

INTERNATIONAL CIVIL AVIATION ORGANIZATION



**REPORT OF THE SEVENTH MEETING OF THE REGIONAL AIRSPACE
SAFETY MONITORING ADVISORY GROUP (RASMAG/7)**

BANGKOK, THAILAND, 4 – 8 JUNE 2007

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/7
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HISTORY OF THE MEETING

1. Introduction

1.1 The Seventh Meeting of the Regional Airspace Safety Monitoring Advisory Group (RASMAG/7) was held in Bangkok, Thailand from 4 to 8 June 2007 at the Kotaite Wing of the ICAO Asia/Pacific Office.

2. Attendance

2.1 The meeting was attended by 28 participants from Australia, Hong Kong China, India, Japan, New Zealand, Republic of Korea, 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, 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 Seventh Meeting of the RASMAG.

4.2 In his opening remarks the Chairman, Mr. Butcher, welcomed participants to the meeting. He thanked the large number of members who he noted had traveled some considerable distance to attend the meeting and thanked them for their enthusiasm in assisting the valuable safety work undertaken by RASMAG. Mr. Butcher informed the meeting of a number of tasks before it, which included consideration of the outcomes of the RASMC/TF in relation to the development of funding methodologies for monitoring activities within the Region. The meeting would hear feedback from the first meeting of the WPAC/SCS RVSM Scrutiny Group that had been established by APANPIRG to address the RVSM operational problems in the WPAC/SCS area. Additionally the meeting was informed of the need to complete work in relation to the data link monitoring guidance material and the need for a detailed review of the reports from the Regional RMAs in relation to RVSM safety assessments.

5. Documentation and Working Language

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

5.2 Twenty-one (21) Working Papers and ten (10) 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 outcomes of RASMC/TF/1
- 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/8 Meeting

Agenda Item 2: Review of outcomes of RASMC/TF/1

2.1 The First meeting of the Regional Airspace Safety Monitoring Committees Task Force (RASMC/TF/1), called for by APANPIRG Decision 17/47 to address regional issues in regard to the funding of safety monitoring activities was held from 13 to 15 February 2007. The meeting recalled that APANPIRG Decision 17/47 stated:

Decision 17/47 – Task Force to establish Regional Airspace Safety Monitoring Committees

That a Task Force be established to develop and distribute to States by 30 June 2007 implementation proposals for the establishment of Regional Airspace Safety Monitoring Committees. The Task Force would work in accordance with the terms of reference (as set by APANPIRG) and use, inter alia, recent ICAO guidance materials in relation to the global approach for the funding of airspace safety monitoring.

2.2 Directors General of Civil Aviation in Asia and Pacific had agreed to an Action Item at their 43rd Conference in December 2006 (Bali, Indonesia) supporting the convening of the Task Force, as follows:

Action Item 43/4 Funding of Safety Monitoring

Recognizing the importance of establishing sustainable approaches to the funding of safety monitoring so that on-going CNS/ATM implementation initiatives in Asia/Pacific will not be delayed and that safety and efficiency will not be compromised, the Conference:

- *Urged the administrations associated with the APANPIRG Task Force on establishment of Regional Airspace Safety Monitoring Committees, to designate, at their earliest possible convenience, appropriately empowered experts to participate in the Task Force.*

2.3 Regrettably, no representatives from China, Fiji or India were present at the RASMC/TF/1 meeting, even though APANPIRG/17 had agreed, on the basis of the size of their airspace and their level of activity in safety monitoring activities, that the RASMC/TF would be composed of designated experts from the following States:

- i. Australia
- ii. China
- iii. Fiji
- iv. India
- v. Japan
- vi. New Zealand
- vii. Republic of Korea
- viii. Singapore
- ix. Thailand
- x. United States of America

2.4 The meeting recalled that, in addressing the concerns of both the United States and Japan, APANPIRG/17 had formulated the following Conclusion:

Conclusion 17/48 – Funding of Pacific RMA & CRA

In recognizing that the United States/FAA was the current service provider of CRA and RMA services for the Pacific Region (with the exception of CRA services for Japan), it was acknowledged that:

- a) *FAA would remain the interim service provider for the Pacific Region until more formal arrangements have been made, and*
- b) *Pacific States using these FAA services commit to reimburse the FAA for those CRA and RMA services rendered effective 30 June 2007.*

Note: The FAA will be formally notifying each of these individual states that if reimbursement agreements are not in place by 30 June 2007, these services are at risk of being suspended.

2.5 The RASMC/TF/1 meeting recognized that although the amount of funds required to support all of the required safety monitoring activities in Asia and Pacific was relatively modest, the RASMC Task Force had been established to address a very important challenge – to ensure that safety was maintained in the provision of ATS within airspaces. The Secretariat drew particular attention to Amendment 43 to Annex 11 requiring that any significant safety-related change to the ATC system,

including implementation of a reduced separation minimum or a new procedure, shall only be effected after a safety assessment has demonstrated that an acceptable level of safety will be met and users have been consulted.

2.6 The Secretariat observed during RASMC/TF/1 that a great deal of progress in safety monitoring had been achieved as a result of the good work of APANPIRG and RASMAG and the generosity of those States which had voluntarily provided safety monitoring services on a regional basis. However attention was drawn to the remaining challenges, including the need to establish sustainable and equitable approaches to funding safety monitoring.

2.7 The RASMC/TF/1 meeting was informed that APANPIRG/16 had 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. The Secretariat explained that work on the subject had been overtaken by events when the Council of ICAO took note of difficulties in sustaining safety monitoring activities in other ICAO Regions and referred the matter to ALLPIRG/5 and the Sixth Meeting of the Air Navigation Services Economics Panel (ANSEP/6). The outcome of the deliberations of these bodies was that a global approach was developed based on the designation of Regional Monitoring Agencies (RMA) activities as multinational facilities/services. The Secretariat explained that, following acceptance of this approach by the Council of ICAO, a sound foundation now existed for the development of Regional Safety Monitoring Agencies.

2.8 Given the support from APANPIRG/17 and the DGCAs (43rd Conference, December 2006) the Secretariat expressed optimism that the RASMC/TF now would be equipped to achieve the outcomes expected by APANPIRG and the DGCAs and requested that, in addressing its terms of reference, RASMC/TF/1 reflect on the following points:

- a) the importance of safety monitoring in order to ensure that on-going CNS/ATM implementation initiatives in Asia/Pacific will not be delayed and that safety and efficiency will not be compromised;
- b) the experience that voluntary funding mechanisms currently relied upon regionally to provide for safety monitoring are not sustainable;
- c) the directive from the President of the ICAO Council to all ICAO Regional Directors recommending that RMAs be implemented as multinational (ICAO) air navigation facilities/service in accordance with a step-by-step procedure; and
- d) the requirement for the Task Force to develop and distribute to States by 30 June 2007 implementation proposals for the establishment of Regional Airspace Safety Monitoring Committees.

2.9 The RASMC/TF/1 meeting gave thorough consideration to the steps that would be required to designate CRA and SMA services as multinational facilities/services in accordance with the guidance provided in the FASID and in accordance with the recent ICAO 'Step-by-Step' guidance, while at the same time the broader implications for the Asia and Pacific Region were assessed. It was readily apparent to the meeting that the complexities of Asia and Pacific in terms of the number of States involved, their varying circumstances, the size and characteristics of the airspaces involved, and the way in which safety monitoring requirements had evolved presented issues that would take time to resolve by expertise not available to the Task Force.

2.10 The RASMC/TF/1 meeting recognized that it did not possess the legal expertise to understand fully what was required to implement such arrangements but appreciated that the process of including a regional safety monitoring arrangement in the regional air navigation plan as a multinational facility/service was a desirable outcome. Nevertheless, concerns were expressed about preserving existing, functioning safety monitoring activities pending resolution of the issues that would need to be attended to in the complex circumstances in Asia and Pacific Region prior to reaching broad commitment amongst the States to the concept of a multinational facility/service.

2.11 With the guidance of the meeting the United States drafted a “Memorandum of Agreement” that was intended to be reached between the FAA and participating States for the purpose of funding the Pacific Approvals Registry and Monitoring Organization (PARMO). The Draft Agreement was viewed by RASMC/TF/1 as a constructive development and it was agreed that the United States should work with affected States to prepare and implement cost sharing agreements for the provision of RMA and SMA safety monitoring services between themselves on this basis. Accordingly the meeting proposed the following action:

RASMC/TF – Action 1 – Prepare and Implement Cost Sharing Agreements for RMA & SMA

The United States together with Australia, Fiji, France, Japan, New Zealand, Papua New Guinea, and the Republic of Korea prepare and implement cost sharing agreements for the provision of RMA and SMA safety monitoring services between the United States, on the one hand, and Australia, Fiji, France, Japan, New Zealand, Papua New Guinea, and the Republic of Korea on the other hand. This Action is to be completed by 30 June 2007.

2.12 The meeting also saw merit in applying this approach elsewhere in the Asia and Pacific Region and requested that the United States develop and provide a generic version of the agreement developed for PARMO and in the light of all of the inputs by the States concerned and their respective technical, legal, financial and other experts. Accordingly the meeting proposed a second action that:

RASMC/TF – Action 2 – Develop and Provide a Generic Agreement

Based on the outcome of RASMC/TF – Action 1 above, the United States develop and provide a generic copy of a cost sharing agreement for the provision of safety monitoring services to RASMAG for promulgation as text for model agreement and that this generic agreement be made available to RASMAG/7 in June 2007.

2.13 RASMC/TF/1 also realized that varying arrangements exist in the States of Asia and Pacific in so far as making payments to other States and, in particular, to private or commercialized entities for provision of services. It was observed that a third party, the ICAO Technical Cooperation Programme, had been relied upon in the role of a financial administrator in the case of establishing the Middle East RMA. Accordingly, the meeting requested that the Secretariat investigate the options, as follows:

RASMC/TF – Action 3 – Investigate Options for Payments via Third Parties

The Secretariat investigates options for States to use a third party to effect payments, for example, to use ICAO Technical Cooperation or IATA, and to report its findings to RASMAG/7 in June 2007.

2.14 The RASMC/TF/1 meeting recognized that the Boeing CRA provided services very widely in the region, including the Pacific area (excluding Fukuoka FIR) and the areas under the jurisdiction of the FANS Implementation Team for the Bay of Bengal (FIT-BOB) which stretched from Indonesian FIRs to the Arabian Sea and into the airspaces of Oman and Yemen. Additionally, Boeing had indicated a preparedness to expand their CRA capability into the wider Indian Ocean as datalink operations were implemented in this area.

2.15 However, Boeing had previously indicated their inability to administratively manage a large number of individual agreements and therefore required a collective approach of some kind. The meeting requested that the FAA investigate whether it was possible for the FAA to act as the administrator on behalf of a large number of States in the CRA arrangements with Boeing. The intention was that FAA, in an administrator role, would take responsibility for a number of multilateral and bilateral arrangements with States perhaps including, for example, India, Indonesia, Malaysia, Maldives, Myanmar, Papua New Guinea, Republic of Korea, Sri Lanka, and Thailand as well as the States in the Pacific Area, and enter a limited number of agreements with Boeing for CRA services. As part of the administrator role, the FAA would receive payments from States and relay them to Boeing for the provision of CRA services. The FAA would study the proposal, as follows:

RASMC/TF – Action 4 – Facilitate Support for the CRA Service

The United States request the Federal Aviation Administration to investigate whether it could facilitate, collect and consolidate fees on behalf of all participating States of the Asia Pacific Region to support the CRA service provided by Boeing, and for the United States to report on the matter to RASMAG/7 prior to June 2007.

2.16 RASMC/TF/1 believed that the generic approach to funding RMA and SMA services called for in RASMC/TF – Action 2 also would be applicable in the case of CRA services and it was recommended that affected States should work together to prepare and implement cost sharing agreements for the provision of CRA safety monitoring services by 30 June 2007, as follows:

RASMC/TF – Action 5 – Prepare and Implement Cost Sharing Agreements for CRA

By 30 June 2007, the Australia, Fiji, France, New Zealand and the United States prepare and implement cost sharing agreements for the provision of CRA safety monitoring services between the United States, on the one hand, and Australia, Fiji, France, and New Zealand on the other.

2.17 RASMC/TF/1 revisited its Terms of Reference and recognized that APANPIRG Decision 17/47 establishing the RASMC/TF had specifically provided that the RASMC/TF develop and circulate, by 30 June 2007, implementation proposals for Regional Airspace Safety Monitoring Committees (RASMCs). While recognizing that these entities were intended to be established according to the thoroughly considered guidance provided by the Council of ICAO, it also was appreciated that the formal implementation of RASMCs was, at best, some time away. The regional complexities that had been discussed during the meeting and which had proved to be obstacles to progress so far would need to be addressed progressively over time in order to provide the necessary degree of confidence, understanding and commitment amongst the participating States. It also was believed that the arrangements that had been proposed by the Task Force would ensure that current arrangements are strengthened and that these would provide stepping stones to the eventual formation of multinational facilities/services. Accordingly, the RASMC/TF could not adequately further address the terms of reference established by APANPIRG, particularly in terms of the 30 June 2007 requirement.

2.18 Noting that APANPIRG had established RASMAG as a permanent advisory group to assist States, the RASMC/TF/1 meeting considered that many of the items in the RASMC/TF terms of reference could be equally well addressed by RASMAG over the longer term. In this context, the meeting drafted amendments to the RASMAG terms of reference that included the residual responsibilities of the RASMC/TF, for consideration by RASMAG.

2.19 Additionally, RASMC/TF/1 considered that the existing Task List of the RASMC/TF could also be fully managed by RASMAG and requested that the Secretariat also bring the RASMC Task List to the attention of RASMAG. The RASMC/TF meeting agreed that as the residual responsibilities and Task List of the RASMC Task Force had been assigned to RASMAG, the RASMC Task Force should be dissolved and drafted the following Decision for consideration by APANPIRG:

Draft Decision RASMC/TF - 1 – Dissolution of RASMC Task Force

That, noting the regional complexities in implementing RASMCs and considering that the implementation of bilateral and multilateral agreements for the funding of safety monitoring presented the most effective short term option, the RASMC Task Force be dissolved and outstanding matters including responsibility for determining long term options for the funding of safety monitoring be assigned to RASMAG.

2.20 The RASMC/TF believed that it was important that financial, legal and administrative experts participate in the activities of RASMAG and requested that the Secretariat include an invitation for States to include representatives with these skill sets in their delegations at meetings of RASMAG when it was expected that substantive financial, legal and administrative issues will be under discussion.

2.21 However, in previous discussions about the slow progress in this matter, RASMAG/6 (November 2006) had recalled the many complexities that had been experienced thus far. In particular, although attempts had been made to ensure the attendance of appropriate State legal, financial and organizational experts at the Study Group called for under Conclusion 16/2, actual attendance of these experts had not eventuated. This had left RASMAG with the *de facto* responsibility to progress the matter, although funding issues were clearly outside the Terms of Reference of RASMAG and the experts routinely attending RASMAG were technical experts rather than financial or legal experts. As such RASMAG/6 had considered that the ability of RASMAG to continue to progress this matter was exhausted as the requisite legal and financial skill sets were not available amongst RASMAG delegates.

2.22 In summarizing the work of the RASMC/TF/1, it was noted that although the meeting had encountered an inability to address the primary purpose of the Task Force, that of the development of implementation proposals for Regional Airspace Safety Monitoring Committees, valuable progress had been made nonetheless. The local complexities of the various sub-areas of the Asia/Pacific region and the manner in which safety monitoring had developed in response to ‘ad-hoc’ implementation of enhanced ATM/CNS systems had meant that the ‘Step-by-Step’ approach to RMA funding advocated by ICAO was not immediately suitable for wide implementation and it was evident that the eventual attainment of this goal would require significant additional work over a long period of time.

2.23 Notwithstanding, RASMC/TF/1 considered that the approach adopted by the Task Force in drafting a formal administrative agreement for use as either a multilateral or bilateral agreement between States would address the immediate difficulties in the Pacific area and ensure the continuation of safety monitoring services that were presently under threat. The agreement had been drafted with the ICAO recommended ‘Step-by-Step’ procedure in mind and therefore was considered to be consistent with the steps described in the ICAO guidance material. Additionally, many of the provisions in the FASID, Guidelines on the Establishment of a Multinational ICAO Air Navigation Facility/Service had been incorporated into the Draft Administrative Agreement. Consequently, the draft agreement could serve as an operating model for adaptation by other States regionally.

Update from United States

2.24 The United States highlighted to RASMAG/7 that, as a provider of both Central Reporting Agency (CRA) and Regional Monitoring Agency (RMA) services throughout the Pacific, the FAA funds approximately \$80,000 USD annually for the provision of CRA services in the Pacific to assist the respective States to resolve operational and technical problems related to the Future Air Navigation System (FANS) data-link system and to monitor the performance of the FANS data-link system. The FAA also funds approximately \$45,000 USD annually for the provision of RMA services in the Pacific to assist in comparing actual performance against safety goals related to continued safe use of RVSM in the Pacific and North East Asia airspace.

2.25 In support of ICAO's global push to establish appropriate cost sharing mechanisms for these types of services, the FAA presented information during RASMC/TF/1 outlining its desire to establish an equitable cost sharing and recovery mechanism for the CRA and RMA services the FAA provides in the Pacific and North East Asia airspace. The FAA determined that, to support the recovery of costs incurred in the provision of CRA and RMA services, it would have to establish appropriate bilateral agreements with each respective State. Thus the FAA was assigned many of the action items from RASMC/TF/1, as described above.

2.26 Immediately following RASMC/TF/1 the FAA completed an internal analysis of the scope and effort required to draft, negotiate, sign and implement new bilateral agreements with all associated CRA and RMA States. This analysis included a determination of the types and numbers of agreements required, the human resources required to draft each agreement and complete all internal FAA and U.S. Government review and approvals, and to coordinate approval of each agreement with the respective States.

2.27 In summary terms, the FAA would have to establish up to five (5) new bilateral agreements for the CRA services and another six (6) for the RMA services, a total of eleven (11) potential new agreements. In many of these cases, the FAA would also have to create a more general Memorandum of Agreement (MOA) between the FAA and subject aviation authority to provide the foundation for the proposed cooperation on CRA and/or RMA services. This would require more senior government approvals within both the United States and Asia Pacific State and add significantly more time and resource expenditure to the already cumbersome process.

2.28 This FAA analysis determined that the amount of internal resources required to complete the aforementioned bilateral agreements to establish cost sharing of CRA and RMA services would be significantly higher than the approximately \$40,000 USD that would be collected annually for the CRA services and \$14,000 USD that would be collected annually for the RMA services. The FAA was also aware that several States in the Pacific have stated their intentions to provide safety monitoring services within their respective flight information regions (FIRs) in the near future and did not see any benefits from engaging with these States on cost sharing negotiations at this time.

2.29 Therefore, in relation to the provision of CRA services in the Pacific, the FAA has fully analyzed the business case associated with establishing "monetary" cost sharing bilateral agreements with all CRA partner States, and has decided to continue completely funding the provision of CRA services for the foreseeable future and thus not pursue any cost sharing agreements.

2.30 Similarly, in relation to the provision of RMA services in the Pacific, the FAA has fully analyzed the business case associated with establishing "monetary" cost sharing bilateral agreements with all RMA partner States, and has decided to continue completely funding the provision of RMA services for the foreseeable future and thus not pursue any cost sharing agreements.

2.31 However, the FAA requires active assistance from the affected States to properly and efficiently provide the RMA services, and thus the FAA intends to aggressively establish “non-monetary” bilateral agreements outlining requirements for the timely provision of the data that the FAA requires to adequately provide safety assessment in the respective FIRs. The FAA will proceed to establish new bilateral agreements with affected States (Australia, Fiji, France, Japan, New Zealand, Papua New Guinea, and the Republic of Korea), focusing on requirements for States to commit to timely submission of data and flight information in exchange for the FAA’s management of PARMO activities and the provision of RMA services in their respective FIRs.

2.32 Notwithstanding, the FAA would continue to provide strong support to ICAO, both in the Asia Pacific region and globally, to establish equitable cost sharing mechanisms requiring affected States to meet their fair share of the overall costs for providing CRA and RMA type services. The FAA also strongly supported the establishment of a process which would review the qualifications of potential providers of safety monitoring services and credential those organizations which satisfy objective criteria developed as part of the process. The FAA remained committed to support ICAO in these endeavors through the RASMAG and other appropriate regional bodies.

Progress on RASMC/TF/1 Action Items

2.33 Based on the decisions taken by the United States, as described above, the meeting agreed that the RASMC/TF/1 Action Items be considered as follows:

Action 1, Action 4 and Action Item 5 – Prepare and Implement Cost Sharing Agreements

As the FAA has decided not to pursue cost sharing agreements for the provision of CRA and RMA services in the Pacific, these action items are no longer applicable and should be closed.

Action 2 – Develop and Provide a Generic Agreement

As the FAA will not be pursuing cost sharing agreements for CRA and RMA services in the Pacific, it will not be able to develop and provide a generic agreement detailing a “monetary” cost-sharing situation. However, the FAA will be able to provide a generic agreement related to the “non-monetary” data sharing agreement that it already has in place with Canada and Mexico, and will be establishing with Pacific RMA affected States.

2.34 In respect to Action Item 3 - Investigate Options for Payments to Third Parties, in response to an approach from the Regional Office IATA had advised that they were unable to facilitate the payment of each State’s CRA funding obligations to FAA by either assisting in the collection of such charges from airlines and/or the diversion of such funds to the FAA on behalf of the States concerned.

2.35 However, the ICAO Technical Cooperation Bureau advised that they would be able to assist with this situation under similar terms and arrangements to those currently in place to support the MID RMA in the Middle East region of ICAO.

Agenda Item 3: Funding of Regional Safety Monitoring Activities

3.1 The meeting expressed its strong appreciation for the ongoing support of both the United States and Thailand in continuing to provide RMA and additional safety monitoring services on behalf of many States regionally. However, the United States and Thailand, as well as the Australian RMA, expressed concerns in relation to pending provisions for long term RVSM monitoring which were expected to increase the responsibilities and commitments of RMAs globally. Associated increases in RMA resources, with additional costs, would be necessary to meet the global long term monitoring provisions. As this would throw additional financial pressures on to existing voluntary arrangements, all regional RMA providers would have to seriously reconsider their position in continuing to absorb the costs of providing such services on behalf of others.

3.2 It was clearly necessary to continue the work in establishing robust and sustainable funding mechanisms for regional safety monitoring services. In this context, the meeting recognised that an approach using a series of bilateral agreements between States, as adopted by the RASMC/TF, had been shown by the analysis undertaken by the United States to be cost prohibitive.

3.3 It was also evident that an important ingredient had been missing from the regional discussions on this matter, that of appropriate financial and legal experts who were empowered to make decisions in this respect. Despite full support from APANPIRG and the Conference of Asia/Pacific Directors General, both RASMAG and the RASMC/TF had suffered with inadequate representation from appropriate financial and legal experts to progress the complex matters under discussion. Without representatives with the appropriate skill-set it would not be possible to make any progress in these issues.

3.4 Although the decision by RASMC/TF/1 to request dissolution on the basis that RASMAG could undertake the work of the Task Force was understandable at the time, the subsequent inability to proceed in the direction of multiple bilateral agreements that had been adopted by the RASMC/TF meant that little progress had been made. Additionally, having RASMAG adopt the expanded terms of reference and task list of the RASMC/TF as proposed by RASMC/TF/1 meant that RASMAG would bear full responsibility for progressing the regional funding issues.

3.5 RASMAG considered that it was inappropriate for it to accept these additional responsibilities as it would detract from the primary technical functions of the group and, in any event, RASMAG had done most of the current work on this issue in the Asia/Pacific region and had reached an impasse due to the lack of financial/legal skill-set. Both RASMAG and RASMC/TF had been consistently unsuccessful in previous attempts to attract State officials from these disciplines to the meetings and considered that this would continue to be the case. Regrettably, RASMAG considered that efforts would need to continue at Director General level to progress this issue and that it would be best managed by a dedicated body such as the RASMC/TF to provide the necessary focus.

3.6 However, the meeting considered that some of the proposed amendments to the RASMAG TORs that had come forward from the RASMC/TF would enhance the functions of RASMAG, and agreed to recommend to APANPIRG that the TORs at **Appendix C** be adopted as the revised TORs for RASMAG. As some of the TORs of the RASMC/TF had been accepted by RASMAG, this resulted in abbreviated TORs for the RASMC/TF (**Appendix D** refers) which would also be presented to APANPIRG for endorsement. The meeting considered that the reduced TORs for the RASMC/TF narrowed the focus of the Task Force and would assist in enabling it to move forward.

3.7 In order to bring the proposals for amendment to the terms of reference of RASMAG and the RASMC/TF to the attention of APANPIRG/18 for consideration, the meeting drafted the following Decisions:

Draft Decision RASMAG7/1

That the revised Term of Reference for the Regional Airspace Safety Monitoring Advisory Group (RASMAG) provided in Appendix X of the APANPIRG/18 Report on Agenda Item 2.1 be adopted.

Draft Decision RASMAG7/2

That the revised Term of Reference for the Regional Airspace Safety Monitoring Committees Task Force (RASMC/TF) provided in Appendix XX of the APANPIRG/18 Report on Agenda Item 2.1 be adopted.

3.8 The meeting recalled that as a result of its technical focus, as opposed to legal/financial focus, RASMAG had previously struggled with making any progress in the funding matters, leading to the preparation by RASMAG/5 of the comprehensive submission to APANPIRG/17 that had resulted in the formation of the RASMC/TF. To simply dissolve the RASMC/TF and return its responsibilities to RASMAG would likely result in the same position already experienced by RASMAG/5 a year ago. As such, the meeting did not support the draft decision for dissolution prepared by the RASMC/TF (paragraph 2.19 refers). Equally, the meeting recognised that without appropriate legal and financial representation from both States and ICAO the RASMC/TF could not make progress either and noted that the timeline of 30 June 2007 imposed by APANPIRG on the RASMC/TF had not enabled RASMC/TF to undertake investigations of any depth.

3.9 The meeting acknowledged that the matters under consideration were extremely complex and had defied any real solution for some years. However, the pending implementation of provisions for long term RVSM monitoring meant that a long term solution had to be found that relieved the few benevolent States from carrying financial as well as technical responsibility for other States, whilst ensuring that adequate and timely safety monitoring continued to be carried out.

3.10 The decision by the United States to continue to completely fund RMA and CRA services in the Pacific had overcome the immediate threat to the provisions of these services and meant that the RASMC/TF had more time to identify a sustainable long term solution. The meeting requested that the Secretariat again present the issues, as originally described in the submission from RASMAG/5 to APANPIRG/17 (**Appendix E** refers), for the attention of APANPIRG/18 via the ATM/AIS/SAR Sub Group, highlighting strongly that participation of State and ICAO legal and financial experts was essential and recommending that the RASMC/TF be tasked to fulfil its original objective, albeit over a longer period of time.

Lack of Funding for CRA Services in Bay of Bengal

3.11 The FIT-BOB/8 meeting (22-23 January 2007) considered a number of matters related to the implementation of FANS 1/A datalink in the Bay of Bengal and Arabian Sea areas and expanded the scope of the FIT-BOB to include both the Indonesian FIRs (Jakarta FIR and Ujung Pandang FIR) as well as the areas or responsibility of the informal Arabian Sea Indian Ocean ATS Coordination Group (ASIOACG).

3.12 FITBOB/7 (July 2006) had noted that although the ADS/CPDLC operational trial in the Bay of Bengal had commenced in February 2004, as a result of the complexities involved in providing funding there were still no CRA services available. Additional ADS/CPDLC trials would commence in the Arabian Sea in early 2007. The lack of CRA services meant that complex problem reports had been unable to be analyzed and the technical parameters of the data link operations had been unable to be verified. As the CRA analysis and ongoing CRA monitoring capability was not available to the Bay of Bengal trial, the safety assessment could not be completed and ongoing performance monitoring of

datalink performance could not take place. Consequently, the implementation of either CPDLC or ADS could not be authorized and no progress could be made beyond the current trial operations.

3.13 The funding proposals for the BOB CRA involved arrangements under which IATA would collect a levy from affected flights on behalf of the States concerned and then pay the Boeing CRA to provide the monitoring services. Significant complexities had arisen in reaching agreements on the contractual obligation of the parties involved and this led to long delays in implementing any arrangements. Recent progress had been made with the Government of India agreeing to such proposals and it was anticipated that both IATA and Boeing CRA would enter contractual arrangements over the next few months.

3.14 RASMAG recognized that the lack of adequate funding arrangements to provide safety monitoring services via a CRA had resulted directly in the inability to advance the datalink trials in the Bay of Bengal and Arabian Sea areas, with the delay already exceeding three and a half years in the case of the Bay of Bengal trial.

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

Plain Language definition of Large Height Deviation (LHD)

4.1 Attention was drawn to the experiences of the WPAC/SCS RSG/1 meeting (as described in Agenda Item 6) and their request to RASMAG to develop a user friendly plain language definition of LHD. The meeting noted that there were a number of States experiencing difficulties in verifying and concluding whether an observed incident would count as a LHD in the RVSM airspace.

4.2 Based on, amongst others, the *Guidance Material on the Implementation of a 300 M (1,000 ft) Vertical Separation Minimum (VSM) between FL290 and FL410 Inclusive for Application in the Airspace of the Asia Pacific Region* and discussions during the meeting, RASMAG adopted the following plain language definition of a Large Height Deviation for regional promulgation:

A RVSM large height deviation (LHD) is defined as any vertical deviation of 90 metres/300 feet or more from the flight level expected to be occupied by the flight

4.3 The meeting also agreed to promulgate the following guidance (see below) to support the plain language definition of a LHD. In this respect, the Secretariat will prepare appropriate information papers for the relevant ICAO ATM meetings.

4.4 The causes of a LHD occurrence include:

- Operational errors (aircraft operating at a flight level other than the assigned flight level due to ATC/Pilot loop errors and incorrect clearance), which are categorized into three causes:
 - Flight crew not following the correct ATC clearance
 - ATC issuing an incorrect ATC clearance
 - Receiving ATC unit unable to apply the separation standards during a transfer of control responsibility between two ATC units.
- Aircraft contingency events occurring in situation where the pilot cannot initially follow normal contingency procedures and is forced to climb/descend through flight levels before diverting from track,

- Deviation due to the effect of high level meteorological conditions, and/or
- Deviation due to Traffic Collision Avoidance System (TCAS) advisories, which includes:
 - Flight crew correctly following the TCAS Resolution Advisory (RA), [see note below],
 - Flight crew incorrectly following the TCAS RA, and
 - Any vertical displacement not conforming to the resolution advisory.

Note: The meeting stressed that it was important to note that a LHD resulting from actions complying with a TCAS RA would not reflect risk in the RVSM airspace since it is a proper remedial action of flight crew to prevent a possible mid-air collision between aircraft. Nonetheless, it was strongly recommended that all LHD occurrences related to TCAS resolution advisory be reported to the responsible RMA for detailed airspace safety analyses.

Categorization of LHD in RVSM Safety Monitoring Reports

4.5 The meeting recognized that in order to be consistent with the plain language LHD definition and associated guidance listing possible causes of LHD occurrences adopted by RASMAG (see above), revisions to the existing LHD categorizations applied by regional RMAs were necessary. Accordingly, the meeting adopted the revised LHD categorizations described in Table 1 below for immediate implementation by all RMAs serving the Asia/Pacific region.

Code	RVSM Operations Large Height Deviation Categorization
Operational Errors	
A	flight crew failing to climb/descend the aircraft as cleared;
B	flight crew climbing/descending without ATC clearance;
C	Incorrect operation or interpretation of airborne equipment (e.g. incorrect operation of fully functional FMS, incorrect transcription of ATC clearance or re-clearance, flight plan followed rather than ATC clearance, original clearance followed instead of re-clearances etc);
D	ATC system loop error; (e.g. ATC issues incorrect clearance or flight crew misunderstands clearance message);
E	coordination errors in the ATC-to-ATC transfer of control responsibility as a result of human factors issues (e.g. late or non-existent coordination, incorrect time estimate/actual, flight level, ATS route etc not in accordance with agreed parameters);
F	coordination errors in the ATC-to-ATC transfer of control responsibility as a result of equipment outage or technical issues;
Aircraft Contingency Events	
G	aircraft contingency event leading to sudden inability to maintain assigned flight level (e.g. pressurization failure, engine failure);

H	airborne equipment failure leading to unintentional or undetected change of flight level (e.g. altimetry errors);
Deviation due to Meteorological Condition	
I	turbulence or other weather related causes;
Deviation due to TCAS RA	
J	TCAS resolution advisory; flight crew correctly following the resolution advisory; <i>Note: LHD resulting from actions complying with a TCAS RA would not reflect risk in the RVSM airspace since it is a proper remedial action of flight crew. Nonetheless, it is strongly recommended that all LHD occurrences related to TCAS resolution advisory be reported to the responsible RMA for detailed airspace safety analysis.</i>
K	TCAS resolution advisory; flight crew incorrectly following the resolution advisory
Others	
L	An aircraft being provided with RVSM separation is not RVSM approved (e.g. flight plan indicating RVSM approval but aircraft not approved, ATC misinterpretation of flight plan)
M	Other

Table 1: Revised LHD Categorizations

4.6 The meeting requested that the Secretariat make information comprising the plain language LHD definition, guidance notes about the possible causes of LHD and the LHD Categorization table widely available to States.

Guidance Material for Data Link Ground Equipment Procurement and Implementation

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

4.8 The meeting recalled that the drafting of *Guidance Material for the Asia/Pacific Region ADS/CPDLC/AIDC Ground Systems Procurement and Implementation* had continued since RASMAG/5 (June 2006), with a number of editorial corrections and enhancements being made. Subsequently the draft material had been presented to the 10th meeting of the CNS/MET Sub-group (July 2006, Bangkok) FIT-SEA/5 (January 2007), FIT-BOB/8 (January 2007) and ISPACG/21 (March 2007) meetings for review and feedback.

4.9 The meeting noted that as the Regional Office was unable to attend the IPACG/26 meeting in May 2007, opportunity had not been taken for review by IPACG. Notwithstanding, as one of the primary authors of the guidance material was from Japan and the other regional FIT groups have had the opportunity to review the material, the Secretariat considered that there was little to be gained by waiting for a further opportunity to present the material to IPACG.

4.10 The meeting reviewed the final draft of *Guidance Material for the Asia/Pacific Region ADS/CPDLC/AIDC Ground Systems Procurement and Implementation* (**Appendix F** refers) and agreed to submit the material to the ATM/AIS/SAR Sub-Group and CNS/MET Sub-Group during July 2007 for review, with a request that the material be presented to APANPIRG/18 (September 2007) for adoption as regional guidance material. The meeting thanked the primary authors in Japan and New Zealand for their work in preparing this guidance material and drafted the following conclusion:

Draft Conclusion RASMAG7/3 – Guidance Material for End-to-End Safety and Performance Monitoring of Air Traffic Service (ATS) Data Link Systems in the Asia/Pacific Region

That the *Guidance Material for the Asia/Pacific Region ADS/CPDLC/AIDC Ground Systems Procurement and Implementation* as shown in Appendix XX to the APANPIRG/18 Report on Agenda Item 2.1, be adopted and circulated as regional guidance material, in accordance with established procedures.

Amendments to GM for the End-to-End Safety and Performance Monitoring

4.11 The meeting reviewed a working paper presented by Airservices Australia at ISPACG/21, in March 2007 showing the results of some AIDC datalink performance monitoring and outlining some suggested amendments and improvements to the regional *Guidance Material for End-to-End Safety and Performance Monitoring of ATS Datalink Systems in the Asia/Pacific Region*.

4.12 Three main points emerged:

- a) Paragraph 4.2 of the guidance material states that a Logical Reject Messages (LRM) indicates unsuccessful delivery. This is incorrect: an LRM indicates that the message was successfully delivered to the receiving ATSU and examined by the ATS application, but that the ATS application could not process the message for some reason.
- b) The trip times for messages differ significantly between one pair of ATSUs and another. An ATSU should therefore carry out performance monitoring separately for each ATSU with which it conducts AIDC.
- c) It may not always be possible to measure return trip times, but measuring one-way trip times can be simply done – for both directions – from time-stamps in the AIDC message and the associated LAM or LRM.

4.13 Accordingly, the meeting adopted an amendment to the Guidance Material, as shown in **Appendix G**, in order to take these points into account and incorporate minor editorial improvements. The Secretariat would make the appropriate update to the Guidance Material and display it on the Regional Office web site.

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

Completion of Horizontal Safety Assessment for South China Sea

5.1 The meeting recalled that although the South China Sea parallel route structure had been implemented in November 2001, no updated horizontal safety assessment had been undertaken in the five and a half years since implementation. Additionally, data used in the implementation safety assessment had necessarily been based on the “old” route structure; as such no horizontal safety assessment had been made based on data from the “new” route structure.

5.2 To urgently address the lack of current horizontal safety assessment for the South China Sea route structure, APANPIRG had adopted Conclusion 17/6 urging concerned States to complete, by 30 June 2007, a horizontal safety assessment in accordance with ICAO ATS safety management provisions.

5.3 Recognizing the urgency of the situation, Thailand reported to RASMAG/6 (Nov 2006) that they had taken a decision to offer their full commitment in providing appropriate staffing and resources to MAAR in order to satisfy this additional task in accordance with the requirements of Conclusion 17/6. RASMAG/6 supported the initiatives of Thailand and encouraged MAAR to proceed in accordance with the proposal as presented to the meeting, thanking Thailand for their continued support.

5.4 MAAR presented a copy of the completed *Safety Assessment for the South China Sea Airspace where a 60NM Lateral Separation Minimum is applied* (**Appendix H** refers). The safety assessment utilized the standard collision risk model applicable to these circumstances and adopted a Sequential Sampling Procedure in order to provide an outcome by way of a Probability Ratio Sequential Test. The safety assessment took into account that there had not been any report of Gross Navigational Error (GNE) during the previous 2 year period and that there had been a total of 108,337 flight movements from the four designated monitoring areas, these being DULOP-DUMOL, AKOTA-AVMUP, LULBU-LEGED, and MELAS-MABLI.

5.5 As a result of the aggregate total flight movements being below the minimum movement’s threshold to provide a clear outcome, the Probability Ratio Sequential Test was inconclusive, indicating that the Test should be continued. However, as the difficulty was simply one of insufficient traffic numbers data to drive the test, inclusion of sufficient flight movement data would provide a clear outcome. Of significance was the fact that no GNEs had been reported in the 2 year sample being used and there was no likely reason for this stable situation to change in the future. In simple terms, it would be necessary for substantial numbers of GNEs to occur (i.e. more than 20) to cause a negative outcome to the Test.

5.6 Accordingly, the meeting agreed that the situation was stable and that there was no evidence to justify any concern. The inclusion of flight movements from GNE reports during 2007 would provide sufficient traffic numbers to pass the minimum movements’ threshold and would push the Probability Ration Sequential Test into the “Route System meets Target Level of Safety” area. In this context, the meeting agreed that safety assessment should be repeated within about 18 months to formally demonstrate that the TLS was being met, and then again periodically or when a significant change was likely to impact the traffic volume and/or disposition. In the interim, the present GNE monitoring arrangements being managed by Hong Kong China, Philippines and Singapore should be continued to ensure data was available.

5.7 The availability of an up to date safety assessment adequately addressed one of the long term concerns of the RASMAG and provided evidence to positively address Conclusion 17/6. RASMAG requested that the Secretariat pass recommendation from RASMAG to APANPIRG that Conclusion 17/6 be considered as 'Completed'.

5.8 The meeting, on behalf of the States concerned, gave comprehensive thanks to Thailand for being prepared to absorb the costs in training for and undertaking this work, and demonstrating via an Annex 11 compliant process that there was no real reason for concern in respect to the safety of horizontal operations. The meeting hoped that Thailand would also be in a position to conduct a further periodic safety assessment of this nature in about 18 months time.

Report of MAAR's RMA activities

Bay of Bengal

5.9 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 2006 and the most recent rolling 12 months of Large Height Deviation (LHD) reports between January 2006 to April 2007 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.

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

- Total of 13 LHD occurred in the BOB RVSM airspace, accounting for 142.0 minutes of LHD duration between January 2006 and April 2007.
- Total of 4 LHD occurrences resulted from equipment failure (Category E), accounting for 118 minutes which are included in the calculation of technical risk.

5.11 Table 2 below summarizes the results of the airspace safety oversight, as of **April 2007**, 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	0.79×10^{-9}	2.5×10^{-9}	Below Technical TLS
Operational Risk	0.27×10^{-9}	-	-
Total Risk	1.06×10^{-9}	5.0×10^{-9}	Below Overall TLS

Table 2: Risk Estimates for the RVSM Implementation in BOB Airspace

5.12 In addition, Figure 1 below presents the trends of collision risk estimates for each month using the appropriate cumulative 12-month of LHD reports since January 2006.

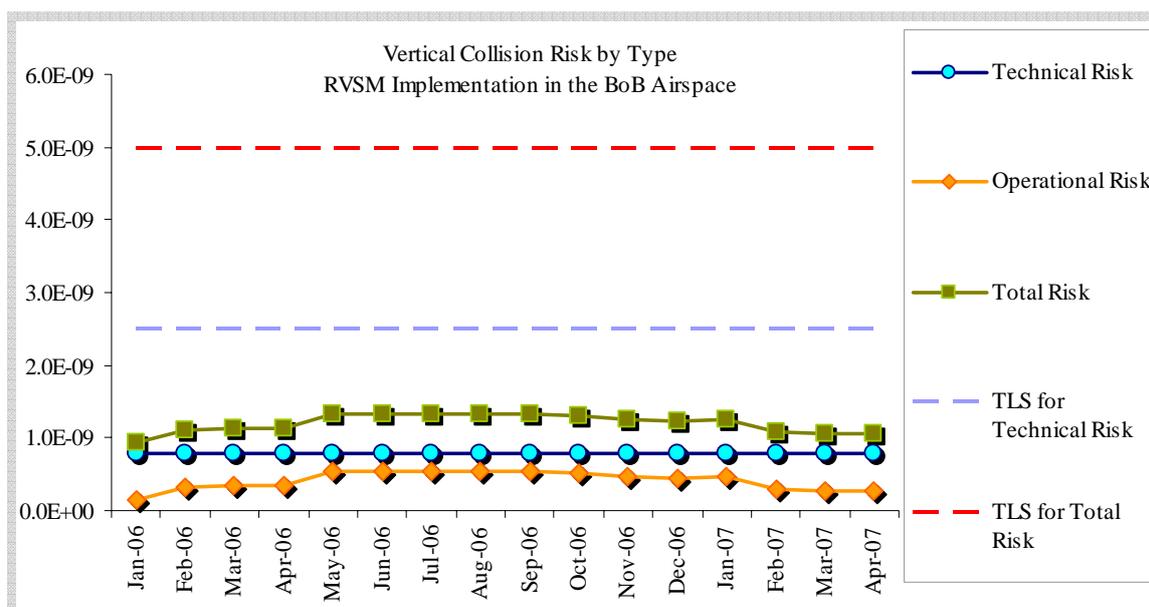


Figure 1: Trends of Risk Estimates for the RVSM Implementation in BOB RVSM Airspace

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.

Western Pacific/South China Sea

5.14 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 2006 and the most recent rolling 12 months of Large Height Deviation (LHD) reports between s January 2006 to April 2007 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.

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

- Total of 103 LHD occurred in the WPAC/SCS RVSM airspace, accounting for 644.5 minutes of LHD duration between January 2006 and April 2007.
- Total of 5 LHD occurrences resulted from equipment failure (Category E), accounting for 128 minutes which are included in the calculation of technical risk.
- One LHD report of ATC system loop error accounting for 72 minutes of LHD duration in December 2006.

5.16 Table 3 below summarizes the results of the airspace safety oversight, as of April 2007, 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	0.42×10^{-9}	2.5×10^{-9}	Below Technical TLS
Operational Risk	5.67×10^{-9}	-	-
Total Risk	6.09×10^{-9}	5.0×10^{-9}	Exceeds Overall TLS

Table 3: 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 cumulative 12-month of LHD reports since January 2006.

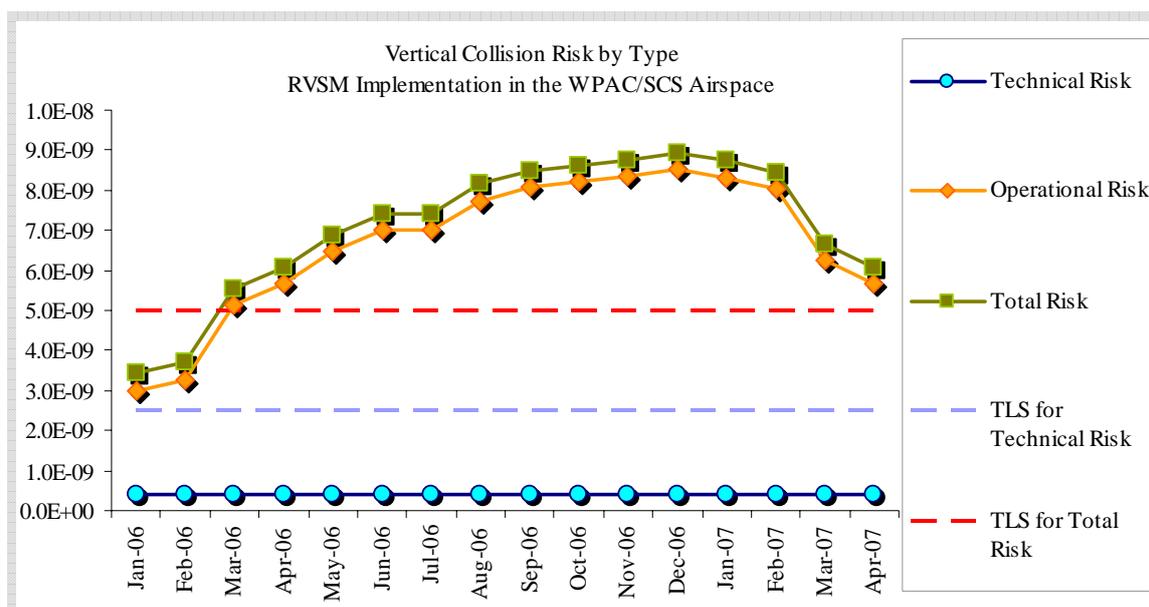


Figure 2: Trends of Risk Estimates for the RVSM Implementation in WPAC/SCS RVSM Airspace

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. The main cause contributing to this infringement is the significant number of operational errors, which are derived from the series of significant LHD occurrences.

5.19 Based on the analysis, the number of LHD occurrences and erroneous duration for aircraft operations is vital to the risk estimate. Therefore, it is strongly recommended that there are remedial and preventive actions to persistently maintain number of LHD occurrence at minimum.

5.20 The meeting reviewed the adverse trend that had been evident in terms of the WPAC/SCS safety assessment, recalling that previous RASMAG reports had recorded total risk estimates as follows:

RASMAG/3 (Jun 2005) = 4.90×10^{-9} (provisional, due lack of data)
RASMAG/4 (Oct 2005) = 3.46×10^{-9} (provisional, due lack of data)
RASMAG/5 (Jun 2006) = 7.08×10^{-9}
RASMAG/6 (Nov 2006) = 11.3×10^{-9}
RASMAG/7 (June 2007) = 6.09×10^{-9}

5.21 The meeting was pleased to note that the latest safety assessment for the WPAC/SCS airspace had shown a dramatic reversal of the adverse trend. Although it was too early to conclude that this was a stable or improving trend, the meeting considered that it was a very pleasing result given the previous circumstances.

Report of Australia's RMA activities

5.22 Australia presented the results of the safety assessments of the Australian Domestic and Indian Oceanic Airspaces undertaken by the Australian RMA. The meeting was reminded that the assessment conducted for the Australian FIRs was limited to that airspace west of the east coast of Australia and that the Tasman and Coral Sea traffic flows continue to be monitored by PARMO as part of the South Pacific assessment. Mr. Butcher informed the meeting that discussions with PARMO had resulted in an agreement that in the future the Australian RMA would be responsible for all airspace within the Brisbane and Melbourne FIRs.

5.23 Australia had provided two assessments covering 12 month periods for the calendar year 2006 and for the period ending April 2007. Both assessments had utilized traffic sample data collected for December 2006 as agreed by the Asia/Pacific RMA. As the meeting had agreed to standardize on a reporting period for 12 months ending April of each year, the presentation to the meeting would concentrate on this period.

5.24 Australia reported that the LHD occurrences in the Australian RVSM airspace were primarily captured as operational errors within the Airservices' Electronically Submitted Incident Report (ESIR) System. A total of 161.5 minutes duration was assigned to the 34 non-NIL LHDs identified through the assessment process, for the 12-month reporting period. Australia highlighted that this was a significant improvement on the previous report made to RASMAG in 2006, and summarized these LHDs as follows:

- The most significant type of LHD both in number and total duration is "Error in ATC-unit-to ATC-unit transferred/transition message" (Category M).
- LHDs classified as "Climb/Descend without ATC Clearance" (Category B) accounted for the second highest total duration but had a relatively low number of occurrences (N=3).
- The significant spike in January 2007 was a single event of "Error in ATC-unit-to ATC-unit transferred/transition message" (Category M).

5.25 The meeting was informed that the assessment for the Australian airspace resulted in an estimation of the total risk as 3.80×10^{-9} fatal accidents per flight hour, which was a further improvement over the 4.6×10^{-9} risk estimate reported in 2006. The meeting noted that the collision risk estimates determined by the Australian RMA, **satisfy the agreed TLS values** of no more than 2.5×10^{-9} (technical risk) and 5.0×10^{-9} (overall risk) 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.

5.26 Table 4 below summarizes the results of the airspace safety oversight in terms of the technical, operational, and total risks for the RVSM implementation in the Australian airspace.

Source of Risk	Lower Bound Risk Estimation	TLS	Remarks
Technical Risk	0.018×10^{-9}	2.5×10^{-9}	Below Technical TLS
Operational Risk	3.70×10^{-9}	-	-
Overall Risk	3.80×10^{-9}	5.0×10^{-9}	Below Overall TLS

Table 4: Risk Estimates for the RVSM Implementation in Australian Airspace

5.27 In addition, Figure 3 below presents the trends of collision risk estimates for each month using the appropriate cumulative 12-month interval of LHD reports since May 2006.

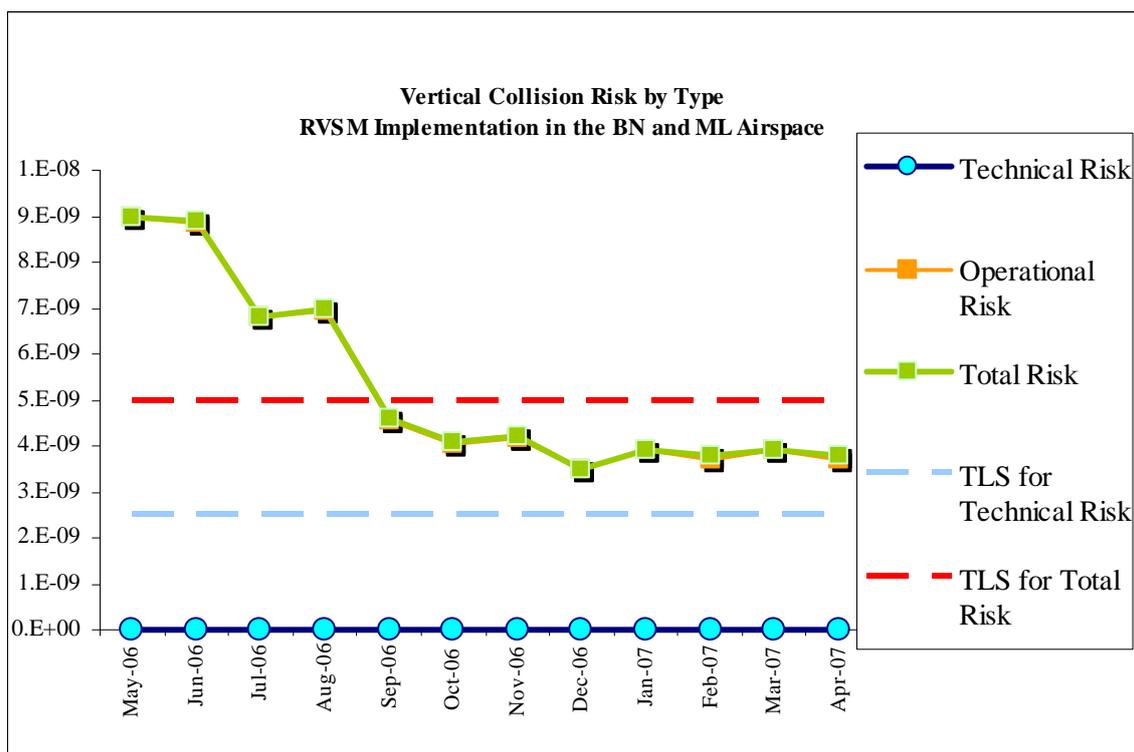


Figure 3: Trends of Risk Estimates for RVSM Implementation in Australian Airspace

5.28 The meeting commented on the excellent outcome for the Australian airspace in terms of estimated risk and noted the significant improved trend in risk since May 2006. Some discussion took place as to what may have assisted in this significantly improved outcome. Australia informed the meeting that Airservices Australia has a mature reporting culture as part of a broad and well established ATS SMS that enables detailed examination of operational errors to be undertaken to identify or review controls that may reduce the likelihood of errors. The meeting agreed that it was likely that the investigative and consequent remediation work able to be undertaken by Airservices as a result of their SMS processes had assisted in achieving this result. The meeting thanked Australia for the presentation and congratulated Australia on continuing to achieve risk estimates below the TLS.

Airspace Safety Assessment – Fukuoka FIR

5.29 Japan presented the meeting with the result of the RVSM airspace safety assessment for the Fukuoka FIR conducted by JCAB in coordination with PARMO and MAAR, and with the assistance of Japan's Electronic Navigation Research Institute (ENRI).

5.30 The meeting noted that during the period of 12 months from Feb 2006 to Jan 2007, JCAB received 51 LHD reports in connection with the Fukuoka FIR out of which 24 LHD occurrences (of which 21 LHDs were categorised as “Errors in ATC-unit-to ATC-unit transfer”) were attributed to Operational Error and accounted for 34.8 minutes. 24 LHD occurrences were attributed to Technical Error (including meteorological factors and TCAS reports) accounting for 13.5 minutes, and 3 LHDs occurred outside of Fukuoka FIR.

5.31 With regard to the particular 21 LHDs caused by “Errors in ATC-unit-to ATC-unit transfer”, JCAB had continued coordination with affected ATC units with the aim of preventing further recurrence of similar errors. JCAB had been advised that remedial actions were undertaken by the those ATC units, such as conduct of refresher training courses for controllers and establishment of procedures to strengthen monitoring capability by supervisor as to transfer of control. JCAB will continue monitoring the situation and cooperate with other ATC units for any improvements to reduce the level of overall risk.

5.32 Table 5 below summarizes the results of the airspace safety oversight, as of January 2007, in terms of the technical, operational, and total risks for the RVSM implementation in the Fukuoka FIR.

Source of Risk	Lower Bound Risk Estimation [accidents / flight hour]	TLS [accidents / flight hour]	Remarks
Technical Risk	0.418×10^{-9}	2.5×10^{-9}	Below Technical TLS
Operational Risk	8.19×10^{-9}		
Overall Risk	8.61×10^{-9}	5.0×10^{-9}	Exceeds the TLS

Table 5: Risk Estimates for safety assessment of the Fukuoka FIR RVSM airspace

5.33 The meeting noted that the overall risk result of the RVSM safety assessment for the Fukuoka FIR exceeded the regionally agreed TLS mainly due to the LHDs caused by “Errors in ATC-unit-to ATC-unit transfer”. JCAB would continue to take remedial actions to reduce the overall risk and continue collecting TSD and LHD reports and conduct safety assessment to ensure the continuing safety of RVSM operations.

Standardized RMA reporting period and format

5.34 At this point the Chairman commented that in reviewing the reports of the various RMAs to this meeting, he had noted that, contrary to previous agreements of RASMAG RMAs, different reporting periods and formats were reflected in the RMA reports which made it difficult to consolidate a single report for APANPIRG. The meeting noted that in fact the United States had used the correct time period but a different format while MAAR, Airservices Australia and JCAB had different time periods but the same presentation format. Following some discussion the RMAs and Japan agreed that the formal reporting period would be the 12 months from 1 May to 30 April with the appropriate December traffic sample. This report would be provided to RASMAG at the meeting which was generally in the June time frame immediately prior to the annual APANPIRG meeting. The RMAs also agreed that a further update report covering the 12 month period 1 October to 30 September would be provided at RASMAG meetings held in the 4th quarter of the calendar year.

Report of PARMO's RMA activities

5.35 The Pacific Approvals Registry and Monitoring Organization (PARMO) provided an update to the meeting based on their 1st quarter 2007 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 2006 through March 2007, 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.

5.36 Twenty-eight risk-bearing large height deviations not involving whole numbers of flight levels were reported to the PARMO during the reporting period. The causes of twenty-one deviations were 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. The causes of the remaining three deviations were due to equipment failure.

5.37 Forty-seven risk bearing large height deviations involving whole numbers of flight levels were reported to the PARMO during the reporting period. The meeting noted that the causes of thirty-seven events were related to ATC transition messages. Of these thirty-seven events, twenty-seven occurred in Pacific airspace, the remaining ten events occurred in North East Asia airspace.

5.38 Seventeen and six of these events were reported to be flight level errors in air traffic control (ATC)-unit-to-ATC-unit transition messages in Pacific and North East Asia airspace, respectively. Four and two of these events related to ATC transition messages were caused by a negative transfer received from the transitioning ATC-unit in Pacific and North East Asia airspace, respectively. There were two additional events, in which the ATC transition message was correct, but the flight level information contained in the transition message was misunderstood - both of these events took place in North East Asia airspace.

Pacific Airspace

5.39 The technical risk was estimated to be 0.0973×10^{-9} fatal accidents per flight hour. The operational risk estimate is 1.56×10^{-9} fatal accidents per flight hour. The estimate of the overall vertical collision risk was 1.66×10^{-9} fatal accidents per flight hour. This estimate was roughly **66 percent below the regionally agreed TLS** value of 5.0×10^{-9} fatal accidents per flight hour. This estimate was based on the most recent 12 months of large height deviation reporting and recently updated collision risk parameters based on the December 2006 traffic samples collected and is shown in Table 6 below.

Source of Risk	Lower Bound Risk Estimation	TLS	Remarks
Technical Risk	0.097×10^{-9}	2.5×10^{-9}	Below Technical TLS
Operational Risk	1.56×10^{-9}	-	
Total Risk	1.66×10^{-9}	5.0×10^{-9}	Below Overall TLS

Table 6. Vertical Collision Risk Estimates for Pacific Airspace

5.40 The meeting noted the localised increase in risk that had manifested in the South Pacific and Pacific trans equatorial traffic flows between Australia/New Zealand and the United States. Investigation had shown that this was as a result of a single long duration (95 minutes) LHD which occurred as a result of confusion about the status a block flight level clearance. No other aircraft were involved and it was considered that this was a non typical LHD occurrence for this environment; however the data was included in the assessment in the interest of completeness.

5.41 Figure 4 below provides a graphical representation of the PARMO’s updated risk estimates for Pacific RVSM airspace based on recent reports of large height deviations.

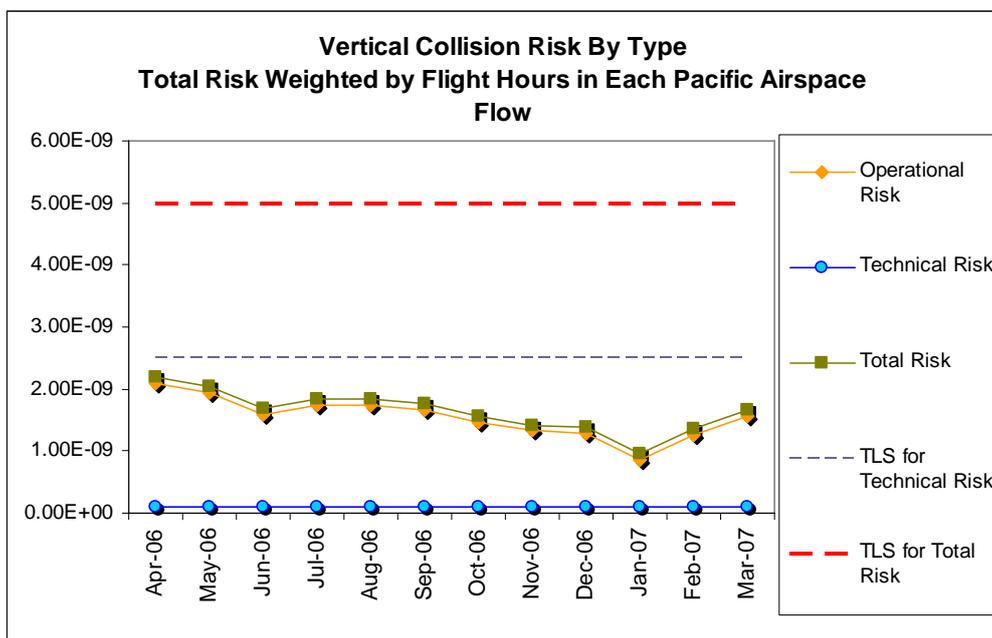


Figure 4. Vertical Collision Risk for Pacific RVSM Airspace

North East Asia Airspace

5.42 The technical risk was estimated to be 0.0857.x 10⁻⁹ fatal accidents per flight hour. The operational risk estimate is 1.013 x 10⁻⁹ fatal accidents per flight hour. The estimate of the overall vertical collision risk was 1.098 x 10⁻⁹ fatal accidents per flight hour. This estimate was roughly **78 percent below the regionally agreed TLS** value of 5.0 x 10⁻⁹ fatal accidents per flight hour. This estimate was based on the most recent 12 months of large height deviation reporting and is shown in Table 7 below.

Source of Risk	Lower Bound Risk Estimation	TLS	Remarks
Technical Risk	0.086 x 10 ⁻⁹	2.5 x 10 ⁻⁹	Below Technical TLS
Operational Risk	1.01 x 10 ⁻⁹	-	
Total Risk	1.09 x 10 ⁻⁹	5.0 x 10 ⁻⁹	Below Overall TLS

Table 7. Vertical Collision Risk Estimates for North East Asia Airspace

5.43 Figure 5 below provides a graphical representation of the PARMO’s updated risk estimates for North East Asia RVSM airspace based on recent reports of large height deviations.

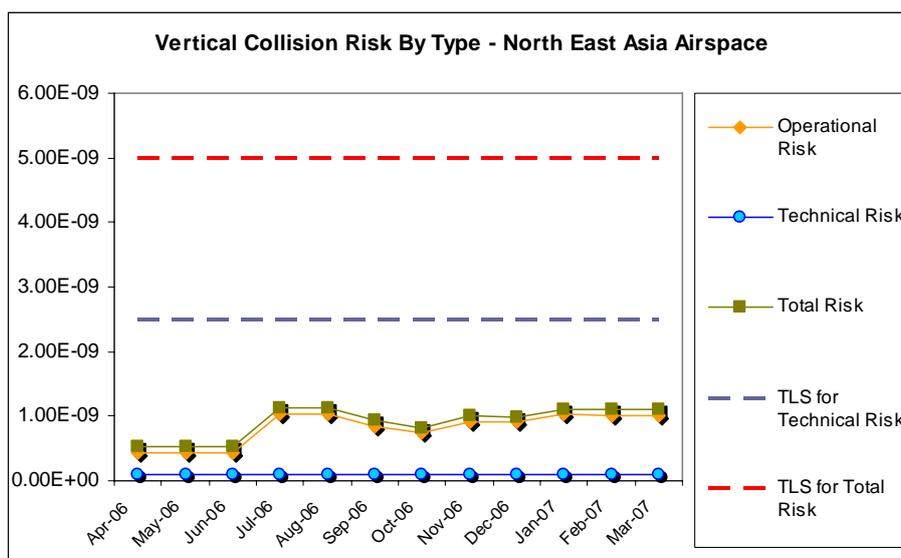


Figure 5: Vertical Collision Risk for North East Asia RVSM Airspace

5.44 The meeting noted that of all the reported large height deviations involving whole numbers of flight levels, the largest contributor to risk bearing large height deviations are errors in the ATC-unit to ATC-unit transition messages in both Pacific and North East Asia airspace.

Non Provision of Traffic Sample Data and Large Height Deviation Reports

5.45 In considering the requirements for routine safety assessment, APANPIRG/16 (August 2005) had 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. As the month of December routinely experienced high traffic levels, APANPIRG/16 had adopted December every year as the standard sample period for vertical and horizontal traffic sample data collection, commencing from December 2005.

5.46 In November 2006 the Regional Office issued State Letter Ref: T3/10.0, T3/10.1.17 – AP105/06 (ATM), as shown in **Appendix I**, advising States of a standardized approach to the collection of vertical and horizontal traffic sample data, and emphasizing a number of relevant Conclusions adopted by APANPIRG/16. 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.

5.47 MAAR drew the attention of the meeting to the importance of both providing adequate data and ensuring accuracy in the submission of both LHD and Traffic Sample Data (TSD). Although the accuracy was slowly improving, MAAR still spent many hours trying to ‘fill in the gaps’ in data that had been submitted as the alternative was simply to discard the data as unusable. Despite their best efforts in following up with States, in a number of cases insufficient data had been forthcoming to complete a number of LHD reports, meaning that they had to be discarded from the sample.

5.48 In order to overcome problems with the poor quality of some of the data provided, including incorrect format and/or incomplete data, MAAR requested that the States concerned strictly follow the instruction provided by MAAR for data collection. In this regard, MAAR encouraged States to visit the MAAR website at <http://www.aerothai.co.th/maar> for the most up to date information and particularly a traffic sample data template including instruction and illustration. Should there be any questions or comments, States were requested to contact MAAR at maar@aerothai.co.th, without hesitation.

5.49 The PARMO expressed similar reservations in relation to the quality of the data submitted. This had led the FAA to pursue a strategy of bi-lateral agreements in relation to the submission of data, as described in paragraph 2.31, with the added cost and administrative burden again falling on the FAA. Any questions in relation to data requirements should be addressed via email to aparmo@faa.gov and full details in respect to the PARMO requirements for submission of data are available on the PARMO website at <http://www.tc.faa.gov/acb300/PARMO/>.

5.50 Recalling that problems in the submission of appropriate quantity and quality of data had been raised many times previously and had led to APANPIRG endorsing Conclusions 16/4 and 16/6, the meeting drafted the following conclusion:

Draft Conclusion RASMAG7/4

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, Maldives, Myanmar, Nepal, Pakistan, Papua New Guinea, Sri Lanka and Tahiti be included in the APANPIRG List of Deficiencies in the ATM/AIS/SAR Fields in accordance with APANPIRG Conclusion 16/6.

5.51 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 2006 and outstanding LHD reports to the relevant RMA. The receipt of appropriate data prior to APANPIRG/18 in September 2007 would result in the removal of that State from the Draft Conclusion above.

High number of Errors in ATC transition messages

5.52 In reviewing the reports of the three regional RMAs and Japan, it was apparent to the meeting that performance in terms of technical error was meeting a good standard throughout all areas. However, in terms of operational error, the TLS was not being achieved in some areas.

5.53 The meeting recognized that the numbers and durations of LHDs reported was driving the risk results, with a large proportion of LHDs relating to difficulties in ATC-to-ATC coordination. The meeting considered that the high number, often in the order of 40% - 50%, of LHDs attributed to errors in ATC transition messaging was by far the most critical aspect of Asia/Pacific regional RVSM operations revealed by the RMA analyses. The meeting encouraged all States to be aware that this ground-ground communication interface exhibited weaknesses in all the regional examples examined. Gaining control of this aspect was critical to ensuring operations remained within the TLS and undertaking investigations in this respect would be a logical and necessary point for States to start in attempting to reduce the instances of LHD.

5.54 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 all types of coordination errors and related decrease in LHD occurrences. The meeting was aware that a fully up to date version (Version 3) of the Asia/Pacific AIDC Interface Control Document would be available later this year and RASMAG urged States to consider the implementation of compatible AIDC capabilities based on the Asia/Pacific AIDC ICD as soon as possible. In this respect the meeting drafted the following conclusion for consideration by APANPIRG/18.

Draft Conclusion RASMAG7/5

That, in noting the continued prevalence of RVSM Large Height Deviation (LHD) occurrences resulting from ATC Unit-to-ATC Unit coordination errors, as reported by RMAs assessing RVSM operations within Asia Pacific Region, the Regional Office:

- a) draws to the attention of States that investigations into LHD should concentrate in this area, and
- b) highlights the APANPIRG recommendation that States work towards the implementation of compatible AIDC capabilities based on the Asia/Pacific AIDC ICD between ATC units as soon as possible.

Submission of LHD reports

5.55 The Secretariat informed the meeting that at the Special Co-ordination Meeting for RVSM Implementation by China (SCM/RVSM China, Beijing, 16 – 18 May 2007), China had proposed a draft AIP supplement for the RVSM implementation in China in November 2007.

5.56 As part of the AIP Supplement, China required that LHDs were to be reported to the Air Traffic Management Bureau (ATMB), the ATC provider of China. However, IATA considered that as the initial report would be made on the radio to the ATMB as ATC service provider at the time of the occurrence, the operator should then submit subsequent written reports to the State of Registry of the operator, not the State of the ATC authority. In IATA's interpretation, this arrangement was in accordance with the relevant provisions in the RVSM manual (Doc 9574). As a result, IATA had suggested amendments to the China AIP proposal that would result in reports being made to the State of Registry by the airline involved.

5.57 The Secretary informed the meeting that the SCM/RVSM China had been unable to agree on how to resolve the issue raised by IATA and had sought RASMAG's input in identifying a regionally harmonised procedure. The meeting thanked the Secretary for bringing this issue to the attention of RASMAG and engaged in significant discussion on the matter.

5.58 While the meeting recognised that the State authority where the LHD had occurred was ultimately responsible for providing the LHD data to the relevant RMA, and therefore needed to have direct access to the report, the members from IATA reiterated their position that LHD reporting should be no different to other types of operational error reporting. IATA commented that the proposed process of a pilot reporting the LHD to air traffic control at the time of the occurrence (e.g. on the radio, via CPDLC etc) and then the airline having to subsequently provide the same report on paper to the RMA was unnecessary as the report that had been made to ATC should be provided by the State authority to the responsible RMA in any case.

5.59 The representatives of the RMAs present agreed with this view, commenting that in their experience they receive very few LHD reports direct from airlines and that the overwhelming majority of reports are obtained from normal reporting mechanisms facilitated by State air traffic service providers.

5.60 After further discussion the meeting agreed to inform the RVSM Task Force that the regional procedure should be that a pilot that becomes aware of a LHD should report it directly to ATC at the time of the occurrence (e.g. on the radio, via CPDLC etc). ATC should then file a written report through their normal reporting system. Reports of this nature should then be collated along with other relevant operational error reports and forwarded to the responsible RMA. The pilot would subsequently be expected to report the LHD through the normal post-flight reporting procedures in place at the airline concerned. RASMAG expected that these reports would then be processed through normal reporting

requirements to the relevant State authority but, in any event, did not support additional paper reporting by the airline to the responsible RMA either directly or via the ANSP in the State of occurrence. .

Japan RMA capability for the Fukuoka FIR

5.61 The meeting recalled that at RASMAG/5, June 2006, Japan presented information concerning the activities and plans in relation to airspace safety assessment, monitoring capability and services to be provided by JCAB and subsequently at RASMAG/6 (November 2006) that the RMA service would commence by the second quarter of 2007. Japan informed that meeting that JCAB had conducted an RVSM airspace safety assessment for the Fukuoka FIR in coordination with PARMO and MAAR, with assistance of the Electronic Navigation Research Institute (ENRI) and considered that they were now capable of assuming full RMA status in the Asia/Pacific region. Representatives from MAAR and PARMO indicated support for Japan, commenting that, in their opinions, the technical performance of the Japan vertical monitoring agency was such that difficulties in performing RMA technical functions were not anticipated.

5.62 The meeting expressed appreciation to Japan for their continued development of capabilities in all areas of airspace safety monitoring, including vertical monitoring. In reviewing applicable requirements in Annex 11, the RVSM Manual (Doc 9574) and the RMA Manual (**Appendix J** refers), the meeting noted the responsibility of APANPIRG, as the body authorizing establishment of an RMA, to ensure that all relevant provisions in these documents were met.

5.63 In this context, the meeting recognised that as RASMAG had been permanently established by APANPIRG to oversee safety monitoring matters, the appropriate way to gain APANPIRG endorsement for the Japan vertical monitoring agency was for RASMAG to make a recommendation by way of a draft Conclusion to APANPIRG that Japan be approved as a regional monitoring agency (RMA).

5.64 Issues associated with the regional credentialing of safety monitoring organisations had been discussed during previous RASMAG meetings and had led to the adoption of the RASMAG List of Competent Safety Monitoring Organisations. In reviewing the history of the convoluted processes used for initial accreditation of the PARMO, MAAR and Australian RMA and having reviewed the applicable provisions, the meeting agreed that RASMAG should define a standardised process under which a safety monitoring organisation could gain approval by APANPIRG for regional activity, adding an item to the task list to this effect. The meeting recognised that with the implementation of long term monitoring requirements it was likely that other agencies, both governmental and private sector, would be seeking to provide monitoring services. Having a standardised process in place would allow the performance of these agencies to be assessed against objective criteria before an approval to provide regional services was granted.

5.65 However, to avoid delay in advancing the Japan vertical monitoring agency to RMA status and in acknowledgement that technical performance of Japan in respect to vertical monitoring was advanced, the meeting agreed that the material in Annex 11, the RVSM Manual (Doc 9574) and the RMA Manual described above would provide an adequate basis against which to assess the capabilities of the Japan vertical monitoring agency. Accordingly, the meeting requested that Japan prepare a full submission to the next RASMAG meeting that demonstrated the capabilities of the Japan vertical monitoring agency against each of the items detailed in these provisions. PARMO and MAAR would assist Japan in the preparation of this documentation.

Activities of CRA-Japan in North/Central Pacific and South-East Asia*North/Central Pacific*

5.66 Japan informed the meeting that at the Thirteenth Meeting of the FANS Interoperability Team (FIT/13) of the Informal Pacific Air Traffic Control Coordinating Group (IPACG), Anchorage, Alaska, USA, from 14 to 15 May 2007, the JCAB CRA reported on 13 datalink problem reports (PRs). The full report of the meeting is available on the IPACG website at <http://www.faa.gov/ats/ato/ipacg.htm>.

5.67 The CRA-Japan also provided the Periodic Status Report (PSR) which indicated that the FOM performance criteria for CPDLC down-link and up-link had been met. The success rate of automatic transfer of connections to Fukuoka FIR from Oakland and Anchorage FIRs was improving steadily, and as of March 2007, the average success rates were 96% for the transfer from Oakland and 97% from Anchorage. The CPDLC up-link message success rate was slightly below 99%.

South-East Asia

5.68 The CRA-Japan was designated as the FIT-SEA CRA by FIT-SEA, and has been providing CRA activities according to the Terms of Reference (TOR) that was agreed upon by the FIT-SEA/3 meeting held in November 2005. Subsequently, FIT-SEA/5 (January 2007) agreed to the arrangement for the Phase 1 operational trial of data link in the Ho Chi Minh FIR, and the trial was commenced at 0001 UTC on 15 March 2007.

5.69 At the Sixth Meeting of the FANS Implementation Team, South-East Asia (FIT-SEA/6, May 2007) the CRA-Japan provided a CRA interim report containing detailed information concerning the status of ATS data link operational performance and the analysis of data link problem reports provided by Singapore and Viet Nam.

5.70 Singapore had provided system performance data for the period of 4 months from January to April 2007, while Viet Nam had provided system performance data from 15 March to 6 May 2007. The FIT-SEA CRA presented the following analysis:

- CPDLC Down-link Performance;
- CPDLC Up-link Performance;
- Total Number of CPDLC Down-link messages (Viet Nam only);
- Total Number of CPDLC Up-link messages; and
- CPDLC Up-link Message Success Rate.

5.71 Additionally, the seventeen (17) PRs received through Singapore and Viet Nam CAAs since 15 March 2007 were analyzed under the following categories.

- ADS-related PRs (10 PRs);
- CPDLC (0 PRs);
- connection (2 PRs); and
- data link failure (5 PRs)

5.72 The CRA-Japan recognized that most of PRs in the Singapore and Ho Chi Minh FIRs were caused by ADS while most of PRs in the Fukuoka FIR were caused by CPDLC. There were certain similarities in problems between the Singapore and Ho Chi Minh FIRs and the Fukuoka FIRs. Overall the CRA concluded that the data link system performance of the Singapore and Ho Chi Minh FIRs met the FOM criteria, and there was no significant problem identified from the PRs submitted from Singapore and Viet Nam.

5.73 Accordingly, FIT-SEA/6 agreed that the results of the Phase 1 trial were satisfactory and the Phase 2 trial was scheduled to commence at 0001 UTC on 2 August 2007 AIRAC date. The Phase 2 trial will be conducted for approximately 6 months until February 2008. The CRA-Japan will continue to provide CRA services for FIT-SEA, and will present a report of Phase 2 operational trial at the FIT-SEA/7 meeting planned to be held in Fukuoka, Japan, in January 2008.

Summary of ADS-C data analysis – NOPAC Route System

5.74 Japan informed the meeting that the NOPAC (NORth PACific) route system was the most congested oceanic ATS route system in the Fukuoka and Anchorage FIRs. In order to accommodate the traffic growth being experienced, 50NM longitudinal separation minimum for ADS-C equipped aircraft had been implemented sequentially beginning from R220 and R580. ENRI was preparing for the future safety assessment in order to accommodate 30NM longitudinal and lateral separation minimum in oceanic airspace.

5.75 ADS data for review were provided by Kobe Aeronautical Satellite Center, for the period September 1st 2005 to August 31st 2006, excepting November 18th 2005 and period January 17th 2006 to February 9th 2006. FDMS data which included flight plans, waypoints etc was also collected for the period from September 1st 2005 to August 31st 2006.

5.76 According to the data, the number of aircraft flying in oceanic airspace of Fukuoka FIR from September 1st 2005 to August 31st 2006 was 474,660, of which 98,924 aircraft (20.8%) were equipped with ADS. According to FDMS data, 92,240 aircraft (19.4% of oceanic airspace users) flew on NOPAC route system in the same period. Of which 26,535 aircraft (28.8%) were equipped with ADS.

5.77 The percentage of aircraft which were equipped with ADS did not exceed 30% in the whole oceanic airspace of Fukuoka FIR and the NOPAC route system combined.

5.78 Japan investigated the time required for the transmission of ADS message from aircraft to the ground (DLCS). It was found that the proportion of down link transmission times greater than 1 minute and 3 minutes were 10.37% and 2.70%, respectively.

5.79 The distribution of along-track prediction errors presented the maximum of the absolute value of along-track prediction errors was 72.0 knots. In the calculation of this distribution, the periodic position reports which were not coupled with 'predicted route group' or 'fixed projected intent group' were omitted. Japan informed the meeting that they would continue further work in this regard

Agenda Item 6: Review of regional safety assessment activities/requirements

Implementation of RVSM in China

6.1 The Asia/Pacific RVSM implementation Task Force had been re-convened in response to a request from China that the RVSM Task Force be made available to assist China with the metric RVSM implementation in the whole of the China airspace, with target date 22 November 2007. The Secretariat presented information to the meeting regarding the RVSM/TF/30 meeting (March 2007, Bangkok) and the Special Co-ordination Meeting for the RVSM Implementation by China (SCM/RVSM China, May 2007) convened to consider the planning and implementation process for the RVSM implementation for China. The Secretary reported that these meetings had considered a number of important issues related to the planned implementation by China, including the flight level allocation scheme, the use of metric flight levels, training material and flight level transition procedures for the many adjacent FIRs.

6.2 Although China had been invited to attend the RASMAG meeting they were not present, however the United States commented that they were certain that if administrative arrangements could have been made in time that China would have been represented at this meeting of RASMAG. The meeting considered that it was regrettable that China had not attended as it would have provided a valuable opportunity for review of their progress in implementing RVSM and to assist in developing the appropriate safety assessments.

6.3 Further discussion resulted in RASMAG agreeing that within the Asia/Pacific Region, implementation of RVSM required that the ICAO provisions and procedures detailed in ICAO RVSM documentation including the RVSM Implementation Manual (Doc 9574) must be followed. The meeting agreed this should also be the case for the RVSM implementation in the airspaces of China.

6.4 Regrettably, RASMAG did not feel that it was in a position to be able to assist China by reviewing the safety assessments or supporting processes being developed for the RVSM implementation, due to the complete lack of information in this regard being available to RASMAG. This meant that, in respect to this implementation, RASMAG was unable to carry out any of the safety oversight functions with which it had been charged by APANPIRG. The meeting agreed that it would be a very positive outcome if information concerning the safety assessment could be made available to RASMAG at the next meeting so that a level of regional safety oversight could be provided, noting that this may well occur post-implementation in any case.

6.5 Additionally, the RASMAG was concerned that given China was not a recognized RMA in terms of approval by APANPIRG and there was apparently no formal process in place for the safety assessment being developed for the China airspace implementation to be approved by one of the Asia/Pacific RMAs. RASMAG also agreed that for China to be considered an Asia/Pacific RMA, if that was in fact the desired course of action, it would need to be subject to a formal vetting process by RASMAG as described in paragraphs 5.62 to 5.65 before any such recommendation to APANPIRG could be made. In this respect, the meeting understood that vertical monitoring capabilities were still under development in China and, as RASMAG would next meet after the implementation 'Go/No Go' meeting had occurred, it would not be possible for RASMAG to make assessment and recommendation to APANPIRG before the planned implementation date.

6.6 In this context, RASMAG was aware of the substantial efforts of the FAA PARMO in assisting China to ensure that all the requirements for RVSM pre-implementation safety assessments were undertaken.

6.7 The meeting recalled the previous concerns in relation to inadequate safety monitoring that had been discussed during APANPIRG. In particular, reference was made to APANPIRG/16 Conclusion 16/5 highlighting that a failure to carry out necessary safety monitoring could place implementation of reduced separation at risk, as follows:

APANPIRG Conclusion 16/5 – No implementation of reduced separation unless compliant with Annex 11

That, recognizing that some States had not adequately complied with safety management provisions, the Regional Office advise States of the Asia/Pacific Region that further regional implementation of reduced separation minima should only proceed in circumstances where implementing States can demonstrate an ability to comply with Annex 11, Chapter 2, safety management provisions for the continuous monitoring and regular assessment of the safety level achieved.

Outcomes of Eleventh Separation and Airspace Safety Panel meeting

6.8 The United States presented a report on the outcomes of the recent Separation and Airspace Safety Panel (ICAO SASP) Eleventh meeting, held from 21 May through 1 June 2007 in Montréal, Canada. The meeting recalled that the SASP undertakes its work programme through project teams and that of specific interest to the RASMAG is the work undertaken by Project Team 2 (PT-2) – RVSM Monitoring.

6.9 The meeting was informed that the SASP Project Team 2 had continued work on developing long-term monitoring requirements applicable to operators and aircraft with State approval for RVSM operation. The SASP Project Team had agreed on a statement of such requirements which will be submitted to the Air Navigation Commission for adoption. The meeting was reminded that the driver for this SASP work was the inclusion in Annex 11 of the following provisions:

3.3.5.1 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.

3.3.5.2 Arrangements shall be put in place, through inter-regional agreement, for the sharing between regions of data from monitoring programmes.

6.10 Additionally, the United States reported that the SASP had convened a meeting of global RMAs in conjunction with SASP/WG/WHL/10 (South Brisbane, Australia, 27 November – 8 December 2006). With the exception of the Middle East Central Monitoring Agency and the South Atlantic Monitoring Agency, all known global RMAs and a number of States intending to form RMAs or planning RVSM implementations participated in the meeting. The major outcome from that meeting was an agreement that the Annex 11 provisions called for a single global statement of minimum long-term monitoring requirements.

Statement of long term RVSM monitoring requirements

6.11 The meeting was advised that the SASP had agreed that height-keeping performance monitoring results, contributed by EUROCONTROL and reviewed by the North Atlantic Operations and Airworthiness Sub Group, had demonstrated long-term adverse trends in altimetry system error (ASE) drift, which, if not reversed, would result in aircraft becoming non-compliant with RVSM requirements. Additionally it had been agreed that globally applicable minimum long-term monitoring requirements were required as ASE could not be detected without specialized monitoring systems and could therefore pose a serious risk if uncorrected.

6.12 As a result of the deliberations by SASP over a protracted period, it had provisionally adopted a statement of globally applicable long-term monitoring requirements as follows:

(1) 2 examples of each operator/aircraft-group combination be monitored at least once each 2 years or within intervals of 1,000 RVSM flying hours, whichever is longer, where monitoring data from any region may be used to satisfy requirements

(2) In addition, depending upon regional considerations, “P” percent of the airframes of an aircraft group of each operator accounting for “R” percent of the annual RVSM flying hours within a region be monitored at least once every “L” months or “U” flying hours, with the percentage determined from analysis of observed performance; monitoring data from any region may be used to conduct an analysis of groups and to satisfy monitoring data requirements

6.13 The meeting noted that this statement was being processed by the Air Traffic Management Section of the Air Navigation Bureau, for consideration by the Air Navigation Commission, the ICAO Council and, ultimately, ICAO’s contracting States. The meeting agreed that the pending implementation of long term monitoring requirements would have significant impacts in the way regional monitoring was managed, including the need for widespread regional height monitoring capability to be made available. In this context, the RMAs present agreed that they would endeavour to communicate collectively prior to the next RASMAG meeting with the objective of providing some guidance on regional issues in this regard. An action item in this respect was added to the task list.

6.14 IATA stated that it was pleasing to see global provisions for long term monitoring finally being progressed as it was something the industry had been wishing to see resolved but which had been a long time in coming. Some discussion ensued with respect to the proposed long-term monitoring requirements proposed by the SASP and how, given the global nature of RVSM, one region would be able to identify a need different from other regions. Additionally IATA asked if any regions had implemented any specific monitoring requirements in line with those proposed.

6.15 The PARMO stated that any aircraft make and model fell into a specific aircraft group and that these groups are subject to varying levels of monitoring given that analysis of the group’s performance may identify a need for closer monitoring. PARMO explained that analysis in Europe had indicated some airframe groups may be approaching levels of non-performance and, given the higher passing frequency in that region, there is a perceived need for higher level of monitoring.

6.16 In regard to the implications of the long-term RVSM height monitoring requirements for the Region, the RASMAG was informed that there were already extensive monitoring results for Asia Pacific-domiciled aircraft which operate international flights in Europe or North America and over fly ground-based height monitoring facilities there. However, the RASMAG recalled that there are, at present, no such facilities within the Region and, hence, any monitoring of aircraft operating only within the Asia Pacific Region requires application of the cumbersome GPS-based monitoring system – necessitating special monitoring arrangements and entailing explicit costs. It was evident that additional long term monitoring requirements would have a significant impact regionally and the meeting was, therefore, of the opinion that work should be undertaken as soon as possible in order to assess what the consequences within the Region would be when the long-term RVSM height monitoring requirements came into effect. Accordingly, the meeting drafted the following conclusion for the consideration of APANPIRG:

Draft Conclusion RASMAG7/6 – Consequences of global RVSM long term height monitoring

That, the Regional Office draw to the attention of the RVSM airspace safety monitoring agencies within the Asia Pacific Region the provisional global RVSM long-term height monitoring requirements recently adopted by the ICAO Separation and Airspace Safety Panel (ICAO SASP), and request that those agencies prepare a regional impact statement summarizing the estimated consequences for the Region, including consideration of numbers of airframes required to be monitored, for initial review by RASMAG/8 in late 2007.

Completion of RMA Manual

6.17 The United States also informed the meeting that the SASP's PT-2 had taken action to progress the completion of the RMA Manual with the goal of completing the task prior to the end of September 2007.

Metric ⇔ Imperial flight level rounding

6.18 During the SASP's PT-2 meeting, discussions had also taken place regarding the flight level allocation scheme (FLAS) proposal by the People's Republic of China and the Russian Federation to amend the current table of metric cruising levels in Attachment 3 to Annex 2. A specific issue raised in relation to this proposal was that in converting metric flight levels to Imperial flight levels, the rounding to the nearest 100 ft that was done by the flight management systems of aircraft manufactured in Europe and the Americas resulted in differences which required further investigation. Further investigation into this issue would take place at the next SASP meeting in late 2007.

Western Pacific/South China Sea RVSM Scrutiny Working Group (WPAC/SCS RSG)

6.19 The First Meeting of the Western Pacific/South China Sea (WPAC/SCS) RVSM Scrutiny Working Group (WPAC/SCS RSG/1) was convened as a result of the APANPIRG/17 (August 2006, Bangkok) review of RVSM operations in the WPAC/SCS area, in which concerns had been raised in relation to the apparent poor safety performance of RVSM operations against the established target level of safety. APANPIRG/17 had set comprehensive terms of reference to guide the work of the WPAC/SCS RSG.

Overall Risk Estimate WPAC/SCS Area

6.20 As the responsible RMA, MAAR provided WPAC/SCS RSG/1 with a summary of airspace safety oversight for RVSM implementation in the WPAC/SCS area, which was fully implemented on 31 October 2002. The estimate of overall risk continued to significantly exceed the agreed TLS value of 5.0×10^{-9} fatal accidents per flight hour due to all causes, with the most recent safety assessment placing the overall risk estimate at 13.6×10^{-9} fatal accidents per flight hour.

6.21 MAAR had identified that the main cause for the TLS being exceeded was the significant number of operational errors, which are derived from the series of LHD occurrences. In December 2005, the level of operational risk increased sharply due to a total of 12 LHD occurrences, accounting for a total duration of 93 minutes. It is then followed by series of LHD occurrences in the subsequent months. Particularly, during March and June 2006, there were a total of 42 LHD occurrences, accounting for 240 minutes. In addition, there was one LHD report of 72 minutes duration in December 2006.

Summary of LHD Occurrences in WPAC/SCS area

6.22 The LHD occurrences in the WPAC/SCS RVSM airspace were summarized by MAAR as follows:

- Total of 151 LHD occurred in the WPAC/SCS RVSM airspace, accounting for 593.4 minutes of operational errors between January 2005 and December 2006;
- 81% of LHD occurrences result from to errors in ATC-unit to ATC-unit transferred/transition message (Category M) – 122 of 151 LHD occurrences;

- 5% of LHD occurrences result from no transfer received from transferring ATC-unit (Category N) – 8 of 151 LHD occurrences;
- 91 operational errors for 546 minutes occurred during December 2005 – December 2006;
- During this period, 338, 119 and 73 minutes of operational error were reported by Manila FIR, Ujung Pandang FIR, and Singapore FIR, respectively.

Analysis of LHD Reports

6.23 WPAC/SCS RSG/1 conducted an extensive review of the summary LHD information provided by MAAR, supported by verbal feedback from State delegates, resulting in the following conclusions:

- a) a large number of LHD occurrences were directly related to erroneous ATC coordination between ACCs, including lack of update to previously coordinated flight levels, readback/hearback errors, coordination not undertaken and flight level change instructions not issued to flights although coordination had been completed;
- b) some examples of LHD were pilot related and included occasions of non-compliance with ATC clearance, flight level change without ATC clearance, altitude bust and callsign confusion;
- c) a significant number of LHD related to 'others' category including TCAS response to airspace penetration by uncoordinated military flights, mechanical difficulties with flights (e.g. depressurization, engine failure) and weather related factors including turbulence;
- d) LHD at the Manila FIR/Taipei FIR/Fukuoka FIR boundary involving ATS routes L625, B462 and B348 in proximity to AGVAR, POTIB, MEVIN were directly influenced by the differing FLOS's in use on either side of the FIR boundaries in this area;
- e) other than the Manila FIR/Taipei FIR/Fukuoka FIR issue described above, based on the LHD data available to the meeting no primary connection could be made between the LHD occurrences and the modified single alternate FLOS in use in the WPAC/SCS area; and
- f) some of the reported LHDs were situations in which, although ATC coordination errors were evident and an ATS incident had occurred, review by the WPAC/SCS RSG indicated that the situation did not meet the criteria for LHD and therefore should not have been reported as LHD.

ATC Coordination issues

6.24 In relation to the ATC coordination errors discussed at paragraph 6.23 a) above, WPAC/SCS RSG/1 considered that there were many ways in which ANSPs could address their obligations in this regard. It was evident that a significant tightening of existing ATC coordination procedures and practice was necessary to ensure that effective coordination was completed. The meeting considered that this was a primary function of ANSPs and the meeting urged affected ANSPs to take urgent and effective action in this regard.

6.25 States were requested to review current coordination arrangements in light of the extensive discussions held during the meeting and correct any shortcomings identified. States were also requested to take urgent action to ensure that bi-lateral arrangements, including suitable ACC contact details, were in place to ensure the immediate notification of affected ACC Supervisors in order to enable immediate investigation and remediation.

Pilot issues

6.26 WPAC/SCS RSG/1 noted the non systemic pattern to the pilot related occurrences at paragraph 6.23 b) above which acted to preclude the application of a specific solution. However, many States described processes in which the operators were advised of the occurrences as part of the investigation conducted by the ANSPs and feedback was sought in response.

'Others' issues

6.27 The 'others' category LHD occurrences described at paragraph 6.23 c) above were also not systemic in nature and therefore did not lend themselves to a systemic solution. States reported appropriate actions in following up many of these examples insofar as possible and the meeting considered that, as the random nature of these types of events was difficult to predict, attempts to identify additional actions by the WPAC/SCS RSG would not be productive.

Manila/Taipei/Fukuoka FLOS issues

6.28 The meeting agreed that matters relating to the Manila FIR/Taipei FIR/Fukuoka FIR boundary FLOSs discussed at paragraph 6.23 d) above would be further studied by WPAC/SCS RSG in order to correct the perceived shortcomings identified in the differing FLOS arrangements in this localized area. The Philippines was requested to provide additional data to support the review of this situation.

LHD not correlated to FLOS

6.29 As recorded at paragraph 6.23 e) above, with the exception of the Manila/Taipei/Fukuoka boundary positive LHD - FLOS correlation discussed previously, analysis of the summary LHD information reviewed by the meeting did not demonstrate a direct link between the LHD occurrences and the modified single alternate FLOS in use in the WPAC/SCS area.

6.30 WPAC/SCS RSG/1 recognized that this conclusion did not consider the secondary issues, for example the controller workload, habituation and distraction precipitated by performance of transition activities, which had been raised by delegates during the meeting. However, as detailed State investigation reports were not available to facilitate a deeper analysis, the meeting requested that States make any additional information available to subsequent meetings.

Definition of LHD

6.31 In reviewing the LHD reports referred to in paragraph 6.23 f) above, WPAC/SCS RSG/1 engaged in extensive discussion as to what actually comprised a LHD. It was evident that different interpretations were held by different States and that this had resulted in LHD reports being submitted for some occurrences that, although they were ATC coordination breakdown incidents resulting in flight level variance of 300 feet or more, were not actually LHD occurrences and therefore should not have been reported as such.

6.32 WPAC/SCS RSG/1 noted that although the RVSM Handbook (Doc 9574) contained a number of references to LHD, these references were presented in complex and technical language which required significant interpretation. This had led to States reaching different conclusions and therefore assessing LHD based on non standardized criteria.

6.33 Following discussion, WPAC/SCS RSG/1 agreed that conceptually a LHD occurrence involved a situation in which there was a lack of control. For example, an incident in which although an incorrect flight level had been coordinated, the receiving controller became aware of the correct flight level by other means (e.g. over the boundary radar observation before the flight entered the area) meant that the receiving controller gained some situational awareness before the flight entered the receiving airspace. Rather than a LHD, this situation was a breakdown of coordination incident and should be investigated accordingly. If however, this same scenario occurred in non-radar airspace and the receiving controller only became aware of the situation after the flight had entered the receiving airspace, no opportunity was available to gain situational awareness before the flight entered the airspace and the situation was that of a LHD.

6.34 In this context and noting that there was not a standardized 'plain language' definition of a LHD available, WPAC/SCS RSG/1 requested that RASMAG urgently address this issue and promulgate a user friendly definition of LHD for wide application. WPAC/SCS RSG/1 agreed that including the plain language definition of LHD on the LHD reporting template on the MAAR website would greatly assist the officers completing the template to assess whether the incident was a LHD or not.

6.35 In considering the definition of what actually comprised a LHD, during WPAC/SCS RSG/1 IATA requested clarification of a situation in which a flight entered an RVSM airspace, flew for 2 hours before exiting that airspace but in that time period had no communications with the ground agency responsible for providing ATC services in that airspace. IATA considered that the inability of the flight to communicate information about any matter, including the flight level occupied by the flight, meant that up to date information about the flight was not available. In particular, the opportunity to report any deviation from flight level was not available and therefore it appeared reasonable that such a flight be considered as a LHD WPAC/SCS RSG/1 requested the Secretariat to also bring this matter to the attention of RASMAG.

Category 'M' LHD definition

6.36 WPAC/SCS RSG/1 also had considerable difficulty in accurately interpreting the 'M' classification for LHD, which was defined as '*Error in ATC-unit to ATC-unit transferred/transition message*' and requested further guidance/clarification from RASMAG as to the type of occurrences that should be classified as 'M'. Additionally, in light of the need for timely investigation of LHD occurrences as discussed above, the meeting requested that RASMAG be requested to discuss whether the additional question '*Were the Supervisors of the affected ACCs advised of this LHD occurrence*' should be included on the LHD template.

WPAC/SCS FLOS Issues

6.37 WPAC/SCS RSG/1 recalled that RVSM/TF/20 (October 2003) had decided to proceed with the RVSM implementation on 27 November 2003 in the area south of the Himalayas and over the Bay of Bengal and beyond (Bay of Bengal and Beyond) using a single alternate FLOS arrangement. RVSM/TF/20 called upon the RVSM/TF to review the interface requirements between the modified single alternate (MSA) FLOS in use in the WPAC/SCS area and the SA FLOS being implemented in the Bay of Bengal and Beyond. Accordingly, RVSM/TF/22 (September 2004) included this matter in its discussions and proposed an amended FLOS for consideration.

RVSM/TF/28 FLOS Review

6.38 RVSM/TF/28 (April, 2006) was held in order to review the FLOS in the WPAC/SCS area. The meeting had been delayed for more than 12 months as suitable LHD reports and TSD was not available to MAAR to enable them to conduct a safety assessment on the FLOS proposed by RVSM/TF/22. In doing this work, MAAR considered three scenarios as a basis for conducting the safety assessments for the WPAC/SCS FLOS review.

6.39 Despite wide support for the Scenario 2 FLOS proposal, RVSM/TF/28 could not reach suitable consensus on the proposed Scenario 2. Additionally, the RVSM/TF/28 considered that decision on an appropriate FLOS & FLAS was not strictly under the jurisdiction of the RVSM/TF and passed the matter on SEACG and ATM/AIS/SAR Sub-Group for further consideration.

Future Direction and Arrangements

6.40 In considering how to progress the FLOS issues in the WPAC/SCS area, WPAC/SCS RSG/1 considered that the Scenario 2 FLOS had previously reached a promising level of consensus and that it would be productive to attempt to address the remaining complexities in the Scenario 2 arrangement in order that a compromise could be reached. It was likely that some modifications to the proposal would be necessary as States had developed their ideas since RVSM/TF/28.

6.41 WPAC/SCS RSG/1 noted the Philippines position that the current Scenario 2 FLOS proposal could not be implemented in the Manila FIR unless flight level transitions took place outside Manila FIR. The meeting also noted Thailand's firm position in relation to no longer servicing unnecessary flight level transition areas.

6.42 After extensive discussion, it was agreed that efforts to fine tune the Scenario 2 FLOS/FLAS proposal and incorporate the relevant components of a new Philippines proposal would provide the most productive way forward. Accordingly, States and international organizations agreed to fully examine the Scenario 2 FLOS/FLAS proposal as the baseline, incorporate appropriate aspects of the new Philippines proposal, conduct State safety assessments for the respective FIRs, determine any changes required and identify all the concerns and actions necessary to implement an enhanced Scenario 2, to be known as the Scenario 3, FLOS/FLAS in the WPAC/SCS area as soon as possible. The enabling activities referred to above would be completed in time for comprehensive review by the WPAC/SCS RSG/2 in June 2007.

Amend L625/B462 FLOS

6.43 The LHD analysis had identified that the LHD occurrences at the Manila FIR/Taipei FIR/Fukuoka FIR boundary involving ATS routes L625, B462 and B348 in proximity to AGVAR, POTIB, MEVIN were directly related to the differing FLOSs in use on either side of the FIR boundaries in this area. As such, the meeting considered that it was extremely important to urgently review and implement amended FLOS/FLAS arrangements to rectify this situation. States involved were requested to consider solutions to this situation that harmonized with the Scenario 2 FLOS/FLAS and the new Philippines proposal and could be incorporated into Scenario 3.

RASMAG Response to Scrutiny Group matters

6.44 The meeting was pleased to be able to respond to the issues that had been raised by the Scrutiny Group, noting that the plain language definition of LHD was shown at paragraph 4.2 of this report and that the LHD Category M had been clarified in the extensive reworking of the LHD Categories as shown in the Table 1 at paragraph 4.5.

6.45 The meeting agreed that the inclusion on the MAAR and PARMO LHD templates of the plain language definition of LHD, as well as a yes/no tick box in relation to whether affected ACC Supervisors had been informed of a LHD occurrence were worthwhile initiatives. An action item was added to the task list in this regard.

6.46 In considering the complex question that had been posed to the Scrutiny Group by IATA in relation to whether an aircraft suffering air-ground communications failure or similar inability to communicate with a ground station for an extended period of time should be treated as an LHD occurrence, the meeting engaged in extensive discussion. Subsequently, the meeting agreed that as a situation such as this would invoke established contingency procedures or, in other regional examples, be conducted under a managed and/or published airspace arrangement, the matter could not be considered a LHD as it would be managed by the contingency procedures that were implemented in response to the situation.

RASMAG List of Competent Airspace Safety Monitoring Organizations

6.47 RASMAG is required by its terms of reference to recommend and facilitate the implementation of airspace safety monitoring and performance assessment services and to review and recommend on the competency and compatibility of monitoring organizations. Accordingly, the meeting reviewed and updated the “RASMAG List of Competent Airspace Safety Monitoring Organizations” (shown at **Appendix K**) for use by States requiring airspace safety monitoring services.

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 considered complete and suitable for closure as well as those remaining open, noting the progress that had been made. Additional items were added, amongst others, in relation to the preparation of a working paper to the ATM/AIS/SAR Sub Group in July 2007 that analyses the effect of AIDC messaging on ATC to ATC unit coordination, and the preparation of a submission by Japan to advance to RMA status.

7.2 Action Item 2/3 in relation to the delivery of a safety workshop for States was closed on the basis that RASMAG had been unable to make any headway in this respect and, in any case, multiple training opportunities including ICAO seminars had been delivered in the region over the last 12 months.

7.3 The meeting agreed that the updated task list included as **Appendix L** accurately reflected the work programme of RASMAG.

Agenda Item 8: Any other business

Finalisation of ATS Contingency Plans for Indonesia

8.1 The meeting was informed about the outcome of ICAO Special Implementation Project (SIP) – Contingency Plan approved by the ICAO Council for 2006 pursuant to APANPIRG Conclusion 16/15. The draft National ATM Contingency Plans of Jakarta and Ujung Pandang FIRs, which were prepared as a result of the 2006 ICAO Special Implementation Project, were adopted by APANPIRG/17 Conclusion 17/11 as a model for Asia/Pacific States in the preparation of national ATM contingency plans.

8.2 During an April 2007 meeting in Jakarta, Indonesia led by the Regional Office, the ATS Contingency Plans for the Jakarta FIR and Ujung Pandang FIR were finalized and authorized by the Indonesian authorities. Soft copies of the Indonesian National ATS Contingency Plans for the Jakarta FIR

(Part I) and Ujung Pandang FIR (Part II) are available from the Secretariat. The Contingency Plans are also available from the Directorate General of Civil Aviation Indonesia, PT (Persero) Angkasa Pura I (AP-I) and/or PT (Persero) Angkasa Pura II (AP-II).

8.3 The meeting noted the availability of up-to-date ATS Contingency Plans for the entire Indonesian international airspace and that these would form the regional model.

AIDC Interface Control Document Version 3

8.4 The ATS Interfacility Data Communication Review Task Force Meeting (AIDC/TF) was held during February 2007. The AIDC Task Force had been re-convened under the terms of APANPIRG Decision 17/13 primarily for the purpose of updating the Asia/Pacific Regional Interface Control Document for ATS Interfacility Ground/Ground Data Communications (AIDC ICD) to produce a Version 3 ICD.

8.5 In undertaking the development of an updated version of the Asia/Pacific ICD to meet the provisions of Decision 17/13, amongst other things the AIDC/TF reviewed a series of working papers that had been prepared by members of the Informal South Pacific ATS Coordination Group (ISPACG). The ISPACG had been working with differing AIDC implementations in various parts of the South Pacific for several years and had identified a number of matters in the ICD Version 2 document, issued March 2003, that needed updating. An additional Appendix was also added to the ICD to include template versions of bilateral letters of agreement for AIDC arrangements.

8.6 A copy of the draft ICD Version 3 document was provided to the meeting for review. Feedback should be provided to the Regional Office prior to June 2007 to ensure the provision of a final Version 3 document to APANPIRG/18 in early September 2007 for adoption as updated regional guidance material.

8.7 Of interest to RASMAG were the concerns raised during the ISPACG/21 meeting (March 2007, Auckland, New Zealand) which relate to the increasing use of AFTN based AIDC and the need for suitable end-to-end performance to be achieved. Some messaging complexity highlighted during the ISPACG/21 discussions seemed to suggest that a monitoring mechanism and activities along the lines of the current datalink monitoring arrangements may be necessary to ensure AFTN performance is adequate for timely AIDC performance.

AIS Implementation Task Force

8.8 The Second meeting of the AIS Implementation Task Force (AITF/2) was held from 6 to 9 February 2007 at ICAO Asia and Pacific Office. The meeting noted new provisions for the implementation of digital terrain data and digital aeronautical charts, and reviewed the following topics from the summary report of AITF/2:

- Conduct of Comprehensive AIS Survey
- Review of Air Navigation Deficiencies in the AIS Field
- Latest Developments in the AIS Fields
- Review of Euro OPADD (Operating Procedures for AIS Dynamic Data) Edition 2.0 and Determination of Update Requirements for Asia/Pacific OPADD
- Status of the AICM/AIXM Implementation
- Performance Based Navigation

Implementation of Air Traffic Flow Management across the Bay of Bengal

8.9 The Tenth Meeting of the Air Traffic Flow Management Task Force (ATFM/TF/10, 30 April - 3 May 2007) took a 'Go' decision to advance the ATFM procedures that had been under test in the Bay of Bengal ATFM operational trial since July 2006 to an operational implementation. The 'Go' decision would result in the seamless advance from operational trial to permanent implementation of ATFM procedures in the affected airspace on 5 July 2007.

8.10 Traffic metering for westbound traffic operating from South-East Asia across the Bay of Bengal via the Kabul FIR to Europe during the congested night time period became necessary to manage the large volume of traffic entering the Kabul FIR (Afghanistan) during the period 2000 - 2359UTC daily. Traffic metering is undertaken using the automated web-based Bay of Bengal Cooperative ATFM System (BOBCAT) developed specifically for this purpose by Aeronautical Radio of Thailand Ltd (AEROTHAI) and the ATFM/TF, in conjunction with a dedicated Air Traffic Flow Management Unit (ATFMU) established at Bangkok ACC. Wheels Up Times and Kabul FIR entry slot times (including flight level and ATS route) calculated by the BOBCAT system are issued to affected flights well before departure from affected ports.

Agenda Item 9: Date and venue of RASMAG/8 meeting

9.1 It was apparent to the meeting that, although good progress had been made in addressing some of the long standing safety issues that had been previously identified by RASMAG, a further meeting in about 6 months time was necessary. Amongst other things, this would enable the RMA submission from Japan to be reviewed and would allow RASMAG to assist with the safety oversight of implementation of RVSM in China if so desired.

9.2 The meeting recognized the difficulties in trying to identify a meeting opportunity that did not clash with the November SASP meeting, United States public holidays and the regional office ATM meeting programme. In scheduling the RASMAG/8 meeting over 4 days from **Tuesday, 11 December to Friday, 14 December**, the meeting noted the clash with an existing Regional Office commitment to the ICAO USOAP programme. If it was necessary for the USOAP audit to take preference, the RASMAG/8 meeting would be rescheduled in January 2008.

Closing of the meeting

10.1 The Chairman, Mr. Butcher, thanked the meeting participants for their valued participation in RASMAG and noted the excellent work that had been achieved as a result of having such a broad level of expertise available to the Group. Mr. Butcher noted that the meeting had been able to provide well considered advice for APANPIRG on a way forward to resolving the long term issues associated with funding for regional monitoring activities and hoped that States would be in a position to provide the necessary legal and financial experts required to facilitate the work of the RASMC/TF.

10.2 The meeting had heard positive feedback from the first meeting of the WPAC/SCS RVSM Scrutiny Group that had been established by APANPIRG to address the RVSM operational problems in the WPAC/SCS area and it was evident that the Scrutiny Group was serving as an effective mechanism by which to address these issues. Mr Butcher also thanked the meeting for the significant technical work undertaken during the course of the meeting that reviewed and developed processes and procedures used by the RMAs in providing safety assessments for RVSM.

10.3 The meeting was reminded of the not insignificant work undertaken by the region's RMAs in providing safety assessments and noted the general improvement in the availability of data for this purpose. However, he noted that there was still a need for more reliable data provision from a number of States and encouraged the members of RASMAG to assist in resolving this issue where possible.

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LIST OF WORKING and INFORMATION PAPERS

WORKING PAPERS

NUMBER	AGENDA	TITLE	PRESENTED BY
WP/1	1	Provisional Agenda	Secretariat
WP/2	2	Summary Report of First Meeting of the Regional Airspace Safety Monitoring Committees Task Force	Secretariat
WP/3	5	Summary of Commencement of RMA Activity of JCAB for the Fukuoka FIR	Japan
WP/4	4	Amendments to the Guidance Material for End-to-End Safety and Performance Monitoring of Air Traffic Service (ATS) Datalink Systems in the Asia/Pacific Region	New Zealand
WP/5	5	State to be reported the Large Height Deviation	RVSM/TF Secretariat
WP/6	6	Review of RASMAG List of Competent Airspace Safety Monitoring Organizations	Secretariat
WP/7	7	Review of RASMAG Task List	Secretariat
WP/8	5	Summary of RVSM Airspace Safety Assessment for the Fukuoka FIR	Japan
WP/9	4	Guidance Material – Data Link Ground Equipment	Secretariat
WP/10	5	Summary of RVSM Airspace Safety Assessment for the Japanese Domestic Airspace	Japan
WP/11	6	Review of the 30 th Meeting of the RVSM Implementation Task Force and the Special Co-ordination Meeting for the RVSM Implementation by China	Secretariat
WP/12	6	Traffic Sample Data (TSD) State Letter	Secretariat
WP/13	5	The First Meeting of the Western Pacific/South China Sea RVSM Scrutiny Group (WPAC/SCS RSG/1)	Secretariat
WP/14	6	Summary Report of the Second Meeting of the Aeronautical Information Services (AIS) Implementation Task Force (AITF/2)	Secretariat
WP/15	4	Definitions of Large Height Deviations in RVSM Airspace	PARMO & MAAR
WP/16	5	Summary of the Airspace Safety Review for the RVSM Implementation in Asia Region	MAAR
WP/17	5	1 st Quarter 2007 Safety Monitoring Report from the Pacific Approvals Registry and Monitoring Organization	PARMO
WP/18	5	Safety Assessment for the South China Sea Airspace where a 60NM Lateral Separation Minimum is applied	MAAR
WP/19	3	Provision of CRA and RMA services	United States

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NUMBER	AGENDA	TITLE	PRESENTED BY
WP/20	5	Safety Assessment for the Introduction of RVSM within the Remaining Portions of Australian Domestic and Indian Oceanic Airspaces	Australia
WP/21	5	Safety Assessment for the Introduction of RVSM within the Remaining Portions of Australian Domestic And Indian Oceanic Airspaces	Australia

INFORMATION PAPERS

NUMBER	AGENDA	TITLE	PRESENTED BY
IP/1	-	List of Working Papers (WPs) and Information Papers (IPs)	Secretariat
IP/2	8	Summary of the 10 th Meeting of the BBACG Air Traffic Flow Management Task Force (ATFM/TF)	Secretariat
IP/3	8	The ATS Interfacility Data Communication Review Task Force Meeting (AIDC/TF)	Secretariat
IP/4	5	Summary of Analysis of ADS-C Data	Japan
IP/5	6	Finalization of the ATS Contingency Plan for Indonesia	Secretariat
IP/6	6	Summary Report of the Eighth Meeting of the FANS Implementation Team, Bay of Bengal (FIT-BOB/8)	Secretariat
IP/7	5	Report of Activity of the Central Reporting Agency (CRA) Japan in the North/Central Pacific and Southeast Asia	Japan
IP/8	6	Requirements for Establishment and Operation of an RMA	Secretariat
IP/9	5	Review of Developments Related to the Reduced Vertical Separation Minimum (RVSM) at the Eleventh Meeting of the Working Group of the Whole of the Separation and Airspace Safety Panel (SAS/WG/WHL/11)	United States
IP/10	3	Financing Safety Monitoring	Secretariat

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AMENDED TERMS OF REFERENCE PROPOSED BY RASMAG/7

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, *including the duties, responsibilities and scope of regional monitoring entities*;
- c) recommend, and facilitate *as necessary*, the implementation of airspace safety monitoring and performance assessment services;
- d) review and recommend on the competency and compatibility of monitoring organizations *and recommend to APANPIRG specific airspace responsibility for individual monitoring entities*;
- 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;
- c) aircraft separation applications using data link, e.g. ADS and CPDLC; and
- d) *ATS Unit to ATS Unit operational messaging using AIDC.*

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Amended Terms of Reference proposed by RASMAG/7

TERMS OF REFERENCE

**Task Force for establishment of
Regional Airspace Safety Monitoring Committees
(RASMC/TF)**

Objective

To develop proposals and take action to implement Regional Airspace Safety Monitoring Committees for the Asia/Pacific Region.

Terms of Reference

- a) Develop proposals for the establishment of Regional Airspace Safety Monitoring Committees including terms of reference;
- ~~b) Identify the appropriate regional monitoring entities and determine the number and area of responsibility;~~
- ~~c) Formulate the duties, responsibilities and scope of regional monitoring entities;~~
- d) Establish a formula for the basis of cost recovery as well as cost recovery mechanism;
- ~~e) Determine a methodology for assigning the responsibility for a regional monitoring entity to a State.~~
- f) The RASMC/TF will report via RASMAG to the APANPIRG.

Composition

ICAO will facilitate the Task Force, which will consist of designated experts from the following States:

1. Australia,
2. China,
3. Fiji,
4. India,
5. Japan,
6. New Zealand,
7. Republic of Korea,
8. Singapore,
9. Thailand,
10. United States of America



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: Other Air Navigation Matters

**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.

(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.

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 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 RSHM. 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 DGCAs (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 (DGCA's 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

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



**DRAFT GUIDANCE MATERIAL
FOR THE ASIA/PACIFIC REGION
FOR ADS/CPDLC/AIDC GROUND SYSTEMS
PROCUREMENT AND IMPLEMENTATION**

Draft V-0.9

Issued by the ICAO Asia/Pacific Regional Office, Bangkok

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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 navigation service providers (ANSP) 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 air traffic service (ATS) interfacility datalink communications (AIDC).

Integrated datalink systems are playing an increasingly important role in air traffic management. Datalink operations support reduced separation minima and so directly contribute to increased airspace capacity. Controller and pilot workload is reduced, and operational safety enhanced, by the automation enabled by datalink systems. As the use of these systems spreads, so more ANSPs must equip with the appropriate facilities.

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

Technical systems must be carefully 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 that good solutions may be excluded.

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.

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.

For the purposes of this material, it is assumed that the ANSP is the organisation setting out to procure 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

A key objective of datalink systems is to support reduced separation minima: any new datalink system should be capable of supporting 30NM lateral and 30NM longitudinal separation based on RNP 4.

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. There are two forms of ADS: broadcast ADS (ADS-B) and contract ADS (ADS-C). With ADS-B, aircraft broadcast positional data up to twice per second; the data may be used by ground systems (and other aircraft). With ADS-C, aircraft report directly to one or more ground systems with specified data at predetermined intervals (usually tens of minutes).

Note: Throughout this document, the abbreviation ADS refers to ADS-C.

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 will 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.

1.3.2 CPDLC

Controller Pilot DataLink Communications (CPDLC) 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 ATSUs 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 ATSUs, including the exchange of free-text messages.

Other than the formal international communication protocol standards, internet protocol (TCP/IP) as a flexible and low cost de-fact industry standard is recommended.

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CHAPTER 2 PROCUREMENT

2.1 GENERAL

2.1.1 System Quality

The overall quality of a system, the Total System Quality, is the product of three main elements: the quality of the design, the quality of production and the quality in operation.

The **Design Quality** is a measure how well the design process has translated the operational requirements into user specifications and the user specifications into product specifications. The design quality depends upon both the definition of operational requirements and development of user specifications by the ANSP and the system design skills of the vendor. If the operational requirements are not well defined, the specification will be compromised and the system design cannot be expected to meet the real requirements. Similarly, if the specification does not correctly reflect the operational requirements, neither will the system design.

The **Production Quality** is a measure of how exactly the products match the specifications, and applies to the hardware, the software and the integration of these to form the system as a whole. In general, the vendor is responsible for production quality.

The **Operational Quality** is a measure of how the actual operation of the system realizes the operational objectives. This depends primarily on the way the system is operated: a badly operated system is not a good system. The operational quality is mainly influenced by the operational management of the ANSP.

The **Total System Quality** is the product of design quality, production quality and operational quality. To achieve high total system quality is clearly necessary to maintain the highest possible quality in each of the three areas.

Cooperation between the ANSP and the vendor is essential to achieve a high total system quality.

2.1.2 Roles and Responsibilities of the ANSP

The ANSP is ultimately responsible for successful implementation of the system. It is therefore vital that the ANSP takes a positive and active role throughout the system procurement and implementation.

The vendor is only responsible for developing and integrating a system to the ANSP's specific requirements.

Air traffic controllers, as the end-users of the system, must 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 controller input. Clearly defined system requirements and specifications are vital in order for potential vendors to be able to offer a suitable system.

Controllers should also be able to contribute to the design, development and integration activities, and must be directly involved in the testing and commissioning processes.

2.1.3 Relationships: Requirements, Specification and Test/Evaluation

The figure below shows the relationships between the operational requirements, the system requirements, the specification, the design and the test and evaluation process. 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.

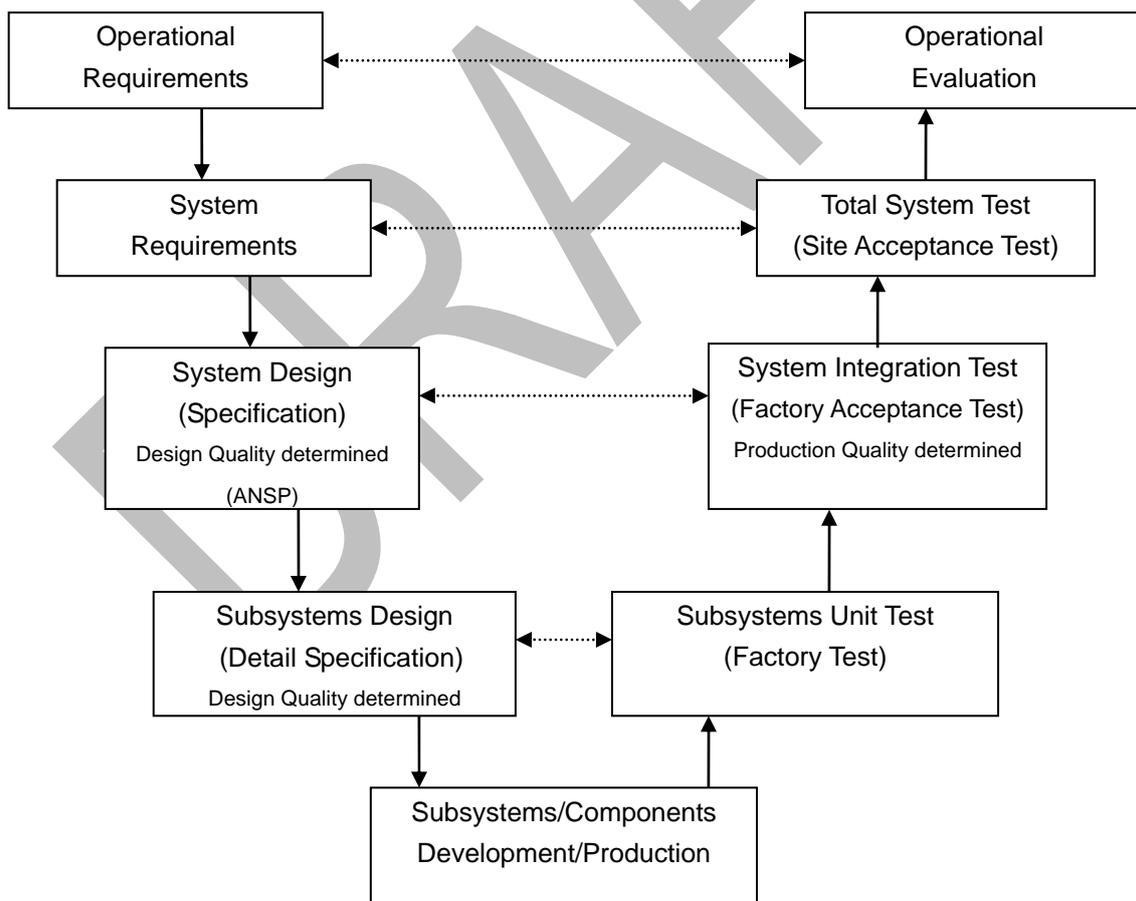


Figure1. Relationship between Requirement, Specification and Test/Evaluation

2.2 PROJECT MANAGEMENT

A project manager should be appointed as early as possible in the project. The basic role of the project manager is to ensure that the project proceeds within predetermined time, resource and cost boundaries. Project management requires a range of special skills, and serious consideration should be given to employing a professional project manager for the duration of the project.

The project manager must be given appropriate levels of financial and organisational authority so that he or she can make project decisions without constant recourse to higher management. It is essential that the terms of reference of the project manager are clearly documented and that they detail these authorities.

The project manager will be responsible for managing all aspects of the project, with particular emphasis on scheduling the many activities of ANSP personnel to match those of the system supplier. He or she will also play a major role in keeping the project within the time and budget constraints by determining what, if any, changes are made to the scope of the contract.

2.3 PLANNING AND CONTRACTING

2.3.1 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 clearly define precisely what the system is to do. Operational requirements should not define how the results are to be achieved – that can be done in the specification.

There is no place for choice in a requirement, and the wording must reflect this; “must”, “shall” and “will” make requirements mandatory. The use of words such as “may”, “should” and “could”, “maximum” and “minimum” and “if”, “except” and “unless” make a requirement imprecise, because the reader does not know exactly what is required. “There should be 10 sectors” or “there should be at least 10 sectors” is vague. “There will be 10 sectors” is precise and leaves no doubt as to what is required.

The operational requirements should be established by a team of experienced controllers whose professional knowledge and experience encompasses all aspects of the ATS operation; the team should also include engineers and, as necessary, other specialists.

2.3.1.1 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 should be considered when developing the specification and during the contract negotiation phase; in the latter case, a supplier could be invited to change such features in an otherwise satisfactory system.

2.3.1.2 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.
- The required separation minima (30/30NM horizontal separation or better)
- Traffic flows (routes, number, flight levels, etc.).
- ATS procedures.
- Related ATS facilities.

2.3.1.3 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. The operational requirements can then be determined, if necessary using the projected environment at several points during the projected system life, and should detail, at the very least:

- The anticipated peak and mean traffic levels.
- The number of sectors, based on the traffic levels.
- Specific services for each sector.
- Inter-sector services.
- Inter-ATSU services.

Once these are established, the specific requirements to provide these services, such as displays and communications, can be determined.

2.3.2 Design and Review

The next stage is for the team to 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; any changes proposed should be discussed with the team and the concept modified accordingly.

2.3.2.1 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.
- System operation (e.g. redundant parallel operation, automatic recovery, etc.).
- Standards to be applied (e.g. ARINC-745, RTCA DO-258A).
- Interface requirements for related ATS facilities.
- Datalink Service Provider (DSP) and its interface.
- Human Machine Interface (e.g. display size, use of colour, input devices).

The document should also identify any new operational procedures that may be required, both for new techniques, such as the use of ADS, CPDLC and AIDC, and for other changes.

2.3.2.2 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. Preliminary information from vendors will give an indication of the systems and capabilities that are available, so that the team can decide on the most appropriate procurement option:

- A standard “off-the-shelf” system.
- A customized off-the-shelf system.
- A 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.

2.3.2.3 Specification

When the operational requirements and the feasibility studies have been completed the specification can be developed. This is discussed in detail in CHAPTER 5.

2.3.2.4 Design Review

The purpose of this design review is to ensure that the conceptual design meets each and every one of the operational requirements and that it is technically achievable and attainable.

The design review team should be independent of the requirements team but should also comprise controllers, engineers and managers. The review may take the form of a walk-through of the conceptual design documents or a desk-top simulation.

The design review report should cover:

- Compliance with operational requirements.
- Connectivity with related systems and adjoining facilities.
- Flexibility and expandability in the future.
- Any operational or technical issues.

2.3.3 Request for Proposal (RFP)

A fully-documented and approved Request for Proposal (RFP) should be submitted to prospective vendors.

2.3.3.1 Objective

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

2.3.3.2 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.
- Operating environment, including:
 - External temperature and humidity ranges.
 - Temperature and humidity ranges in the equipment area and operational area.
 - Mains power supply voltage and frequency.
- Acceptance testing requirements.
- 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.

2.3.3.3 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 issuing a bulletin to all bidders containing each question received and the response. This should be done at frequent intervals so that vendors have time to adjust their proposals if necessary.

2.3.4 Evaluation of Proposals

Proposals must not be opened before the stated final date for bids.

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.

Once the preferred bidder has been selected, the other bidders should be informed that they may be invited to negotiate if a contract cannot be concluded with the preferred bidder.

2.3.5 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 ANSP.

It is important that the negotiations cover all aspects of the contract, including the vendor's schedule. The negotiating advantage is with the purchaser until the contract is signed; it then passes to the vendor. Changes made after the contract has been signed are inevitably costly and often time-consuming.

The negotiations must be clearly documented.

If a satisfactory contract cannot be concluded, the next preferred bidder may be invited to negotiate a contract; alternatively, the tender process may be started again, but this is a costly process and is unlikely to produce a better outcome.

When the contract has been signed, the other bidders should be informed.

CHAPTER 3 IMPLEMENTATION

The implementation phase begins when the contract is signed.

Typically, the vendor's activities during the implementation phase include design review, manufacture, factory testing, documentation, training, delivery, installation, site acceptance testing and handover.

The ANSP is involved in all these activities to some degree, except manufacture; but the ANSP must also prepare for the operation of the system. This will involve developing test requirements, planning training, organising staff deployment, developing procedures and planning the operational transfer from the existing to the new system.

3.1 IMPLEMENTATION SCHEDULE

The project manager can now use the vendor's schedule as the basis for finalising the overall project schedule. The project schedule should detail all anticipated activities, including system design reviews, factory and site acceptance tests, training (both vendor training and internal training), commissioning and operational transfer. The schedule should also show related activities such as development of operational and technical procedures and preparation of operational material such as charts.

3.2 CONTRACT SUPERVISION

The project manager is normally responsible for supervision of the contract works. This can generally be achieved by monitoring the vendor's progress reports, at least until the vendor starts work on site.

It is likely that desirable changes to the specification or the contract will be identified during design reviews or factory testing. However, careful management of change is essential. Every change will incur costs and delays.

A formal change control system should be implemented, with every change being submitted for approval only after costs and delays have been established. The procedure should identify the levels of cost and delay that the project manager can approve.

3.3 SYSTEM DESIGN REVIEW

This review takes place after the vendor has completed the design for the system, and, as with the concept design review, is intended to ensure that the design meets all the operational and technical requirements. The design review is the point at which the design quality is determined. It is also the last stage at which design changes should be made; however, changes made at this stage are likely to incur costs and delays.

3.4 FACTORY ACCEPTANCE TEST

The factory acceptance test is the last opportunity for the ANSP to identify problems before the system is shipped out from the factory and is the point at which the

production quality is determined. It is also usually the first opportunity for ANSP personnel to examine and try out the system, and is often combined with factory-based training. It is important that operational as well as technical personnel attend the factory acceptance: it should be a test of operational features as well as of technical compliance.

The vendor should produce a detailed test schedule well before the beginning of the test, so that the ANSP can consider whether the tests meet the requirements and whether any additional tests should be included.

The results of any tests performed by the vendor before the acceptance test should be made available at the start of the acceptance test.

Any problems that are encountered during the factory test should result in agreed corrective actions to be undertaken by the vendor. These may be carried out before shipping or on site, according to the nature of the problem. The results of the factory test form an important part of the contract documentation, as they record the performance of the system and the agreed corrective actions.

3.5 PREPARATION FOR OPERATION

There are a number of items that the ANSP must address in preparation for operation of the new system. These include:

- Development of operational procedures.
- Development of system management procedures.
- Preparation of system data (for maps, etc).
- Establishment of system parameters.
- Development of internal training courses for controllers, system operators and technical staff.
- Development of operational transfer plan.
- Safety assessment.

The ANSP is responsible for carrying out these tasks, although some assistance and information from the vendor will be necessary to complete them. Some of the work can be carried before the installation begins, but it may be more convenient to leave some until the vendor's specialists are on site.

While it is not appropriate for this guidance material to address each item in detail, some items do merit discussion.

3.5.1 Operational Procedures

The FANS 1/A Operations Manual (FOM) has been adopted for Regional use and contains the procedures for the use of the datalink applications.

The ANSP may need to develop other procedures.

3.5.2 System Management Procedures

Procedures for managing the system must be developed. These should cover such topics as system start, changeovers between “main” and “standby” systems, contingency operations, map data management, data recording and monitoring,

3.5.3 Preparation of System Data

The ANSP will be required to provide data to define, for example, FIR boundaries for hand-off processing and airspace maps for the display system. The vendor will provide details of the information required and may either process the data into the system or, preferably, train and assist the ANSP staff to do so.

The preparation of this type of data can be a very detailed and time-consuming process, and due allowance should be made in the project plan.

3.5.4 Establishment of System Parameters

System parameters are used to set values for a number of variables used in the software. These parameters can be changed, but normally only by software specialists. Typical system parameters include timer intervals, for example to set the default interval between ADS periodic contracts, standard range settings, display colours, etc.

The vendor will detail the system parameters and will be able to suggest suitable values; however, the ANSP must make the final decision on each parameter. The parameters should be set before site acceptance testing, so that their effect can be determined. The parameter values should be finalised before operational transfer and changes avoided during the initial period of operation.

3.5.5 Development of Training Courses

It may not be practical or appropriate for the vendor to provide initial training for all personnel, and future training requirements must also be considered. The ANSP must develop its own training courses to complement the initial training by the vendor and to meet its future training requirements.

3.5.6 Operational Transfer Plan

The operational transfer plan should detail each step of the transfer, particularly with regard to contingency measures to recover from system problems or unexpected operational difficulties.

For each step, the plan should give details of the timing, the people involved and any other resources that may be required. It is important to clearly define the measures or events that determine that each step has been satisfactorily completed.

It is also important that the plan is made widely available so that everyone involved understands what will happen.

The operational transfer process is discussed in 3.8 below.

3.5.7 Safety Assessment

It is most important that a safety assessment (or safety case) is prepared for the introduction and operation of the system. The purpose of the safety assessment is to identify all the risks associated with the introduction and operation of the system, to establish the level of each risk and to determine how those risks can be removed or reduced to an acceptable level.

Examples of risks are ADS link failure, workstation failure, inadequate controller training, and failure to close a CPDLC message sequence.

The resulting safety assessment document will list all the risks that have been identified, the associated risk levels and the measures adopted to remove or mitigate each risk.

Safety assessments are described in detail in ICAO Doc 9859, Safety Management Manual.

3.6 TRAINING

Comprehensive training is vital so that controllers, system operators and maintenance personnel must all be able to carry out their tasks competently and effectively as soon as the system becomes operational. A comprehensive training plan is a prerequisite for a successful training programme.

Training is perhaps the most important of all the preparatory tasks.

3.6.1 Controller Training

While the separation standards that controllers apply will probably not change, at least not immediately on introduction of the new system, the tools they use will have changed significantly. The training must cover both the operation of the new workstations and the associated tools and, equally importantly, the procedures for using the datalink applications.

Training on the manipulation of the displays and controls should be provided initially by the vendor, and the ANSP's training staff should be included in the first courses. The training staff can then develop and deliver that training.

The procedures for the use of datalink applications have been developed within the Region and are laid out in regional documents. The vendor cannot be expected to provide training on datalink procedures; this is a task that must be performed by professional training controllers. The training modules must be developed well in advance, ideally in cooperation with the training sections of other ANSPs that have experience of datalink operations.

The timing of the training is important. There will almost certainly be several courses to train all controllers, and all training should be completed before operational transfer. The controllers on the earliest courses may have difficulty remembering what they have been taught; one solution is to provide short refresher courses shortly before operational transfer.

3.6.2 System Operator Training

The operation of the system includes starting and stopping the system, switching between operational and standby units, rebooting, system recovery, changing system parameters, loading data for maps, etc, and installing software changes.

The vendor must provide the first training courses for system operators. The syllabus must include the items identified above, with sufficient background to allow the operators to understand the implications of the various actions that they will be expected to perform. They should also be given a good understanding of the various functions of the system.

The training should include practical sessions using the full system, so that the operators experience the various tasks at first hand.

3.6.3 Maintenance Training

The first training courses for maintenance technicians must also be carried out by the vendor. With systems of this type, technicians must be able to diagnose faults down to circuit board level. However, as these systems include a number of computers, technicians must have an understanding of the general software structure. They should also be trained to differentiate between hardware and software faults, and to undertake simple software recovery activities.

3.6.4 Simulator Based Training

If simulator facilities are provided as part of the system, a large proportion of the training can be carried out using these facilities. Simulators are particularly valuable in allowing controllers to experience unusual or exceptional conditions, such as traffic overloads, weather deviations, route changes, emergency descents, conflicts and system failure.

3.7 SITE ACCEPTANCE TEST

The site acceptance test is the last stage before handover by the vendor. This test is crucial. It is the last opportunity to identify problems while the system remains the responsibility of the vendor and should be resolved at the vendor's expense. Once the acceptance documents are signed, the vendor can fairly claim that any new problems are the responsibility of the ANSP and will seek costs if asked to rectify them.

The vendor should produce a test schedule well before the tests are due to start, but it is unlikely that the schedule will contain tests that exercise operational procedures. The

ANSP, in consultation with the vendor, should develop operational scenarios that will test a wide range of procedures and functions and add these to the schedule.

3.7.1 Physical Checks

The first stage is typically a physical inspection and inventory check to ensure that all items are present and serial numbers recorded accurately. It is important to inspect the physical condition of all units and record any defects.

3.7.2 Technical Tests

This is generally followed by the technical tests which establish whether the system is correctly set up and is working properly. The system parameters are usually set during these tests, though some may need to be adjusted during the operational tests. System start-up, changeover and shut-down procedures, as well as contingency degradation and recovery processes, must also be tested.

3.7.3 Operational Tests

The operational tests determine whether the operational characteristics are correct, the controls function as expected and the system handles incoming and outgoing data correctly. There should also be tests to ensure that the system operates correctly under the specified maximum load.

These tests will typically take several days to complete as all functions must be tested from all workstations. A number of typical scenarios should be prepared in advance so that the tests can be carried out in a realistic environment.

It is essential that live testing of the datalink functions takes place. Tests of ADS and CPDLC will require the cooperation of either one or more airlines or alternatively an aircraft manufacturer with a suitable test-bench. If airlines are used, it must be quite clear that ATS instructions passed are for test purposes and are not to be complied with.

3.7.4 Results

As with the factory test, it is most important to record, in detail, all problems and unusual occurrences.

The outcome of the test should include an list of corrective actions to be undertaken by the vendor within an agreed timescale.

3.8 OPERATIONAL TRANSFER

The most usual ways of transferring operation to a new system are the phased transfer and the parallel operation transfer.

3.8.1 Parallel Operation Transfer

The parallel operation transfer starts with old system being used operationally and the new system running in parallel with its controllers going through their

tasks as though that system was operational. When the time comes to switch over to the new system, the old system is operated in parallel for a short time as a fall-back in case of unforeseen problems. Operation of the new system need not be full-time until shortly before transfer: for example, it would be appropriate to start parallel operations during low traffic periods and work up to busy periods. H24 parallel operation is not necessary until immediately before and after transfer.

The parallel operation transfer is generally preferable as it allows the new system to be run, in its entirety, in an environment that is as close as possible to fully operational before actually taking over the operational load. However, it does require full staffing of both systems during periods of parallel operation.

3.8.2 Phased Transfer

In the phased approach, operations are transferred bit by bit, typically one sector at a time, until the whole operation is running smoothly on the new system. This type of transfer may be more appropriate where the space available dictates that only one or two positions can be transferred at a time or where limited staff numbers mean that it is impossible to operate both systems simultaneously.

In this type of transfer, it is good practice to keep at least one sector available on the old system as a contingency position.

3.8.3 Preparation for Transfer

The transfer must be carefully planned; in particular, there must be close coordination with external ATS units that may be affected. Staff must be thoroughly briefed before the start of the transfer process and must be kept informed of any changes to the plan.

The criteria for deciding when operations can be transferred to the new system must be clearly defined in advance. If a phased transfer is planned, transfer criteria should be set for each phase.

It is quite possible that problems will arise and it may be necessary to return the operation to the current system or to the last successful step, as appropriate. The reversion process should be established in advance – if contingencies have not been planned for, it is very likely that mistakes will be made and the problem compounded.

After the transfer has been successfully completed, it is useful to hold a debriefing to determine what went well and what did not. This can identify potential problems and possible areas of concern with both the technical and the operational aspects of the system and the new procedures.

CHAPTER 4 REQUIREMENTS

4.1 GENERAL REQUIREMENTS

The integrated ATS datalink system will incorporate AFN, ADS, CPDLC and AIDC.

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

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

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

The 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.
- Electronic flight progress strips, and paper strips if required.
- Presentation of emergency status.
- Other information pertinent 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.

- Anticipated growth of FANS operation.
- Number of displays.
- Number of connections for terminal systems.

4.1.1 Notification of Error Messages

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

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

Controllers will be notified when the 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 and/or deactivating various timer values for the messages received in response to transmitted messages, the system will monitor whether or not aircraft responses arrive within a specified time limit.

Timers are generally based on the operational requirements of 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 concerned.

A timer file will be provided in the 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 Applicable Documents

4.1.3.1 ICAO Documents

Annex 10, Volume III, Communication Systems

Manual of Technical Provisions for the Aeronautical
Telecommunication Network – Doc 9750

Manual of Air Traffic Services Data Link Applications – Doc 9694

Regional Supplement to the ASTERIX Interface Control Document
(ICD) for the Asia/Pacific Region

Asia/Pacific Regional Interface Control Document (ICD) for ATS
Inter-facility Data Communications (AIDC), version 2

Guidance Material for End-to-End Safety and Performance Monitoring
of ATS Datalink Systems in the Asia Pacific Region

FANS 1/A Operations Manual

4.1.3.2 Industry Standards

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

- ARINC 622: ATS Datalink Applications over ACARS Air-Ground Network (end-to-end).
- RTCA DO-258/EUROCAE ED-100: 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

The Central Reporting Agencies (CRAs) perform safety assessments of datalink performance, and to support this function, in accordance with the FOM,

ATSUs are required to produce monthly statistics of end-to-end system performance in daily operations. The system performance criteria from the FOM are reproduced at APPENDIX C. The system should have appropriate tools for monitoring and analysing the performance data for reporting to the appropriate monitoring agency.

4.2 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 system and aircraft avionics systems for:

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

Note: Details of Datalink Initiation Capability (DLIC) 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 system must be capable of accepting or rejecting AFN logon requests.

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

4.2.2 Use of AIDC for Forwarding AFN Message

The ATS 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 system will be capable of processing the specified number of message exchanged 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 system will have the capability of terminating CPDLC connection with the aircraft.

4.3.2 Transfer of CPDLC between ATC Sectors

The 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 system will be capable of handling the message set and the standardized free text messages defined in the FOM, as well as free text.

The 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 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 FOM.

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

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

The system will apply validation checks to incoming data by reference to flight plan data in relation to time, altitude, direction and position.

The 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.

The datalink system should have the capability of supporting 30NM lateral and 30NM longitudinal distance based separation standards.

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 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

General descriptions of 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 ATSU's are necessary to determine the operational and system requirements for both ATSU's, and should be made before developing the system. 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 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 Annex 10, 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 Systems 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. System specifications should be based primarily on operational requirements; the technical specifications should be framed to support those requirements. Specifications produced by technical personnel tend to concentrate on technical features, sometimes at the expense of operational suitability.

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, the operator interface, system capacity, and recording and data analysis.

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, is it to be part of an integrated system or is it to be 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?
- Is complete duplication of the system required?
- What are the requirements for main/standby computers and independent contingency workstations?
- Will there be 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 Datalink 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 DSPs 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 DSPs; ARINC and SITA are the major DSPs; 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 DSPs, such as AVICOM Japan.

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

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

The AFTN is currently 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 surveillance data formats; specifying ASTERIX where possible will allow the greatest flexibility for the future. The ASTERIX Standard was adopted as the ICD for surveillance data exchange for the Asia/Pacific Region in 1998. 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 ADS B Data

Where ADS B data is available or anticipated, the system should be capable of accepting and processing such data.

5.2.7 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 in the FMC.

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 a ground system to cancel the emergency mode status, most ground systems do not have this capability; however, 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 an 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 (ACF) 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 OPERATOR INTERFACE

5.4.1 Human Factors

Human factors play a major part in the success or failure of a system to meet its operational objectives. A system that is uncomfortable to use will lead to

controller dissatisfaction, which as controllers are an essential part of the overall system, can only degrade the overall system performance.

Displays and keyboards that are poorly designed from a human factors aspect will be inefficient and may cause actual harm to the users. Bad display design can affect the eyes and bad keyboard design may result in occupational overuse syndrome (repetitive strain injury). The human factors implications of the system specification should be very carefully considered, and it may be appropriate to get specialist advice.

5.4.2 Displays

One or more displays are required to handle the ADS, CPDLC and AIDC messages. Many systems incorporate message handling in 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. It is essential that colour allocation is not arbitrarily decided, but is based upon sound human factors principles. Inappropriate colour choices can contribute to fatigue, confusion and errors. To avoid these problems, a human factors expert should be engaged to advise on the use of colour.

Different symbols should be used for radar tracks, ADS-B tracks, ADS-C tracks and tracks generated from flight plan information. The track symbol should be that of the source of the highest quality information. At the current stage of development of ADS-B systems, radar is generally accepted as the best surveillance data, followed by ADS-B and then by ADS-C. Flight plan tracks are the lowest quality.

The status of the CPDLC connection is important information for the controller and is best displayed in the track label.

5.4.3 Message Handling

Message handling for ADS, CPDLC and AIDC messages is usually achieved by some form of menu access for generating messages and by pop-up windows for replying to incoming messages. Most systems now offer access via the track label.

For CPDLC, there are two elements to generating most messages: selection of the specific message and entry of necessary data. The message selection should be simple: there are about 180 uplink messages available. Some

systems present a selection of appropriate messages – for example, by offering only height-related messages if the height field in the track label is selected. ADS contract messages are more simple and infrequently required, so that a simple menu-type operation is normally adequate. AIDC messages can usually be generated automatically from flight plan data.

If a particular message handling method is required, it should be clearly stated in the specification.

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 provisions 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.

5.4.4 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
- Temporary maps
- Bearing-distance lines
- Velocity vectors

- Label overlap avoidance

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 Temporary Maps

Temporary maps allow controllers to depict on the display areas of interest on a temporary basis. Temporary maps should be simple both to construct – a few straight lines is usually adequate – and to switch on or off on the display.

5.5.3 Bearing-Distance Line

As its name suggests, a bearing-distance line allows a controller to measure the bearing and distance between 2 points on a display. The points might be an aircraft track symbol and a reporting point or 2 aircraft track symbols.

Some systems allow one or both ends of the line to lock on to an aircraft track symbol, so that the bearing and distance information displayed is updated as the aircraft move.

Multiple bearing distance lines, if available, can be useful.

5.5.4 Velocity Vectors

Velocity vectors display a vector from the track symbol showing the calculated position of the track after a specific time. The time is normally preset to a default value (typically 2 minutes); most systems allow the controller to set a different value.

Some systems also allow velocity vectors to be shown for all tracks or for a selected track only.

5.5.5 Label Overlap Avoidance

Label overlap avoidance allows the track labels to be moved to avoid labels overlapping one another. This is done by rotating some labels to new positions relative to the track symbol or by changing the distance of some labels from their symbols. The process is normally automatic, but should allow the controller to set selected labels to a preferred position.

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.

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%

5.7 RECORDING AND DATA ANALYSIS

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 summarises the FOM datalink monitoring requirements for ANSPs.

Requirements	Monitor/Record
Operational Procedures	Time stamped ATS messages with identification and reference numbers
	Message Assurance
	Anomaly event report
Performance	End-system availability
	Transit times
Safety (i.e. operational, performance and 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

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
ANSP	Air Navigation Service Provider
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
DSP	Datalink Service Provider
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)

APPENDIX B 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
Safety Management Manual	Doc 9859	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 C 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.

3 END-TO-END ROUND-TRIP TIME

3.1 The end-to-end round trip message time may be measured as the time difference between the transmission of an AIDC message and the reception of the corresponding Logical Acknowledgement Message (LAM) or Logical Rejection Message (LRM). If the originating AIDC system receives neither a LAM nor an LRM from the receiving system within a specified time limit (a variable system parameter, typically between 1 and 3 minutes), it will declare a time-out, and the time-out parameter must be used as the round-trip time.

3.2 ~~Any All~~ AIDC messages requiring a LAM response may be used; ~~CPL messages are perhaps the most used and therefore the most convenient measuring results from a variety of message types should give a more representative overall result.~~

3.3 Because of variations in circuits used for AIDC, separate measurements should be made and reported for each ATSU with which AIDC messages are exchanged.

3.34 A large number of measurements of round-trip times should be averaged for performance reporting.

3.5 Note: if it is not practical to measure end-to-end times, one-way trip times may be measured by comparing the time-stamps of the outgoing AIDC message and the received LAM or LRM. The reverse path may be measured from the time-stamps of the received AIDC message and the corresponding LAM or LRM.

4 MESSAGE DELIVERY SUCCESS RATE

4.1 The Message Delivery Success Rate may be expressed as the percentage of messages successfully delivered to the destination ATSU.

4.2 Unsuccessful delivery is indicated by ~~either the reception of an LRM or~~ a time-out due to non-reception of a LAM or LRM within a specified time.

~~4.3 Case 1: LRM Received~~

~~4.3.1 When an AIDC system detects an error in a received message, it responds with a Logical Reject Message (LRM) to the originating system. Receipt of the LRM indicates that the original message was not successfully delivered.~~

~~4.4 Case 2: Time-out~~

~~4.4.13~~ The time-out indicates non-delivery of the message (and initiates various actions within the AIDC system).

$$\text{Message Delivery Success Rate} = 1 - \frac{\text{LRM} + \text{TO}}{\text{TOT}} = 1 - \frac{\text{TO}}{\text{TOT}}$$

Where:

~~LRM~~ = number of received LRMs

TO = number of Time Outs

TOT = total number of messages

4.54 A large number of measurements of delivery success rates should be averaged for performance reporting. Non-typical extended transit times should also be investigated.



International Civil Aviation Organization

**The Seventh Meeting of the Regional Airspace Safety Monitoring
Advisory Group (RASMAG/7)**

Bangkok, Thailand, 4-8 June 2007

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

**SAFETY ASSESSMENT FOR THE SOUTH CHINA SEA AIRSPACE WHERE A 60NM
LATERAL SEPARATION MINIMUM IS APPLIED**

(Presented by Monitoring Agency for Asia Region)

Summary

This paper provides a safety assessment for the South China Sea Airspace where a 60NM lateral separation minimum between RNP 10 approved aircraft is applied. The safety assessment is carried out for lateral separation on parallel tracks using December 2006 traffic sample data.

1. Introduction

- 1.1. This paper provides a safety assessment for the parallel tracks in the South China Sea Airspace where a 60NM lateral separation minimum between RNP 10 approved aircraft is applied.
- 1.2. The traffic sample data collected in December 2006 is used for this safety assessment.

2. Background

2.1. The standard collision risk model applied for this analysis is

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

2.2. **Table 1** presents the individual parameters used in the risk model, together with their definitions and assumed values. The values have been taken to be the same as in reference 5, where appropriate.

Model Parameter	Description	Value	Source for Value
N_{ay}	Number of fatal accidents per flight hour due to loss of lateral separation.	See below	
S_y	Lateral separation minimum.	60NM	Airspace characteristics
$P_y(S_y)$	Probability that two aircraft assigned to routes separated by the lateral separation minimum S_y are in lateral overlap.	See below	
$P_z(0)$	Probability that two aircraft operating at the same flight level are in vertical overlap.	0.538	Conservative value commonly used in most assessments
λ_x	Average aircraft length.	0.0318 NM	Analysis based on the submitted TSD
λ_y	Average aircraft wingspan.	0.0289 NM	
λ_z	Average aircraft height with undercarriage retracted.	0.0087 NM	
S_x	Length of longitudinal window used to calculate occupancy.	120NM	Airspace characteristics
$E_y(\text{same})$	Same direction lateral occupancy.	0.00	Analysis based on the submitted TSD
$E_y(\text{opp})$	Opposite direction lateral occupancy.	0.78	
$ \overline{\Delta V} $	Average relative along-track speed between aircraft on same direction routes separated by the lateral separation minimum.	13 Knots	Conservative value commonly used in most assessments
$ \overline{V} $	Average absolute aircraft ground speed.	480 Knots	
$ \overline{\dot{y}(S_y)} $	Average absolute relative cross track speed for an aircraft pair that lose all of their assigned lateral separation.	75 Knots	
$ \overline{\dot{z}(0)} $	Average absolute relative vertical speed of an aircraft pair that is assigned to the same flight level on adjacent routes.	1.5 Knots	

Table 1: Parameters associated with the Collision Risk Model for the Lateral Dimension.

2.3. Lateral occupancy is a measure of the density of traffic on a parallel route system. Lateral occupancy may be defined in terms of proximate pairs.

- 2.4. A pair of aircraft on adjacent parallel routes is said to be proximate if the aircraft cross adjacent fixes at the same level on their respective routes within the longitudinal window, S_x of each other, travelling in either the same direction for same direction occupancy, or in opposite directions for opposite direction occupancy.
- 2.5. Same (Opposite) direction lateral occupancy is defined as twice the number of same (opposite) direction proximate pairs divided by the total number of flights considered in the occupancy estimation.
- 2.6. The value of $P_y(S_y)$, the probability that two aircraft assigned to routes separated by the lateral separation minimum S_y are in lateral overlap, depends on the core lateral navigational accuracy of the aircraft as well as on the prevalence of gross lateral deviations. It is assumed that the core lateral navigational accuracy is RNP 10, namely that 95 percent of the time the lateral deviations will be within 10NM of the route centerline.
- 2.7. Using the standard collision risk model presented above and using the parameter values in Table 1, with $E_y(\text{Same}) = 0.00$ and $E_y(\text{Opposite}) = 0.78$, it can be seen that the maximum allowable values of the lateral overlap probability, $P_y(S_y) = 2.73 \times 10^{-9}$
- 2.8. Modeling the overall lateral errors of aircraft by double-double exponential densities, $DDE(y; \alpha, \lambda_1, \lambda_2)$, where λ_1 is related to the RNP value, and assuming that $\lambda_2 = S_y$, as is usually done in lateral collision risk estimation, $P_y(S_y)$ may be readily calculated, see for example reference 4. Reference 4 also gives a relationship between $P_y(S_y)$ and ζ , the probability of a lateral error within 10NM of an adjacent route, and also between $P_y(S_y)$ and η , the probability of a lateral error at least as large as half of the route spacing.
- 2.9. Given the parameters and other values assumed above, if $\eta \leq 1.30 \times 10^{-4}$ or $\zeta \leq 1.26 \times 10^{-6}$, then N_{ay} will be less than the Target Level of Safety of 5×10^{-9} fatal accidents per flying hour.
- 2.10. Provided the gross lateral errors in the South China Sea will be such that they satisfy $\eta \leq 1.30 \times 10^{-4}$ or $\zeta \leq 1.26 \times 10^{-6}$, then the lateral collision risk will be less than the Target Level of Safety of 5×10^{-9} fatal accidents per flying hour.
- 2.11. To determine whether a route system meets the target level of safety for lateral dimension, Sequential Sampling Procedure is applied. (Reference 6)
- 2.12. **Table 2** presents parameters used in Probability Ratio Sequential Test, together with their definitions and assumed values.

Model Parameter	Description	Value
η_0	Rate of gross error applicable to H_0	1.04×10^{-4} (80% of η_1)
η_1	Rate of gross error applicable to H_1	1.30×10^{-4} (η_m)
α	Type-I error: The test rejects H_0 (and accepts H_1) when H_0 is true (and H_1 is false)	0.05
β	Type-II error: The test accepts H_0 (and rejects H_1) when H_0 is false (and H_1 is true)	0.05

Table 2: Parameters used in Probability Ratio Sequential Test

- 2.13. Choosing the two hypothetical values (η_0 and η_1) close to each other would make the test more accurate. However, the cost of reducing the difference is a large increase in the number of trials needed for the sequential test to reach a decision.
- 2.14. There has been no report of Gross Navigation Error (GNE) during the past 2 years or a combine of 108,337 flight movements from four designated monitoring areas that are DULOP-DUMOL, AKOTA-AVMUP, LULBU-LEGED, and MELAS-MABLI.
- 2.15. The result from probability ratio sequential test is provided in the **Figure 1**.

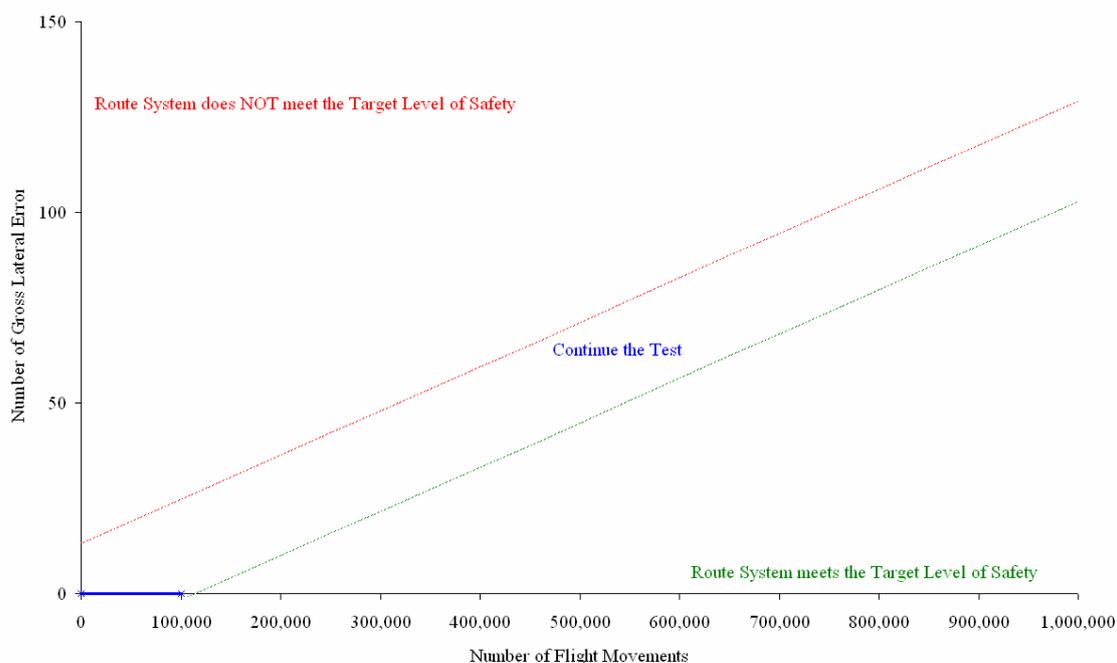


Figure 1: Result from Probability Ratio Sequential test

3. Conclusion

- 3.1. Based on information available, the result is still inconclusive as it neither accepts nor rejects the hypothesis as number of flight movements is below the minimum movements required even without a report of gross navigational error.
- 3.2. Nonetheless, it is expected that the target level of safety will be met provided that no significant gross navigational error occurs.

.....

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— END —



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منظمة الطيران
المدني الدولي

国际民用
航空组织

Ref.: T3/10.0, T3/10.1.17 – AP105/06 (ATM)

7 November 2006

Subject: December collection of one month
Traffic Sample Data (TSD)

Action required: TSD be submitted to RVSM Regional
Monitoring Agencies (RMAs) by the end of January 2007

Sir/Madam,

I have the honour to direct your attention to the Conclusions of the Sixteenth and Seventeenth Meetings of the Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG/16 & APANPIRG/17) held in Bangkok, Thailand from 22–26 August 2005 and 21–25 August 2006, respectively. APANPIRG/16 noted the amended provisions of Annex 11, effective 24 November 2005, that specifically require the institution of ongoing monitoring on a regional basis of aircraft height keeping performance for all airspace where RVSM is applied. APANPIRG also recognized that periodic monitoring by States of the safety performance of reduced horizontal separation was also necessary under the broader provisions of Annex 11 which require implementation of systematic and appropriate ATS safety programmes.

In regard to the continuous monitoring and regular assessment of target levels of safety in reduced separation applications (including RVSM and RNP), APANPIRG/16 endorsed the use of a standardized approach to the sampling of vertical and horizontal traffic data under the terms of the following Conclusion:

Conclusion 16/4 – Traffic Sample Data Collection

That, States be advised by Regional Office that December every year had been adopted for the routine collection of 30 days of traffic sample data to satisfy airspace safety monitoring requirements.

Additionally, APANPIRG/16 adopted Conclusion 16/6 requiring that States not providing safety related data to regional safety monitoring agencies in accordance with the parameters of the safety monitoring agencies would be included in the APANPIRG List of Deficiencies in the ATM/AIS/SAR fields.

/2

In its review of these matters, APANPIRG/17 noted the very positive response from States in respect of the provision of Traffic Sample Data (TSD) for December 2005. APANPIRG/17 considered that the situation had improved significantly compared with previous years and it was expected that this improvement could be sustained. However, as some States had still not provided appropriate safety data APANPIRG/17 included them in the List of Deficiencies in the ATM/AIS/SAR Fields in accordance with Conclusion 16/6.

APANPIRG/17 also recognized that although the South China Sea parallel route structure had been implemented in November 2001, no updated horizontal safety assessment had been undertaken in the four and a half years since implementation. Additionally, data used in the implementation safety assessment had necessarily been based on the "old" route structure; as such no horizontal safety assessment had been made based on data from the "new" route structure. In order that this matter be properly addressed, APANPIRG/17 adopted the following Conclusion:

Conclusion 17/6 – Completion of the horizontal safety assessment for the South China Sea route structure

That, recognizing that no horizontal safety assessment for the South China Sea parallel route structure had been conducted since implementation in 2001, the ICAO Regional Office urges concerned States to complete, by 30 June 2007, a horizontal safety assessment in accordance with ICAO ATS safety management provisions.

Accordingly, in addition to the routine provision of RVSM Large Height Deviation (LHD) reports and RNP Gross Navigational Error (GNE) reports – including "Nil" reports - States are required to complete a traffic sampling during December 2006. States not providing data will continue to be included on the APANPIRG List of Deficiencies in the ATM/AIS/SAR fields.

The RVSM Regional Monitoring Agency (RMA) for the FIRs listed below is the Monitoring Agency for the Asia Region (MAAR). States with responsibilities for these FIRs should complete traffic sampling for a period of one month for December 2006 in accordance with the format and requirements of MAAR. Resulting data should be submitted electronically to MAAR by the end of January 2007 for airspace safety analysis. The appropriate Traffic Sample Data format and instructions are available from the MAAR website at: <http://www.aerothai.co.th/maar/dl.php>.

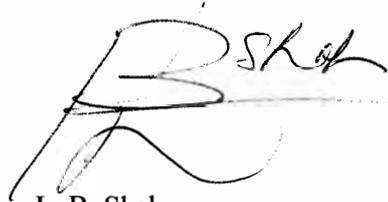
Bangkok	Calcutta	Chennai	Colombo	Delhi	Dhaka	Hanoi	Ho Chi Minh
Hong Kong	Jakarta	Karachi	Katmandu	Kota Kinabalu	Kuala Lumpur	Lahore	Male
Manila	Mumbai	Phnom Penh	Sanya FIR	Singapore	Ujung Pandang	Vientiane	Yangon

Additionally, States with responsibilities for the RNP10 monitoring arrangements of gross navigational errors (GNE) in respect of the South China Sea route structure, including ATS routes L625, M771, N884 and N892, should ensure appropriate data as required under the terms of the existing Letter of Agreement is captured on an ongoing basis and forwarded to the Civil Aviation Authority of Singapore for collation. In accordance with APANPIRG Conclusion 17/6, TSD from the relevant FIRs in the South China Sea will be used to update the horizontal safety assessment for the South China Sea route structure during the first half of 2006.

Similarly, the RVSM RMA for the FIRs listed below is the Pacific Approvals Registry and Monitoring Organization (PARMO). States with responsibilities for these FIRs should complete traffic sampling for a period of one month for December 2006 in accordance with the format and requirements of PARMO. Resulting data should be submitted electronically to PARMO by the end of January 2007 for airspace safety analysis. The appropriate Traffic Sample Data format and instructions are available from the PARMO website at <http://www.tc.faa.gov/acb300/PARMO/>

Anchorage Oceanic	Auckland Oceanic	Brisbane (east of Australian mainland)	Honiara	Incheon	Melbourne (east of Australian mainland)
Nadi	Nauru	Oakland Oceanic	Port Moresby	Tahiti	

Accept, Sir/Madam, the assurances of my highest consideration.



L. B. Shah
Regional Director

Requirements for the establishment and operation of Regional Monitoring Agencies (RMAs)

Relevant extracts from Annex 11 – Air Traffic Services (amendment 44, 23/11/06)

3.3.5.1 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.*

3.3.5.2 Arrangements shall be put in place, through interregional agreement, for the sharing between regions of data from monitoring programmes.

Note.— *Guidance material relating to vertical separation and monitoring of height-keeping performance is contained in the Manual on Implementation of a 300 m (1 000 ft) Vertical Separation Minimum Between FL 290 and FL 410 Inclusive (Doc 9574).*

Relevant extracts from the RVSM Manual (Doc 9574)

6.4 RESPONSIBILITIES OF THE AUTHORITIES

Introduction

6.4.1 The methodology used to progress the evaluation of system performance is described in relation to the specific tasks of the various bodies and units which form a typical regional organization:

- a) regional planning group;
- b) regional monitoring agency; and
- c) air traffic control.

Responsibilities of the regional planning group (RPG)

6.4.2 The overall responsibility for deciding that RVSM should be implemented and continued rests with the RPG (see also 3.1).

6.4.3 The organization and overall control of the system and height-keeping performance monitoring mechanisms rests with the RPG. The following points are of particular importance:

- a) determining the system and height-keeping performance monitoring mechanisms for which requirements have been presented in this section and expanded upon in Appendix A;

- b) recommending measures for the recovery of costs associated with a height-keeping performance monitoring mechanism;
- c) establishing an RMA (see 6.4.4). This should include detailed operating procedures and standard letter and report formats; and
- d) requiring the RPG to conduct an annual review of all aspects of the system's operation. Any review should include:
 - 1) an assessment of the system safety;
 - 2) the verification or amendment of the parameters employed in the CRM;
 - 3) the scrutiny of data and reports from the RMA;
 - 4) the recommendation of measures to reduce system risk and to improve height-keeping performance; and
 - 5) the recommendation of improvements to the monitoring process.

Responsibilities of a regional monitoring agency (RMA)

6.4.4 The experience gained through the monitoring of NAT MNPS RVSM operations indicates that the concept of having an RMA for each region in which RVSM is introduced is essential to safety. The RMA will have a significant role to play in all aspects of the monitoring process, but one of its priorities will be to establish a database of aircraft approved by the respective State authorities for operations at RVSM levels in that region. This is an essential part of the monitoring process because this information is of vital importance if the height-keeping performance data collected by the monitoring systems is to be of use in the risk assessment. RMAs in regions that have previously established such databases share approvals and height-monitoring data among each other, which should facilitate the transfer of this data to regions where new RVSM implementation programmes are being established.

6.4.5 Further to 6.4.4, typical duties of an RMA are as follows:

- a) to receive reports of those height deviations of non-compliant aircraft which are of a magnitude equal to or greater than the following criteria:
 - 1) TVE > 90 m (300 ft);
 - 2) ASE > 75 m (245 ft); and
 - 3) AAD > 90 m (300 ft).

Note.. The above figures are absolute values and do not include any measurement error in the height monitoring system employed. The threshold at which follow-up action is initiated should take account of the inherent inaccuracy of the monitoring system.

- b) to take necessary action with the relevant State and operator to:
 - 1) determine the likely cause of the height deviation; and
 - 2) verify the approval status of the relevant operator;

- c) to recommend, wherever possible, remedial action;
- d) to analyse data to detect height deviation trends and, hence, to take action as in c);
- e) to undertake such data collections as required by the RPG to:
- 1) investigate height-keeping performance of the aircraft in the core of the distribution;
 - 2) establish or add to a database on the height keeping performance of:
 - . the aircraft population;
 - . aircraft types or categories; and
 - . individual airframes;
- f) to monitor the level of risk of collision as a consequence of operational errors and in-flight contingencies as follows:
- 1) establish a mechanism for collation and analysis of all reports of height deviations of 90 m (300 ft) or more resulting from the above errors/actions;
 - 2) determine, wherever possible, the root cause of each deviation together with its size and duration;
 - 3) calculate the frequency of occurrence;
 - 4) assess the overall risk (technical combined with operational and in-flight contingencies) in the system against the overall safety objectives (see 2.1); and
 - 5) initiate remedial action as required. It is important to bear in mind that height deviations, as a consequence of operational errors and in-flight contingencies, occur in all airspace irrespective of the separation minimum. The purpose of this monitoring activity is to ensure that operations in RVSM airspace do not induce an increase in the risk of collision from these causes and that the total vertical risk does not exceed the agreed overall safety objectives (see 2.1). The actions/measures proposed to reduce risk should not be exclusive to RVSM airspace;
- g) to initiate checks on the approval status of aircraft operating in the relevant RVSM airspace (see 4.3.3 to 4.3.6), identify non-approved operators and aircraft using RVSM airspace and notify the appropriate State of Registry/State of the Operator accordingly;
- h) to circulate regular reports on all height-keeping deviations, together with such graphs and tables necessary to relate the estimated system risk to the TLS, employing the criteria detailed in 6.2.8, for which formats are suggested in Appendix A; and
- i) to submit annual reports to the RPG.

Responsibilities of State regulatory authorities in the monitoring process

6.4.6 As part of the process to monitor compliance with the global system performance and global heightkeeping performance, independent monitoring of aircraft height-keeping performance in a given region may be instigated. The RMA will be responsible for collating and analysing the height-keeping data and in the event that an RVSM-approved aircraft is monitored with an estimated ASE or TVE in excess of the limits, corrected for system measurement inaccuracy, set out at 6.4.5, will take action to inform both the appropriate State authority and the operator. The State authority will be requested to take action to help the RMA determine the cause of the error. In the event that the investigation reaches an unsatisfactory conclusion, the State authority may consider suspending or revoking the operator's RVSM approval. Following any rectification work, the operator would again be expected to demonstrate compliance with the RVSM MASPS by ensuring that the subject aircraft has been monitored by an independent height-monitoring system at the earliest opportunity.

Role of the appropriate ATC authority in monitoring height-keeping performance

6.4.7 The ATC authority has a vital role to play in the monitoring process in that there is a need to gather information on and report any deviation equal to or greater than 90 m (300 ft), **for any reason**, from cleared levels whether the deviation causes an incident or not. This information will contribute to the assessment of the level of overall risk in the system. The information required by the RMA to conduct the risk assessment might, depending on the region of implementation, include the following data:

- a) reporting agency;
- b) date and time of deviation;
- c) location of deviation;
- d) airspace/operating conditions, e.g. operational air traffic (OAT)/general air traffic (GAT)/random/organized track system (OTS) (if applicable);
- e) flight identification and type;
- f) flight level assigned;
- g) observed/reported final flight level Mode .C./pilot report;
- h) duration not at the cleared flight level - cause of deviation;
- i) other traffic;
- j) crew comments, if any, when notified and controlling authority remarks.

Relevant extracts from the RMA Manual

FOREWORD

Doc 9574 indicates that there is a need for system performance monitoring during both implementation planning and the post-implementation operational use of RVSM. The principles and procedures for monitoring are described in Chapter 6 of Doc 9574. In all regions where RVSM has been implemented, Regional Monitoring Agencies (RMA) have been established, by the appropriate Planning and Implementation Regional Groups (PIRGs), to undertake these functions. The objectives of the RVSM monitoring programme include, inter alia:

- a) verification that the RVSM approval process remains effective;
- b) verification that the target level of safety will be met on implementation of RVSM, and will continue to be met thereafter;
- c) monitoring the effectiveness of the altimetry system modifications which have been implemented to enable aircraft to meet the required height-keeping performance criteria; and
- d) evaluation of the stability of altimetry system error (ASE).

CHAPTER 1

INTRODUCTION

1.1 Purpose of the Manual

1.1.1 The purpose of this manual is to provide a set of working principles common to all RMAs. It is not intended to provide exhaustive guidance on how to operate a regional monitoring agency (RMA). Information on what is required of an RMA will be found in the *Manual on Implementation of a 300 M (1 000 ft) Vertical Separation Minimum between FL 290 and FL 410 inclusive* (Doc 9574).

1.2 General description of RMA functions

1.2.1 An RMA supports the implementation and continued safe use of RVSM within a designated airspace. In the context of RVSM, “safe” has a quantitative meaning: satisfaction of the agreed safety goal, or target level of safety (TLS). Section 2.1 of Doc 9574 describes the safety objectives associated with RVSM implementation and use. Paragraph 2.1.4 of Doc 9574 specifies that the TLS attributable to aircraft height-keeping performance, or the technical TLS, should be no greater than 2.5×10^{-9} fatal accidents per aircraft flight hour. Paragraph 2.1.6 specifies that the safety goal for overall risk in connection with RVSM should be set by regional agreement, with several examples of precedent indicating that the value used in practice should be consistent with 5×10^{-9} fatal accidents per aircraft flight hour.

1.2.2 Paragraphs 6.4.4 and 6.4.5 of Doc 9574 provide a detailed list of RMA duties and responsibilities. These are also reproduced in Appendix A of this manual. For the purposes of this overview, the functions of an RMA can be summarized as:

- a) establish and maintain a database of RVSM approvals;
- b) monitor aircraft height-keeping performance and the occurrence of large height deviations, and report results appropriately;
- c) conduct safety and readiness assessments and report results appropriately;
- d) monitor operator compliance with State approval requirements after RVSM implementation; and
- e) initiate necessary remedial actions if RVSM requirements are not met.

1.2.3 The intent of this manual is to provide guidance on RMA operating procedures, in order to achieve a standardized approach to the way in which RMAs carry out these functions and the associated detailed duties and responsibilities of Doc 9574.

1.2.4 The manual also lists, in Appendix A, the RMA responsible for the provision of monitoring and safety assessment activities in each FIR in which RVSM has been implemented.

1.3 Requirements for establishment and operation of an RMA

1.3.1 An RMA must have both the authority and technical competence to carry out its functions. In establishing an RMA, it is therefore necessary to ensure that:

- a) the organization must receive authority to act as an RMA as the result of a decision by a State, a group of States or a planning and implementation regional group (PIRG); and
- b) the organization acting as an RMA has adequate personnel with the technical skills and experience to carry out the functions listed in 1.2.2.

1.3.2 It is the responsibility of the body authorizing establishment of an RMA to ensure that these requirements are met. An example of a process satisfying this requirement would be for the organization intending to be an RMA to participate in a training programme under the guidance of one of the established RMAs, e.g. the North Atlantic Central Monitoring Agency (NAT CMA), the European Organisation for the Safety of Air Navigation (Eurocontrol) or the Pacific Approvals Registry and Monitoring Organization (PARMO). For an organization with no prior experience with RVSM monitoring, such a programme could take as long as one year and should include both formal and on-the-job training.

APPENDIX A
REGIONAL MONITORING AGENCY DUTIES AND RESPONSIBILITIES

Based on paragraphs 6.4.4 and 6.4.5 of the Manual on Implementation of a 300 m (1 000 ft) Vertical Separation Minimum Between FL 290 and FL 410 Inclusive (Doc 9574), the duties and responsibilities of a regional monitoring agency are to:

1. establish a database of aircraft approved by the respective State authorities for operations within RVSM airspace in that region.
2. receive reports of height deviations of aircraft observed to be non-compliant, based on the following criteria:
 - a) TVE 90 m (300 ft);
 - b) ASE >75 m (245 ft);
 - c) AAD 90 m (300 ft).
3. take the necessary action with the relevant State and operator to:
 - a) determine the likely cause of the height deviation; and
 - b) verify the approval status of the relevant operator.
4. recommend, wherever possible, remedial action;
5. analyse data to detect height deviation trends and, hence, to take action as in the previous item;
6. undertake such data collections as are required by the PIRG to:
 - a) investigate height-keeping performance of the aircraft in the core of the distribution;
 - b) establish or add to a database on the height-keeping performance of:
 - the aircraft population
 - aircraft types or categories; and
 - individual airframes
7. monitor the level of risk as a consequence of operational errors and in-flight contingencies as follows:
 - a) establish a mechanism for collation and analysis of all reports of height deviations of 90 m (300 ft) or more resulting from the above errors/actions;
 - b) determine, wherever possible, the root cause of each deviation together with its size and duration;
 - c) calculate the frequency of occurrence;
 - d) assess the overall risk (technical combined with operational and in-flight contingencies) in the system against the overall safety objectives (see 2.1 of Doc 9574); and
 - e) initiate remedial action as required.
8. initiate checks of the “approval status” of aircraft operating in the relevant RVSM airspace (see 4.3.3 to 4.3.6 of Doc 9574), identify non-approved operators and aircraft using RVSM airspace and notify the appropriate State of Registry/State of the Operator accordingly;
9. circulate regular reports on all height-keeping deviations, together with such graphs and tables necessary to relate the estimated system risk to the TLS, employing the criteria detailed in 6.2.8 of Doc 9574, for which formats are suggested in Appendix A to Doc 9574; and
10. submit annual reports to the PIRG.

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 2007)

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	APANPIRG RMA	Current	Brisbane & Melbourne FIRs.
		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. Hiroshi Inoguchi, JCAB Co-Chair, email: Inoguchi-h2hh@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. Masao Kondo, Special Assistant to the Director, Flight Procedures and Airspace Program Office, email kondou-m2pd@mlit.go.jp)	Japan	RMA	Current	Fukuoka FIR
		SMA	Available second quarter – 2009	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	APANPIRG RMA	Current	Bangkok, Kolkatta, 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 last quarter- 2007	Bangkok, Kolkatta, 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	APANPIRG RMA	Current	Anchorage Oceanic, Auckland Oceanic, Honiara, Incheon, 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) in South China Sea	Current	Hong Kong, Ho Chi Minh, Manila, Sanya, Singapore FIRs,

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RASMAG — TASK LIST

(last updated 8 June, 2007)

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/7	Secretariat	Open	<p>Establishment of the WPAC/SCS RVSM Scrutiny Working Group was endorsed by APANPIRG/17. The first meeting will be held in Jan 2007.</p> <p>WPAC/SCS RSG/1 meeting held Jan/Feb 2007, second meeting to be held 12-15 June. Good progress made by RSG/1 in identifying reasons for LHD and identifying remedial measures.</p>
2/3	Prepare and deliver safety workshop for States.	Report Progress to RASMAG/7	Secretariat All members	Open Closed	<p>Two HQ SMS courses and one ATS SMS SIP were conducted at Regional Office in Sept 2006, coordination continuing with Hong Kong China for an SMS Workshop in first half 2007.</p> <p>Hong Kong China Workshop delayed because Regional Office unable to schedule date.</p> <p>Two day ATS SMS Seminar 'Managing Change in ATM' presented by UK NATS at Regional Office from 10 to 11 May 2007 — approx 75 participants.</p> <p>This item closed by RASMAG/7 due prevalence of SMS training opportunities in other forums and restricted resources of RASMAG to deliver workshops.</p>

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ACTION ITEM	DESCRIPTION	TIME FRAME	RESPONSIBLE PARTY	STATUS	REMARKS
2/4	Develop SMA Handbook.	Report Progress to RASMAG/8	Chairman (R. Butcher), All members Secretariat	Open	<p>Work progressed on the draft document by RASMAG/6, all members to review and provide input to Mr Butcher by end of Jan 2007.</p> <p>No input received by Mr. Butcher before RASMAG/7, to be provided as soon as possible and not later than September 2007 to enable work to progress.</p>
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/8	RASMAG members Secretariat	Open	<p>Referred to RMAs by RASMAG/5 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/8	RASMAG members Secretariat, including Air Transport Officer	Open	<p>APANPIRG Decision 17/47 establishes Regional Airspace Safety Monitoring Committees Task Force, first meeting Feb 2007. Also Secretariat to prepare a Discussion Paper for presentation at 43rd DGCA Conference, Dec 2006.</p> <p>First meeting of Regional Airspace Safety Monitoring Committees Task Force held February 2007, results reported to RASMAG/7</p> <p>RASMAG/7 amended TOR of RASMC/TF and RASMAG to progress this matter, subject APANPIRG/18 adoption in September 2007</p>

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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 RMAAs and recorded in the RASMAG/4 meeting report. Also include material from the RASMAG/6 Extraordinary meeting of RMAAs	Report to SASP Nov 2006 Meeting	Asia Pacific RMAAs	Open Completed	SASP/WG/WHL/10 held Nov-Dec, South Brisbane Australia
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 Completed	Draft Guidance Material now mature, to be circulated to ISPACG, IPACG, FIT-SEA, FIT-BOB and ASIOACG during 2007 for comment. RASMAG/7 accepted final version Guidance Material for review by ATM/AIS/SAR/SG and CNS/MET/SG and recommendation to APANPIRG/18 for adoption as regional guidance material.
5/5	Regional Office to coordinate with the RNP-SEA/TF to ensure inclusion of safety assessment requirements in the Task Force TOR	Report progress to RASMAG/8	Regional Office	Open	Next RNP-SEA/TF meeting scheduled March 2007 late 2007 or early 2008
6/1	Create common template for all Asia Pacific RMA reporting based on current MAAR template	Report progress to RASMAG/8	Asia Pacific RMAAs	Open	Progress discussed during RASMAG/7, final work still to be completed by RMAAs.
6/2	Implement single annual consolidated Asia Pacific RMAAs report based on 31 March data period of 12 months from 1 May to 30 April annually and including appropriate December traffic sample data for consideration by May/June RASMAG prior to August/September APANPIRG	Report progress to RASMAG/8	Asia Pacific RMAAs	Open	Progress discussed during RASMAG/7, final work still to be completed by RMAAs
6/3	Chairman to coordinate with Airservices Australia to provide briefing in relation to previous methodology for SCS horizontal assessment to MAAR representatives at November SASP meeting in Australia.	Report to RASMAG/7	Chairman, MAAR	Open Completed	

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ACTION ITEM	DESCRIPTION	TIME FRAME	RESPONSIBLE PARTY	STATUS	REMARKS
7/1	Submit working paper to ATM/AIS/SAR Sub Group in July 2007 analysing effect that the implementation of AIDC has had on numbers of ATC Unit to ATC Unit coordination errors to provided evidence/justification for early implementation of AIDC	Submit to ATM/AIS/SAR/ SG July 2007	New Zealand, Australia	Open	
7/2	Prepare submission supporting advancement of Japan vertical monitoring agency to RMA for consideration by RASMAG/8. Submission to address provisions of Annex 11, RVSM Manual (Doc 9574) and RMA Manual in respect of requirements for establishment and operation of an RMA	Submit to RASMAG/8	Japan, assisted by MAAR & PARMO	Open	
7/3	Include plain language definition of LHD on MAAR and PARMO LHD template	Report progress to RASMAG/8	MAAR, PARMO	Open	
7/4	Include yes/no tick box for question “ <i>Were the Supervisors of the affected ACCs advised of this LHD occurrence</i> ” on MAAR and PARMO LHD template	Report progress to RASMAG/8	MAAR, PARMO	Open	
7/5	Secretariat to provide extracts from report of RASMG/7 relating to RVSM implementation in China via Regional Office letter to China.	End June 2007	Regional Office	Open	
7/6	Define and promulgate a standardised process under which a safety monitoring organisation could gain approval by APANPIRG for regional activity	Report progress to RASMAG/8	RASMAG, RMAs	Open	
7/7	Asia/Pacific RMAs communicate collectively prior to the next RASMAG meeting with the objective of providing some guidance on regional issues/impacts resulting from the implementation of global long term height monitoring provisions for RVSM operations.	Report progress to RASMAG/8	Asia/Pacific RMAs	Open	

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