframes does (not) vary over time, (if it does, to measure the extent of the variation).

2.4.2 The Sub-Group recalled further that each Region had adopted a set of minimum monitoring requirements (MMR) associated with initial approval of an operator and its fleet for RVSM operations, noting that the MMR requirements for all Regions were, materially, the same.

2.4.3 At the Sub-Group meeting, EUROCONTROL presented recommendations for long-term monitoring requirements. These recommendations are as follows:

- i. New operators, or operators with new aircraft, are to comply with the Minimum Monitoring Requirements as soon as possible but no later than 6 months after the issue of RVSM approval

- ii. Operators are to ensure that the required numbers of aircraft are monitored to comply with the Minimum Monitoring Requirements over a 2-year period.
- iii. The maximum time between measurements on individual aircraft should not exceed 4 years.
- iv. Only measurement taken on the current operator/aircraft combination can be used for compliance with item i and ii.

2.4.4 In response to presentation of this specification, the NAT OPS/AIR Sub-Group concluded that it was not in a position to recommend long-term monitoring requirements. However, the Sub-Group did recommend that the development of any set of long-term monitoring requirements should proceed under the assumption that it would be necessary to examine operator/aircraft-type ASE performance.

2.4.5 The meeting noted that the EUROCONTROL recommendations are based on long-term monitoring requirements adopted for the European Region, as published in chart format with supporting tables by EUROCONTROL. Additionally it was noted that the phrase “over a 2 year period” might be interpreted in different ways. One could also interpret recommendation iii above to mean that a census of an operator’s fleet must be completed every 4 years. The meeting concluded that any long-term monitoring requirements should be drafted in a clear and concise manner that leaves little to interpretation.

2.5 *Questions Posed For Consideration When Developing Globally Applicable Long-Term Monitoring Requirements*

2.5.1 The meeting discussed a series of questions associated with final establishment of long-term monitoring requirements. The first set of questions was posed by WP/3, authored by EUROCONTROL and presented at the OPS/AIR Sub-Group meeting.

2.5.2 The EUROCONTROL questions and Project Team 2 discussion follows:

Question E1. Is it necessary to ensure that, over some period of time, each aircraft operating in RVSM airspace is monitored at least once?

PT2: This seems reasonable and desirable. It may be possible for the SASP Mathematicians Sub-Group to consider how robust the estimate of risk would be under different scenarios. A practical consideration would be the monitoring infrastructure in the region. In summary a technical question exists as to how much data is needed for risk assessment even though practical considerations (including regional considerations, for example, infrastructure and traffic density) may not make a census of airframes worthwhile.

Question E2. What interval of time, fixed (24 months) or variable, is appropriate?

PT2: The OPS/AIR Sub-Group indicated current continued airworthiness provisions are insufficient to identify ASE degradation in 24 months, the prescribed interval for such checks. Using an interval of time that is variable by aircraft type is perhaps not possible due to different altimetry components among aircraft of the same type.

Question E3. What interaction is there between an independent monitoring check of ASE and operator-conducted maintenance-type check?

PT2: The NAT OPS/AIR has concluded that current RVSM maintenance-check requirements do not contribute to identifying and remedying ASE drift. Some operators have questioned the need for altimetry system checks if monitoring is conducted. A practical consideration in linking monitoring to maintenance checks is that regional monitoring agencies (RMAs) do not have access to data on the conduct of operator maintenance checks.

Question E4. How long can a measurement on any given aircraft be considered to be valid?

PT2: The validity is dependent on the stability of ASE which is dependent on a review of monitoring data to determine, for an aircraft type, the time interval for which ASE performance is stable. Maintenance actions or interventions would also have to be considered, as step changes in monitoring data have been correlated to maintenance.

Question E5. Is a measurement of an airframe applicable only to the current operator?

PT2: Would the technical performance of an aircraft be the same with different operators? Some operators may operate the same aircraft in different segments of the flight envelope and that can result in different ASE observations.

Question E6. What percentage of aircraft from a given operator is required to ensure sufficient and accurate data?

PT2: The basis for the existing globally harmonized regional minimum monitoring requirements is the amount of existing monitoring data for each aircraft type and the compliance with RVSM MASPS observed in such data. Operators of those aircraft types for which relatively less data is available, or which have evidenced inferior performance, must monitor relatively more airframes. In some instances, this may require monitoring 60 percent of an operator's fleet of a given aircraft type. Since this monitoring target, in particular, was set in advance of the 1997 implementation of the RVSM in the NAT when there were fewer monitoring results available, it may be appropriate to ask the Panel's Mathematicians' Sub-Group or another specialist body to review the applicability of targets set out in the minimum monitoring requirements now in use.

2.5.3 Given the regional-focus of the long-term monitoring paragraphs included in Annex 11, applicable from 24 November 2005, the project team discussed additional questions:

Question S1. What is the minimum monitoring infrastructure required of a Region?

PT2: Annex 11 prescribes that monitoring should be done on a regional basis. Realistically, this question can be answered only after the long-term monitoring requirements are defined. Nevertheless, it should be taken into account in developing such requirements and an associated plan for meeting them. Currently, some regions where RVSM is in place have no monitoring assets and these regions rely on operators using monitoring services associated with other regions.

Question S2. Should the vertical occupancy or passing frequency within a Region affect the long-term monitoring requirements applicable to the Region?

PT2: The Project Team agreed that the height-keeping performance of aircraft has no relationship to the passing frequency.

Question S3. How should the percentage of intra- and inter-regional operations within a Region's airspace affect monitoring requirements, if at all?

PT2: Both should be considered, although the monitoring of inter-regional operations should be addressed with higher priority.

Question S4. How should the annual traffic volume, in comparison to other regions, affect monitoring requirements within a Region, if at all?

PT2: Monitoring requirements could be developed with consideration to the annual traffic volume as observed by an RMA.

Question S5. What is the expected role, if any, of emerging new technology, such as ADS-B and multilateration systems, in contributing to a Region's monitoring system infrastructure?

PT2: New technology should contribute a Region's monitoring system infrastructure. There would be value in examining the possible contribution to monitoring assets of GPS-derived aircraft geometric height available from ADS-B. Evaluation of data from current ADS-B trials and other sources should help to determine whether operation of ADS-B might contribute to height monitoring.

3. Recommendations

3.1 The Meeting is invited to note NAT Ops/Air progress in identifying and resolving the causes of ASE drift.

3.2 As a means of appreciating the possible effect of adopting global requirements, the Meeting is invited to note the scope of the long-term monitoring specification proposed by EUROCONTROL to the most recent NAT Ops/Air meeting.

3.3 The Meeting is invited to review the questions discussed by Project Team 2.

3.4 Further, the Meeting is invited to adopt a position regarding the need for current Rams to initiate a cooperative effort aimed at developing draft long-term monitoring requirements for presentation to SASP/WG/WHL/10.

3.5 Finally, assuming that a cooperative RMA effort aimed at developing long-term monitoring requirements is deemed useful, the Meeting is invited to call upon ICAO to support a meeting of all RMAs to formulate such requirements and a plan for implementing such requirements.

3.6 The Project Team noted that such an all-RMA meeting could take place in conjunction with the next SASP Working Group of the Whole meeting, since many States providing RMA services are Panel members. Such States might consider augmenting their delegations at the next working group of the whole meeting in order to ensure participation in such an all-RMA meeting. The Team noted further that the location of the next working group of the whole meeting would be favorable to encouraging non-Panel-member States providing RMA services to participate.

ICAO SAFETY MANAGEMENT SYSTEM (SMS) COURSE

Course information and outline

Background

Managing any aviation organization, large or small, requires the management of many business processes: financing, budgeting, communicating and allocating resources, and so forth. In recent years, managing safety has been added to the list of business processes. Managing safety is now as much a part of running a business as any of the traditional business processes.

ICAO first introduced the requirement for safety management in Annex 11 — *Air Traffic Services*, and Annex 14 — *Aerodromes, Volume I — Aerodrome Design and Operations*. A need was then identified to expand the concept and to harmonize provisions with Annex 6 — *Operation of Aircraft, Part I — International Commercial Air Transport — Aeroplanes, and Part III — International Operations — Helicopters*, and in a near future the Organization will explore the extension of the concept and requirement to other Annexes of the Chicago Convention.

An SMS is a systemic approach to managing safety, including the necessary organizational structure, accountabilities, policies and processes. In order to reinforce the notion of safety management being a managerial process, the new ICAO safety management requirements include provisions for an organization to establish lines of safety accountability throughout the organization, as well as at the senior management level. The requirements impose upon States the responsibility to establish a safety programme and, as part of such programme, require that air operators, maintenance organizations, air traffic services providers and certified aerodrome operators implement a safety management system (SMS). Lastly, the requirements impose on States the responsibility to establish an acceptable level of safety for the activities/provision of services under consideration.

Course goals

The goals of the *ICAO Safety Management System (SMS) Course* are to:

- a) develop participants' knowledge of safety management concepts and ICAO Standards and Recommended Practices (SARPs) on safety management in Annexes 6, 11 and 14, and related guidance material; and
- b) develop participants' knowledge and skills to certify and oversee the implementation of key components of a basic SMS, in compliance with relevant ICAO SARPs and national regulations.

Target audience

Representatives from civil aviation authorities with responsibilities regarding the implementation of safety programmes, and the implementation and/or oversight of safety management systems, in the areas of aircraft operations, air traffic services, maintenance of aircraft and aerodrome operations.

How participants will benefit

By the end of the course, participants will acquire knowledge, techniques and skills to assist them in evaluating and auditing a safety management system, as well as measuring its performance, including:

- Identification of the means necessary to manage safety observing a performance based approach;
- Application of techniques to identify hazards, and to manage proactively system safety risks;
- Targeting of resources appropriately, and measuring the results of resource allocation;
- Application of predictive assessment methods such as LOSA and NOSS, based on threat and error management;
- Identification of the means necessary to develop and sustain a safety culture;
- Integration of Human and Organizational Factors into the safety management system;
- Evaluation of system operation; and
- Improvement of communications on safety between the civil aviation authority and aviation organizations.

Prerequisites

Participants must have basic technical aeronautical knowledge and a minimum of two years experience in flight, air traffic control or aerodrome operations in a civil aviation administration or the aviation industry.

Class size

The maximum class size for this course is 30 persons.

Course duration

Five days for a total 30 classroom hours, including exercises, case studies and examination.

References

- ICAO Annexes to the Convention on International Civil Aviation
 - Annex 6 – *Aircraft operation, Parts I and III*
 - Annex 11 – *Air Traffic Services*
 - Annex 14 – *Aerodromes – Volume I – Aerodrome Design and Operations*
- ICAO Safety Management Manual (Doc 9858)

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Training material

The instructional strategy will involve case study materials, presentations and group work.

Course time table

	Day 1	Day 2	Day 3	Day 4	Day 5
Session 1	Accreditation	Module 3	Module 5	Module 8	Module 10
Session 2	Accreditation	Module 3	Module 5	Module 8	Module 10
	Coffee/Tea Break				
Session 3	Module 1	Module 3	Module 6	Module 9	Module 11
Session 4	Module 2	Module 4	Module 6	Module 9	Module 12
	Lunch				
Session 5	Module 2	Module 4	Module 7	Module 9	Module 12
Session 6	Module 2	Module 5	Module 8	Module 9	Module 13
	Coffee/Tea Break				
Session 7	Module 2	Module 5	Module 8	Module 9	Closing

OUTLINE OF MODULE PLANS

Module 1 – SMS course introduction

Introduction

- Objective of the module:
 - ❖ *To introduce the course objectives, strategies and structure, as well as to allow participants to be acquainted with each other and with the course instructors.*

Main presentation

- Description of the module contents:
 - ❖ **Part I** – *Presentation of ICAO instructors and participants*
 - ❖ **Part II** – *Course objectives, strategies and structure*
 - ❖ **Part III** – *Administrative information*
 - ❖ **Part IV** – *Evaluation procedures*

Conclusion

- Summary
- Questions by participants.

Module 2 – Basic safety concepts

Introduction

- Objective of the module:
 - ❖ *At the end of this module, participants will be able to describe why new perspectives for understanding and new methods for managing safety are necessary. Participants will be able to describe the limitations of traditional methods to identify hazards, reduce risks and ensure an acceptable level of safety, and the benefits of a proactive approach to the management of safety.*

Main presentation

- Description of the module contents:
 - ❖ Concept of safety
 - ❖ Safety investigation
 - ❖ The evolution of safety thinking
 - ❖ A concept of accident causation
 - ❖ The organizational accident
 - ❖ People and safety – SHEL model
 - ❖ Operational performance and technology

- ❖ Understanding operational errors
- ❖ Organizations and safety culture
- ❖ Safety investigation
- ❖ Questions and answers
- ❖ Working group activities

Conclusion

- Progress test: Exercise N° 02/01 – The Anytown City airport accident (*See Handout N° 1*)
- Test answers and feedback.

Module 3 – Introduction to safety management

Introduction

- Objective of the module:
 - ❖ *At the end of this module, participants will be able to identify in a case study the strengths and weaknesses of the defences in the civil aviation system, the role of defences in preserving operational safety, and identify latent conditions and risk factors in the system that can produce safety breakdowns.*

Main presentation

- Description of the module contents:
 - ❖ The safety stereotype
 - ❖ The management dilemma – safety vs. production
 - ❖ Need for safety management
 - ❖ Strategies for safety management
 - ❖ Reactive, proactive and predictable safety management
 - ❖ The imperative of change
 - ❖ Evolving methods – Building blocks
 - ❖ Responsibilities for managing safety
 - ❖ Questions and answers

Conclusion

- Progress test: Exercise N° 03/01 – The Anyfield Airport accident (*See Handout N° 2*)
- Test answers and feedback.

Module 4 – Hazards

Introduction

- Objective of the module:
 - ❖ *At the end of this module, participants will be able to apply the four fundamentals of hazards identification and management through a case study.*

Main presentation

- Description of the module contents:
 - ❖ Terms and associated definitions
 - ❖ First fundamental – Understanding hazards
 - ❖ A predictive relationship
 - ❖ Second fundamental – Hazard identification
 - ❖ Scope of hazards
 - ❖ Hazard management
 - ❖ Sources of hazard identification
 - ❖ Third fundamental – Documentation of hazards
 - ❖ Fourth fundamental – Costs considerations
 - ❖ Safety vs. costs
 - ❖ Questions and answers

Conclusion

- Progress test: Exercise N° 04/01 – International airport construction project (*See Handout N° 3*)
- Test answers and feedback.

Module 5 – Risks

Introduction

- Objective of the module:
 - ❖ *At the end of this module, participants will be able to apply the four fundamentals of risk management through a case study.*

Main presentation

- Description of the module contents:
 - ❖ First fundamental – Risk management
 - ❖ Second fundamental – Risk probability
 - ❖ Third fundamental – Risk severity

- ❖ Risk assessment matrix
- ❖ Risk assessment criteria
- ❖ Fourth fundamental – Risk mitigation
- ❖ Evaluating risk mitigation options
- ❖ Risk mitigation strategies
- ❖ Risk management process at a glance
- ❖ Hazard identification and risk management – Class exercises
- ❖ Questions and answers

Conclusion

- Progress test: Exercise 05/01 – Accident Boeing 747-412 – 9V-SPK Taipei-Chiang Kai Shek Airport, Taiwan (*See Handout N° 4*)
- Test answers and feedback

Module 6 – SMS regulation

Introduction

- Objective of the module:
 - ❖ *At the end of this module participants will be able to describe the safety management requirements included in Annexes 6, 11 and 14.*

Main presentation

- Description of the module contents:
 - ❖ AGA, ATS and OPS/AMO safety management
 - ❖ SMS – ICAO common definitions
 - ❖ What is a safety programme?
 - ❖ What is an SMS?
 - ❖ SMS – Acceptable level of safety
 - ❖ OPS/AMO safety programme requirements
 - ❖ ATS safety programme requirements
 - ❖ AGA safety programme requirements
 - ❖ OPS safety programme requirements
 - ❖ Acceptable level of safety – Legal considerations
 - ❖ Acceptable level of safety – Scope and implementation
 - ❖ Question and answers

Conclusion

- Discussion

Module 7 – Introduction to SMS

Introduction

- Objective of the module:
 - ❖ *At the end of this module, participants will be able to list the differences between a safety programme and an SMS, outline the basic components of an SMS, and the benefits of an SMS for organizations in order to satisfy regulatory, business and operational requirements.*

Main presentation

- Description of the module contents:
 - ❖ Introduction and aviation system stakeholders
 - ❖ First fundamental – ICAO requirements
 - ❖ Safety programme – SMS relationships
 - ❖ SMS – Introductory concepts
 - ❖ SMS main characteristic features
 - ❖ Second fundamental – The four components of SMS
 - ❖ Third fundamental – SMS and QMS
 - ❖ SMS and QMS – Striking a balance
 - ❖ Systems integration benefits
 - ❖ Systems integration considerations
 - ❖ Fourth fundamental – The importance of gap analysis
 - ❖ SMS – Interrelationships
 - ❖ Questions and answers

Conclusion

- Discussion.

Module 8 – SMS planning and development

Introduction

- Objective of the module:
 - ❖ *When completing the module the participants will be able to describe the requirements associated to the planning and development phases of an SMS, and explain the structure of an SMS implementation plan.*

Main presentation

- Description of the module contents:
 - ❖ SMS project management flowchart
 - ❖ The components of SMS
 - ❖ Planning phase

- ❖ System description and gap analysis
- ❖ Management commitment and responsibility
- ❖ Safety accountabilities of managers
- ❖ Development phase
- ❖ SMS functional structure definition
- ❖ SMS implementation plan
- ❖ SMS documentation
- ❖ Conclusion
- ❖ Questions and answers

Conclusion

- Progress test: Exercise 08/01 – Cuzco International Airport operation (*See Handout N° 5*)
- Test answers and feedback

Module 9 – SMS implementation and operation

Introduction

- Objective of the module:
 - ❖ *When completing the module the participants will be able to describe the requirements associated to the implementation and operation phases of an SMS, including a phased approach for the SMS implementation.*

Main presentation

- Description of the module contents:
 - ❖ SMS project management flowchart
 - ❖ Appointment of key safety personnel
 - ❖ Safety manager and safety office
 - ❖ Safety Review Board (SRB) and Safety Action Group(s) (SAG)
 - ❖ Documentation – Safety management manual (SMM)
 - ❖ Safety hazard identification and risk management
 - ❖ Safety management training
 - ❖ Emergency response planning
 - ❖ Safety performance monitoring and measurement
 - ❖ Audits and surveys
 - ❖ Change management
 - ❖ Communication

- ❖ Phased approach for the SMS implementation
- ❖ Questions and answers

Conclusion

- Progress test: 09/01 – Collision between two aircraft at Milano-Linate Airport (*See Handout N° 6*)
- Test answers and feedback.

Module 10 – SMS audit

Introduction

- Objective of the module:
 - ❖ *At the end of this module participants will be able to demonstrate their understanding on how to audit an SMS, through the development of the outline of an SMS standard.*

Main presentation

- Description of the module contents:
 - ❖ SMS project management flowchart
 - ❖ Auditing the SMS
 - ❖ Audit staff
 - ❖ Auditor's training
 - ❖ Auditor's maintenance of competence
 - ❖ Audit objectives and responsibilities
 - ❖ Independence of the auditor
 - ❖ Auditing the SMS
 - ❖ Audit plan and working documents
 - ❖ Report content and corrective action follow-up
 - ❖ Measuring soundness, appropriateness and efficiency of SMS

Conclusion

- Progress test: Exercise 10/01 – Model of SMS regulation – Outline of a SMS Standard.
- Test answers and feedback

Module 11 – Examination

Introduction

- Objective of the module:
 - ❖ *The objective of the examination is to verify that participants have understood the basic principles of the development, implementation, operation and performance measurement of safety management programmes and systems in order to increase safety and efficiency in operations, before granting individual SMS certification.*

Module 12 – Examination review

Introduction

- Objective of the module:
 - ❖ *The objective of this session is to review with participants the results of the course examination and to clarify doubts with respect to the implementation of the SMS and the use of the proposed tools.*

Module 13 – Course feedback

Introduction

- Objective of the module:
 - ❖ *The objective of this module is to be able to respond to the following questions:*
 - *What we learned and how we can apply the acquired knowledge in our own organizations?*
 - *What obstacles are anticipated for the implementation of SMS in our States organizations?*
 - *Participants feedback concerning the structure of the course and potential improvements*

ICAO Bay of Bengal ATS Coordination Group – ATFM Task Force

SAFETY ASSESSMENT

Operational Trial Implementation of Bay of Bengal Cooperative Traffic Flow Management System (BOBCAT)

1 Background

Despite airspace capacity improvements including the EMARSSH realignment of ATS routes (November 2002) and the implementation of RVSM in the Bay of Bengal area (November 2003), recent meetings of the Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG), the Bay of Bengal ATS Coordination Group (BBACG) and the RVSM Implementation Task Force (RVSM/TF) had all recognized a continuing need to improve the overall management of traffic flows across the Bay of Bengal and South Asia area.

APANPIRG/15 (August 2004) noted the considerable efforts being made by States to collaborate, together with IATA, to improve the ATFM over the Bay of Bengal area and encouraged all parties to continue their efforts in this respect and to take into account the benefits to be derived from ATM automated systems.

A Special ATS Coordination Meeting – Bay of Bengal (SCM-BOB) was subsequently held in conjunction with the BBACG/16 meeting at the ICAO Regional Office (Bangkok), from 31 January – 4 February 2005. The SCM-BOB concluded that a dedicated Air Traffic Flow Management Task Force (ATFM/TF) should be established under BBACG to progress flow management arrangements for the Bay of Bengal and South Asia traffic flows, and drafted terms of reference accordingly. To meet agreed objectives, the ATFM/TF adopted a phased implementation programme under which Phase One was confined to flights planning to transit the Kabul FIR during the night time peak period.

During the ATFM/TF/2 meeting (Delhi, India, 28 June - 1 July 2005) the Task Force noted Thailand's readiness to proceed to an operational trial and requested Thailand to continue to develop the Bay of Bengal Cooperative ATFM Advisory System (BOBCAT) automated system to the stage of an operational trial, in close cooperation with concerned States, ICAO and IATA. The ATFM/TF considered that an ATFM operational trial should be conducted to enable the States concerned to assess the effectiveness of the system.

In preparing for an ATFM operational trial, the ATFM/TF reviewed the standards and recommended practices relating to the implementation by States of safety management programmes for Air Traffic Services (ATS) contained in Section 2.26 of Annex 11 – *Air Traffic Services* and corresponding provisions in Chapter 2 of the *Procedures for Air Navigation Services – Air Traffic Management* (PANS-ATM, Doc 4444). The ATFM/TF noted the requirement for States to undertake a safety assessment prior to the implementation of any new separation minimum or procedure, in order to ensure that safety is maintained in the provision of ATS within airspaces and at aerodromes.

2 Safety Assessment

The safety assessment activities undertaken by the ATFM/TF recognized that the Bay of Bengal Cooperative Traffic Flow Management System (BOBCAT) was not intended nor designed to “control” aircraft or relieve any of the traffic separation responsibilities of the ATS providers concerned. ATS providers would retain full responsibility for all ATS functions, including traffic management.

In accordance with Phase One of the ATFM system implementation planning being coordinated by the ATFM/TF, the purpose of BOBCAT was to regulate, by the calculation and distribution of wheels up and gateway fix slot times, the flow of westbound air traffic departing airports from East Asia, South-East Asia and South Asia and which had planned to transit the Kabul FIR between the hours of 2000 and 2359 UTC daily.

The BOBCAT was an advisory system which did not have executive control of aircraft. Nevertheless, BOBCAT would provide scheduling information for aircraft departures and, if the system did not perform to design expectations, this could lead to traffic congestion. However, the ATFM/TF considered that in no case would erroneous advisory information from BOBCAT be expected to lead to breakdown of required ATS separation as ATS providers retained responsibility for tactical ATS and traffic management.

3 Methodology

The ATFM/TF conducted safety assessment activities in accordance with guidance in Chapter 6 the draft ICAO *Manual on Safety Management for Air Traffic Services*. In this context, commencing during the ATFM/TF/3 meeting (Bangkok, Thailand, 6-9 September 2005) the ATFM/TF undertook hazard identification activities in preparation for an operational trial of the BOBCAT system. The seven hazards and associated mitigators identified were recorded in the attached Hazard Log and the Hazard Log was reviewed and updated during subsequent meetings of the ATFM/TF.

Recognizing that the BOBCAT system was an advisory system only and that failure of the BOBCAT system during the operational trial would result in reversion to existing procedures, the ATFM/TF did not formally classify identified Hazards in terms of likelihood and severity. Nevertheless, mitigators were identified in many instances that would be applied with a view to enhancing the conduct of the operational trial.

4 Primary Requirements

As a result of the safety assessment activities and associated works, the ATFM/TF identified the following primary requirements for the conduct of the ATFM operational trial:

- a) Proof of BOBCAT Concept by the conduct of desktop simulations/paper trials;
- b) Preparation and publication of a comprehensive AIP Supplement containing procedures and requirements for the operational trial;
- c) Preparation and publication of comprehensive ATFM Users Handbook containing procedures and requirements for the operational trial;

- d) Computer based training capabilities via the BOBCAT website;
- e) Adequate ATFMU staffing and equipment levels, including technical support;
- f) Advanced BOBCAT system Hardware and Software requirements including equipment redundancy, firewall protection, etc
- g) Ghosting of operations for 7 day period prior to live trial;
- h) Immediate reversion capability to pre-trial conditions using existing State bi-lateral arrangements; and
- i) Availability of suitable methodology and set of objective criteria against which trial performance could be measured.

5 Assumptions and Constraints

Assuming the full completion, or planned completion prior to commencement of an operational trial, of the items described above, the ATFM/TF would convene a meeting at a suitable time prior to the scheduled start of the 7 day ghosting period in order to conduct an assessment of the readiness level of trial participants and make a Go/ No Go decision in relation to the commencement, or otherwise, of the ATFM operational trial.

In the event of significant non compliance or lack of readiness in relation to the items described in Section 4 above, commencement of the trial would be delayed until a suitable readiness level was achieved.

6 Post Implementation Review

A post implementation review of trial performance would be completed by the ATFM/TF within approximately 3 weeks of the commencement of the trial using a suitable methodology and set of objective criteria. This would facilitate objective assessment of the ATFM trial and the provision of high integrity information to enable States and users to evaluate the effectiveness of the BOBCAT system.

7 Safety Statement

Having conducted safety assessment activities in accordance with the above, including consideration of the attached Hazard Log and the ongoing work of the ATFM/TF, and recognizing that an immediate reversion to pre-trial arrangements could take place in the event of unforeseen difficulties, the States participating in the ATFM operational trial had not identified safety concerns that would impede the conduct of a Phase 1 ATFM operational trial using the BOBCAT system.

- END -

ICAO Bay of Bengal ATS Coordination Group – ATFM Task Force

BOBCAT Safety Assessment - Hazard Log

**Operational Trial Implementation of
Bay of Bengal Cooperative Traffic Flow Management System (BOBCAT)**

	Hazard No 1
Description:	Non-standard, incorrect or corrupt data leading to erroneous advisory information.
Remarks:	The BOBCAT is a computerized system with user access via the public internet. This hazard identifies the possibility of incorrect data being presented to or utilized by BOBCAT, resulting in erroneous advisory information being promulgated by BOBCAT.
Mitigation:	<ol style="list-style-type: none">1) BOBCAT provides advisory information only; ATS providers retain responsibility for tactical ATS and traffic management.2) Hardware – The BOBCAT Concept of Operations includes details of system hardware architecture which incorporates contemporary firewall protection to ensure no unauthorized access is obtained, in particular to application and database servers.3) Software – incorporates checking algorithms to ensure aircraft can not be scheduled at the same gateway fix at the same time and at the same flight level.4) AEROTHAI support engineers will monitor BOBCAT Error Log and provide support for ATFMU staff to resolve non-standard, incorrect or corrupt data issues.

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	<p>5) Paper Trial – Paper trials/simulations of full functionality of BOBCAT prior to operational trial comprises validation exercises in order to identify data errors and other issues.</p> <p>6) ATFMU – Structured training programme for ATFMU staff to ensure recognition of non-normal data configurations, and a “reasonableness” check of slot allocation lists is conducted by ATFMU staff prior to the list being published to users.</p> <p>7) ATS Unit – The ATS Units adjacent to or controlling gateway fixes would identify situations where traffic was inappropriately sequenced and provide tactical ATS intervention.</p> <p>8) Ghost Operations – Implementation of operational trial will utilize staged implementation of BOBCAT. Stage one (7 day period) would require full functionality and user input, but slots generated would not be issued to aircraft. Facilitates testing of databases and procedures under operational conditions. Stage 2 commences live operations only provided Stage 1 operations are acceptable.</p> <p>9) Computer based training package for BOBCAT operations and interactive web board (i.e. discussion page) will be provided on BOBCAT web site.</p>
Hazard No 2	
Description:	Errors or bugs in software update leading to erroneous advisory information.
Remarks:	This hazard identifies concerns in respect of major software changes or other major equipment changes which could result in introduction of catastrophic software threats.

<p>Mitigation:</p>	<p>1) BOBCAT provides advisory information only; ATS providers retain responsibility for tactical ATS and traffic management.</p> <p>2) Hardware – The BOBCAT Concept of Operations includes details of system hardware architecture which includes duplicated systems throughout enabling redundancy, allows one system to be non operational whilst duplicated system carries the load.</p> <p>3) Bay of Bengal and South Asia ATFM Handbook includes requirements and procedures for major software updates. Significant system and software changes to be reviewed by suitable oversight authority e.g. Air Traffic Flow Management Task Force, Bay of Bengal ATS Coordination Group, AEROTHAI Senior Engineering Staff prior to implementation</p> <p>4) Paper trial and ghost operations provide intensive testing of software.</p>
<p>Hazard No 3</p>	
<p>Description:</p>	<p>Hardware or networking failures or incompatibilities leading to absence of advisory information or promulgation of erroneous advisory information.</p>
<p>Remarks:</p>	<p>Hardware and/or hardware networking problems/public internet failures may create a situation where BOBCAT goes off line without warning, leading to an absence of data or erroneous data presentation to users due lack of update capability.</p>

<p>Mitigation:</p>	<p>1) BOBCAT provides advisory information only; ATS providers retain responsibility for tactical ATS and traffic management.</p> <p>2) Hardware – The BOBCAT Concept of Operations includes details of system hardware architecture which includes duplicated systems throughout enabling redundancy of hardware without compromising entire BOBCAT system.</p> <p>3) Software configuration includes user visible time/date stamp of slot allocation list and other time bound pages.</p> <p>4) AIP Supplement and Bay of Bengal and South Asia ATFM Handbook includes requirements and procedures for internet outage, including manual procedures for contact with ATFMU via telephone, AFTN and fax to allow gateway allocation list to be updated and gateway allocations issued. Fax template will be included in ATFM Users Handbook.</p> <p>5) ATFMU staffing includes provision for technician qualified and trained on all BOBCAT facilities to be on duty during hours of operation of ATFMU.</p> <p>6) Paper trial and ghost operations provide intensive testing of system. Ghost operations allow testing of hardware and networked system under operational conditions.</p>
	<p>Hazard No 4</p>
<p>Description:</p>	<p>Inadequate or inappropriate information entered into the system by users leading to erroneous advisory information.</p>

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Remarks:	BOBCAT would have a large number of users, particularly dispatchers from many airlines, interacting with the system. Potential for the “wrong” information to be entered, leading to consequential erroneous data being promulgated by BOBCAT.
Mitigation:	<ol style="list-style-type: none">1) BOBCAT provides advisory information only; ATS providers retain responsibility for tactical ATS and traffic management.2) Two day BOBCAT Workshop (9 & 10 November 2005) for airline dispatchers and affected ATS officers conducted during ATFM/TF/4 meeting (7 – 11 November 2005).3) Bay of Bengal and South Asia ATFM Handbook includes comprehensive requirements and procedures for users of the system.4) Comprehensive AIP Supplement, including slot submission procedures, published 2 AIRAC cycles prior to commencement of trial.5) Structured training programme for ATFMU staff to ensure recognition of non-normal data configurations, and a “reasonableness” check of slot allocation lists is conducted by ATFMU staff prior to the list being published to users.6) BOBCAT software makes extensive use of simplified menus for user selection of data input, limited choices in each menu for routes, levels etc, no ability for users to vary menus or input data other than what is contained in the menus. Checking algorithms incorporated to test “reasonableness” of submitted Mach Number, elapsed time from departure to waypoint, wheels up time at least equal to ETD plus standard taxi time, unique aircraft registration number check to ensure single slot per airframe.7) BOBCAT Concept of Operations includes provisions for security of user access to BOBCAT. Access only via password to authorized users with written approval from ATFMU manager.8) Computer based training package for BOBCAT operations and interactive web board (i.e. discussion page) will be provided on BOBCAT web site.

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Hazard No 5	
Description:	Unforeseen changes in airspace operational status leads to sudden reduction in airspace capacity.
Remarks:	If the airspace operational status changes without due notification e.g. sudden non-availability of an ATS route, it will take some time before BOBCAT can reschedule slots if the sudden change in status occurs prior to the publication of the nightly slot allocation list. If the change in airspace operational status occurs after the slot allocation list has been published, BOBCAT is unable to assist.
Mitigation:	<p>1) BOBCAT provides advisory information only; ATS providers retain responsibility for tactical ATS and traffic management.</p> <p>2) Sudden changes in operational status that occur prior to the cut off time for the calculation and promulgation of the gateway allocation list can be managed by BOBCAT, e.g. a route that is suddenly not available is removed from the route selections available to users. Users that have already selected the route that is no longer available would be allocated one of their other preferences that did not include this route.</p> <p>3) In contingency circumstances, flight spacing can be redefined on any route or waypoint without requiring re-submission of slot requests.</p> <p>4) Circumstances where the change in operational status occurs after the gateway allocation list has already been promulgated would require ATS providers to tactically manage the situation in accordance with normal ATS contingency plans/procedures.</p>

Hazard No 6	
Description:	Industry does not comply with agreed wheels up and/or gateway fix times leading to congestion and un-flowed traffic sequence.
Remarks:	Non compliance by Industry with published wheels up and/or gateway fix times could lead to schedule conflicts at gateway fixes.
Mitigation:	<p>1) BOBCAT provides advisory information only; ATS providers retain responsibility for tactical ATS and traffic management.</p> <p>2) ICAO PANS ATM (Doc 4444) includes provisions at paragraph 7.8.1 which place responsibility on pilot and operator to ensure that aircraft is ready to taxi in time to meet ATFM requirements.</p> <p>3) Implementation of flow management provided by BOBCAT is as a result of collaborative arrangements between Bay of Bengal ATS providers and IATA, including IATA member airlines. Industry consultation/liaison with/by IATA and ICAO Regional Office provides increased communications and agreement between users and ATS providers.</p> <p>4) Comprehensive AIP Supplement agreed by users and issued by involved States requires compliance by users with gateway slots allocated by BOBCAT.</p> <p>5) ATFMU procedures include analysis capability to identify users that regularly do not comply with ATFM procedures. ATFMU will contact these users to advise of non compliance and ascertain remediation proposed by users.</p> <p>6) Bay of Bengal and South Asia ATFM Handbook includes comprehensive requirements and procedures for users of the system, including provision for exempted aircraft, and coordination activities required in the event of a missed slot. Includes procedures for ANSPs to submit report of non-compliance with BOBCAT procedures for review by BOBCAT oversight authority.</p>

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	7) Two day BOBCAT Workshop (9 & 10 November 2005) for airline dispatchers and affected ATS officers conducted during ATFM/TF/4 meeting (7 – 11 November 2005).
	Hazard No 7
Description:	ATS Units do not comply with agreed wheels up and/or gateway fix times leading to congestion and un-flowed traffic sequence.
Remarks:	Non compliance by ATS Units with published wheels up and/or gateway fix times would lead to schedule conflicts at gateway fixes.
Mitigation:	<p>1) BOBCAT provides advisory information only; ATS providers retain responsibility for tactical ATS and traffic management.</p> <p>2) ICAO PANS ATM (Doc 4444) includes provisions at paragraph 7.8.1 which enable adjustments to be made to sequence of departing aircraft in respect of aircraft subject to ATFM requirements.</p> <p>3) Implementation of flow management provided by BOBCAT is as a result of collaborative arrangements between Bay of Bengal ATS providers and IATA, including IATA member airlines. Industry consultation/liaison with/by IATA and ICAO Regional Office provides increased communications and agreement between users and ATS providers.</p> <p>4) Downstream ATS Units will be required to tactically manage non compliances from upstream ATS Units and submit a report to the ATFMU in accordance with procedures in the ATFM Users Handbook.</p> <p>5) Comprehensive AIP Supplement agreed by users and issued by involved States requires compliance by users with gateway slots allocated by BOBCAT.</p>

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| | <p>6) ATFMU procedures include analysis capability to identify ATS Units that regularly do not comply with ATFM procedures. ATFMU will contact these ATS Units to advise of non compliance and ascertain remediation proposed by ATS Units.</p> <p>7) Bay of Bengal and South Asia ATFM Handbook includes comprehensive requirements and procedures for users of the system, including provision for exempted aircraft, and coordination activities required in the event of a missed slot. Includes procedures for submission of report of non-compliance with BOBCAT procedures for review by BOBCAT oversight authority.</p> <p>8) Two day BOBCAT Workshop (9 & 10 November 2005) for airline dispatchers and affected ATS officers conducted during ATFM/TF/4 meeting (7 – 11 November 2005).</p> |
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RASMAG — TASK LIST

(last updated 8 June, 2006)

ACTION ITEM	DESCRIPTION	TIME FRAME	RESPONSIBLE PARTY	STATUS	REMARKS
1/7	Monitor outcome of FLOS discussions at next RVSM TF meeting and report back to RASMAG.	RASMAG/6	Secretariat	Open	<p>RASMAG/4 WP/7 refers, RVSM TF/28 scheduled April 2006</p> <p>RASMAG/5 WP/8 refers. RVSM/TF/28 held April 2006, unable to reach consensus on alternate FLOS arrangement. Separate body (task force) to be convened by affected States to address this issue.</p>
1/10	In accordance with RASMAG TOR, review regional and global airspace and ATM implementation plans to identify requirements for airspace safety monitoring and assessment activities.	Report Progress to RASMAG/6	Secretariat, All members	Open	Ongoing

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ACTION ITEM	DESCRIPTION	TIME FRAME	RESPONSIBLE PARTY	STATUS	REMARKS
2/3	Prepare and deliver safety workshop for States.	Report Progress to RASMAG/5	Secretariat All members	Open	<p>RASMAG/4 reviewed Seminar held during RASMAG/3 and considered compiling a suitable ATS safety management training aid as the basis for further regional safety management training on video and/or DVD. Feedback requested to Regional Office by 15 December 2005.</p> <p>RASMAG/4 considered outcomes of ATS SMS SIP conducted August 2005 and recommended referral to DGCA/43.</p> <p>RASMAG/5 informed that approval gained for ATS SMS SIP to run in second half of 2006. In addition 2 X ICAO HQ SMS workshops to be conducted at Regional Office in September 2006 and coordination continuing with Hong Kong China for a SMS workshop in first quarter 2007.</p>
2/4	Develop SMA Handbook.	Report Progress to RASMAG/6	Chairman (R. Butcher), United States (L. McCormick), All members Secretariat	Open	<p>RASMAG/4 WP/5 refers. Feedback requested to L. McCormick by 15 December 2005.</p> <p>Work progressing on final draft document.</p>
2/5	Develop guidance on ADS/CPDLC ground system minimum equipment requirements and deployment considerations	Report progress to RASMAG/6	New Zealand (T. Farmer), Japan (Y Nakatsuji, H Matsuda) All members, Secretariat	Open Closed	<p>RASMAG/4 WP/8 refers. Feedback requested to T. Farmer by 15 December 2005.</p> <p>RASMAG/5 WP/10 refers. Guidance material progressing, all parties to review and provide feedback to primary authors by end July 2006. Superseded by RASMAG Action Item 5/4</p>

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ACTION ITEM	DESCRIPTION	TIME FRAME	RESPONSIBLE PARTY	STATUS	REMARKS
3/1	Provide guidance to States in respect of the issues surrounding quantum and application of Target Levels of Safety (TLS).	Report Progress to RASMAG/6	RASMAG members Secretariat	Open	<p>Referred to RMAs for discussion/action.</p> <p>Additional guidance material included in Amendment 44 to Annex 11, effective November 2006.</p>
3/2	Consider funding issues in respect of the provision of multi national infrastructures e.g. safety monitoring services.	Report Progress to RASMAG/6	RASMAG members Secretariat, including Air Transport Officer	Open	<p>APANPIRG C16/2 Funding arrangements for regional airspace safety monitoring</p> <p>That, a study group be convened to develop a feasible and sustainable proposal to equip States to organize and finance necessary safety monitoring mechanisms for the provision of safety services for the international airspaces in the Asia/Pacific region and that States be represented at that meeting by their appropriate legal, financial and organizational experts who would be best equipped and empowered to resolve any difficulties. The study group should report to RASMAG not later than the end of June 2006.</p> <p>3-day study group meeting to be convened during May June 2006.</p> <p>Initial Study Group meeting combined with RASMAG/5. RASMAG/5 developed and circulated draft Working Paper for APANPIRG/17 proposing a way for in accordance with global guidance.</p>

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ACTION ITEM	DESCRIPTION	TIME FRAME	RESPONSIBLE PARTY	STATUS	REMARKS
3/5	RASMAG Chairman to coordinate with Airservices Australia and request that a follow up safety assessment for the South China Sea route structure be completed as soon as possible	Report progress to RASMAG/5	Australia (D. Anderson), Thailand (P. Herabat), Secretariat	Open Closed	RASMAG/4 finalised arrangements for Airservices Australia to conduct one-off safety assessment. Regional Office to coordinate with Airservices and MAAR, data to be collected December 2005. Safety assessment still not completed. Airservices Australia advised RASMAG/5 as a result of a change in organizational priorities, the resources required for this assistance work would need to be re-assessed and it was likely that assistance may not be available in the short term.
4/1	Identify deficiencies based on non provision of safety related data by States and raise recommendation to APANPIRG of States for inclusion on Deficiencies List.	Report to RASMAG/5	RMAs, SMAs	On-going Closed	RASMAG/4 reviewed APANPIRG/16 Conclusion 16/6 — Non Provision of safety related data by States That the Regional Office advise that States not providing safety related data to approved regional safety monitoring agencies, including RMAs, in accordance with the requirements of safety monitoring agencies will be included in the APANPIRG List of Deficiencies in the ATM/AIS/SAR fields. RASMAG/5 noted general good response from States in this respect, however identified 5 States for inclusion on the deficiencies list in accordance with APANPIRG Conclusion 16/6
5/1	Review outcomes of DGCA/06 in respect to implementation of Safety Management Systems and identify any matters within the scope of RASMAG to address.	Report to RASMAG/6	All	Open	

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ACTION ITEM	DESCRIPTION	TIME FRAME	RESPONSIBLE PARTY	STATUS	REMARKS
5/2	Develop a paper that proposes consideration of the matters discussed and agreed by the tripartite meeting of Asia Pacific RMAs and recorded in the RASMAG/4 meeting report.	Report to Global RMA meeting proposed by ALLPIRG/5 Conclusion 5/12	Asia Pacific RMAs	Open	
5/4	Develop guidance on ADS/CPDLC ground system minimum equipment requirements and deployment considerations. Review draft Data Link Guidance Material and provide feedback to primary authors in Japan and New Zealand	Feedback by end July 2006 direct to Japan and New Zealand Report progress to RASMAG/6	New Zealand (T. Farmer), Japan (Y Nakatsuji, H Matsuda) All members, Secretariat	Open	
5/3	Australia to assist with Human Factors input to the data link draft guidance material	Feedback by end July 2006 direct to Japan and New Zealand	Australia	Open	
5/4	Regional Office to coordinate with the Cairo Office of ICAO to establish whether Pakistan should be covered by the MAAR or the MID RMA	Report to RASMAG/6	Regional Office	Open	
5/5	Regional Office to coordinate with the RNP-SEA/TF to ensure inclusion of safety assessment requirements in the Task Force TOR	Report to RASMAG/6	Regional Office	Open	
5/6	States review availability of dedicated ATS SMS Official to assist with the conduct of the Regional Office SMS SIP in last quarter of 2006	Respond to Regional Office by 31 July 2006	States	Open	
5/7	Consider the validity of the Scrutiny Group mechanism adopted by the United States 30/30 Scrutiny Group for application in the WPAC/SCS Area	Review during RASMAG/6	RASMAG/6	Open	

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