

INTERNATIONAL CIVIL AVIATION ORGANIZATION



**REPORT OF THE THIRD MEETING OF THE REGIONAL AIRSPACE
SAFETY MONITORING ADVISORY GROUP (RASMAG/3)
AND THE ICAO ATS SAFETY MANAGEMENT SEMINAR**

BANGKOK, THAILAND, 6 – 7 and 8 – 10 JUNE 2005

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

Adopted by the RASMAG
and published by the ICAO Asia and Pacific Office

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RASMAG/3 & ICAO ATS Safety Management Seminar
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PART I – HISTORY OF THE MEETING

1. Introduction

1.1 The Third Meeting of the Regional Airspace Safety Monitoring Advisory Group (RASMAG/3) was held in Bangkok from 6 to 7 June 2005 at the Kotaite Wing of the ICAO Asia/Pacific Office. Consecutively, the ICAO ATS Safety Management Seminar was conducted from 8 to 10 June 2005.

2. Attendance

2.1 The meeting was attended by 34 experts from Australia, Cambodia, China, India, Indonesia, Japan, Malaysia, Mongolia, New Zealand, Philippines, Singapore, Thailand, United States, IATA and IFALPA. A list of participants is at **Attachment 1** to this report.

3. Officers & Regional Office

3.1. Mr. Robert Butcher, Safety Manager, Airservices Australia acted as Chairperson and presided over the meeting throughout its duration.

3.2. Mr. Andrew Tiede, Regional Officer ATM, was the Secretary for the meeting and was assisted by Mr. Kyotaro Harano, 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, who welcomed the participants to Bangkok and the third meeting of the RASMAG. Mr. Tiede commented on the good work undertaken by the first two RASMAG meetings and expressed confidence that the third meeting would continue in this vein, building effectively on the previous work. He wished the meeting every success.

4.2 Mr. Tiede noted that in recent years, the inclusion by ICAO of safety management provisions in Annex 11 and the extensive implementation of reduced separation applications like RVSM had necessitated increased safety planning and monitoring activities by States. In many instances, the expertise required for safety monitoring activities was not readily available, requiring States to collaborate in the provision of safety services and to work towards establishing suitable mechanisms for the funding of multinational infrastructure and services. Mr. Tiede drew attention to the many difficulties being experienced in the provision of safety monitoring services throughout Region, observing that the lack of funding was one of the main obstacles

4.3 Mr. Robert Butcher as Chairperson of RASMAG welcomed the members of RASMAG to the meeting and noted that a number of new representatives were now present. He stated that he was aware that many members had traveled long distances and that this confirmed a regional interest in promoting safety and resolving the issues previously identified by RASMAG. Mr. Butcher drew the meetings attention to the busy schedule for the meeting and thanked the States and organizations who had provided papers in support of the work program.

5. Language and Documentation

5.1. All discussions were conducted in English. Documentation was issued in English. A total of 19 Working Papers and 7 Information Papers were considered by the meeting. A list of the RASMAG/3 Working and Information Papers is at **Attachment 2**.

PART II - REPORT ON THE RASMAG/3 MEETING

Agenda Item 1: Adoption of Agenda

1.1 The meeting considered the provisional agenda that had been proposed by the Regional Office and adopted it as the agenda for the meeting:

- Agenda Item 1: Adoption of Agenda
- Agenda Item 2: Review the Terms of Reference
- Agenda Item 3: Review and update RASMAG Work Plan
- Agenda Item 4: Review the airspace safety monitoring arrangements in the Asia/Pacific Region and the activities of regional airspace safety monitoring agencies
- Agenda Item 5: Provision by States of safety related data
- Agenda Item 6: Airspace safety monitoring documentation and regional guidance material
- Agenda Item 7: Funding of Regional Safety Monitoring Activities
- Agenda Item 8: Any other business
- Agenda Item 9: Date and venue of the RASMAG/4 Meeting

Agenda Item 2: Review of Terms of Reference

2.1 The meeting noted that the APANPIRG/15 meeting (23 – 27 August 2004) had reviewed the Report of RASMAG/1 and under Decision 15/4, agreed to the recommendation of RASMAG/1 to change its terms of reference (TOR) to address coordination with the contributing bodies of APANPIRG and to amend the task list to include “data link”.

2.2 The meeting reviewed the revised terms of reference and task list, and agreed that these met the requirements of the Group (**Appendix A** refers). The meeting expressed a view that RASMAG had used the first two meetings constructively to formulate and update the RASMAG TOR, to the point that the TOR was of sufficient maturity to address the current requirements of RASMAG and that there was no need to retain a review of the TOR as a standing agenda item. The meeting agreed that the item ‘Review of TOR’ should be removed from the agenda for the next meeting.

Agenda Item 3: Review and update RASMAG Work Plan

3.1 The meeting reviewed and updated the RASMAG task list as shown in **Appendix B** and agreed that this met the work programme of the group.

3.2 The meeting was pleased with the progress that had been made in respect to addressing items on the task list, noting that a number of the items had been closed as a result of the work undertaken

between meetings, and complimented the Regional Office and the delegates involved in these works. The meeting was also apprised of the status of items remaining open, noting the progress that had been made.

3.3 In respect of the ongoing action item to develop guidance on ADS/CPDLC ground system requirements, the meeting noted the work of Japan in regard to guidance in relation to the deployment of ADS/CPDLC, and agreed to broaden the original action item to include deployment considerations in addition to the ground system requirements. The meeting thanked Japan for their willingness to assist in this respect.

Agenda Item 4: Review the airspace safety monitoring arrangements in the Asia/Pacific Region and the activities of regional airspace safety monitoring agencies

Report of PARMO's RMA activities

4.1 The Pacific Approvals Registry and Monitoring Organization (PARMO) briefed the meeting in respect of PARMO activities and provided the most recent in a series of quarterly reports issued by PARMO for review by the meeting. The report detailed safety monitoring outcomes for the Pacific RVSM airspace over the first quarter of 2005. The meeting was advised that the PARMO had undertaken its usual data collection exercise in support of its monitoring activities and noted that while most States involved had provided the necessary data, some States had not provided any data.

4.2 PARMO explained the analysis methodology used by PARMO, highlighting the tables detailing the risk-bearing height deviation incidents where whole numbers of flight levels and those not involving whole flight levels, had been identified as factors. The meeting was informed that the analysis indicated that the technical risk for the Pacific remained unchanged at 9.32×10^{-11} fatal accidents per flight hour and that the operational risk estimate was 1.55×10^{-9} fatal accidents per flight hour. The estimate of the overall vertical collision risk was 1.64×10^{-9} fatal accidents per flight hour which is approximately 67% below the TLS.

4.3 The meeting thanked PARMO for the detailed report provided and noted that the TLS had been met in the Pacific RVSM airspace. The meeting noted with some concern the lack of routine provision of large height deviation reports from some States (including 'NIL' reports) and the fact that 2 States had not reported any data since April 2004. This fact generated significant discussion as to likely resolutions to these problems although no firm decisions were made at this point of the proceedings.

Report of Australia's RMA activities

4.4 Australia updated the meeting in respect of the recent RVSM safety assessment activities undertaken by Airservices Australia as RMA for the Brisbane and Melbourne FIRs. The meeting was informed that an estimate of the relevant occupancies for the collision risk model was obtained using a sample of 19 days in December 2004. This limited sample was the result of difficulties encountered in retrieving the required data sample from the Airservices database, however the sample size was considered adequate for assessment.

4.5 Australia reported that the same and opposite direction vertical occupancies ($E_z(\text{same})$ and $E_z(\text{opp})$), using $\hat{s}_x = 15$ minutes, were estimated to be 0.2207 and 0.021662, respectively, in the Australian domestic RVSM airspace, and 0.0582 and 0.005963, respectively, in the Indian Oceanic RVSM airspace. Australia explained that the same direction occupancy was routinely calculated for flight levels separated by two vertical standards rather than only one as the majority of Australian routes are two way routes with air craft flying odd or even levels depending on the direction of flight. This approach to

calculation will somewhat over-estimate the collision risk in this case as there are very few uni-directional routes in Australia.

4.6 The meeting was informed that the estimate of technical risk in the Australian domestic RVSM airspace is 2.17×10^{-10} fatal accidents per flight hour, and 4.88×10^{-11} in the Indian Oceanic RVSM airspace. This is more than one order of magnitude less than the technical TLS in each case. However, Australia reported that the results for the operational risk did not meet the TLS. There were a total of 236 minutes of operational errors in the 12 month period to December 31, 2004 resulting in an estimate of risk due to operational errors of 8.47×10^{-9} fatal accidents per flight hour in Australian domestic RVSM airspace and 3.58×10^{-8} in Indian Oceanic RVSM airspace.

4.7 Consequently, the total risk due to technical and operational errors is 8.69×10^{-9} fatal accidents per flight hour in Australian domestic RVSM airspace and 3.59×10^{-8} in Indian Oceanic RVSM airspace. The overall vertical risk in RVSM airspace, weighed by flight hours in each airspace, is 9.26×10^{-9} fatal accidents per flight hour. Australia confirmed that although the TLS had not been met within the Australian FIRs during 2004, an inspection of the operational error data indicated that this was a direct consequence of three or four LHD reports of an extended time duration. Of note is the fact that none of these LHD reports identified issues specific to RVSM per se, but were errors that were likely to be equally resident in CVSM airspace. However, Airservices Australia had investigated the circumstances surrounding these incidents by formal process, with the result that specific recommendations and actions had been identified and were being implemented in an effort to reduce the likelihood of similar incidents occurring in the future.

4.8 During the discussion in respect of the outcomes reported by Australia, a query was raised as to whether the reduced sample size for December 2004 (19 days) that was used by Australia would skew the outcomes. Australia commented that they were confident that the sample had been of sufficient size; this was supported by PARMO. PARMO also noted that while there were LHD errors identified by Australia in their RVSM assessment, it was important to note that these types of incidents, while inherent in any airspace configuration, were probably more readily focused on through the process of setting and working towards a TLS. This results in a more concentrated effort to find and treat these issues due to their perceived linkage to a quantitative target.

What is meant by a TLS?

4.9 At this point the meeting considered the question of what is actually meant by a TLS. One delegate commented that given the results provided by Australia, this then raised the question as to how this variation can be explained to those such as regulators or senior management and also what should be done in respect of not meeting the TLS. The Australian regulator commented that in their view they believe that RASMAG, and even the Region as a whole, was faced with a significant problem regarding application of the TLS. The regulator suggested that as ICAO and other bodies have identified TLSs that should be achieved, how do we then manage a situation where the TLS is not met and what does this mean? The Australian regulator suggested that RASMAG needed to clearly explain what a TLS was and how it should be regarded.

4.10 MAAR commented that RASMAG should explain that the technical component of the TLS was of more concern, as if it was demonstrated that there was some variation in the technical component this was the risk that had the biggest impact on RVSM. MAAR stated that, in their view, the Operational Error risk should be expected to be more variable given the human element involved.

4.11 IATA commented that a target level of safety should be considered as an aiming point rather than a 'hard' point and that if it is not met then it is incumbent on a State or organization to identify the reasons why and then treat the problem. New Zealand, in agreeing with IATA, stated that on observing that a TLS was being exceeded, a regulator would want to know from the service provider what

was being done about resolving the identified issues. In the event that nothing was being done, then this would raise sufficient concern to prompt the regulator to require remedial actions to be taken. Australia commented that where a TLS had been set for a specific implementation, States or organizations must demonstrate an ability to meet the TLS prior to implementation.

4.12 Post implementation, Australia considered that the TLS should be considered as a target that a service provider would put all effort into achieving. However, it was likely that a number of issues, such as human errors, would manifest themselves in such a way that any particular re-assessment of the safety of the system may show that the TLS was not met. As a result, the service provider would need to demonstrate that all reasonable action was being implemented to treat the problems to reduce the likelihood of recurrence. It may be that in some extreme circumstances, this may mean the reversion to the previous, assumed safe, system.

4.13 The Australian regulator suggested that RASMAG needed to discuss how the process described above would be undertaken and then use that as a possible model for wider reference. The meeting agreed this would be a task for future meetings to address, with a view to studying the matter in an effort to provide clarification to States in this respect.

4.14 Other delegates also commented regarding the discussion on TLS. Japan indicated that they had considered the TLS as a 'hard' target that they would always be required to meet under any circumstances. PARMO reminded the meeting that in implementing RVSM, the move from 2000 to 1000 feet separation required a change to the technical risk but that the underlying operational risk remained relatively unchanged and that a number of errors only received prominence and effective treatment as a result of the work needed to implement the RVSM technical requirements.

4.15 The meeting reviewed references in Annex 11, the Air Traffic Services Planning Manual (Doc 9426) and the Manual on Airspace Planning Methodology for the Determination of Separation Minima (Doc 9689) in this respect, noting guidance in respect to the derivation and application of TLS.

4.16 A discussion ensued regarding the necessary actions if the outcome of airspace safety monitoring determined that the target level of safety had been exceeded. The meeting considered information provided in the ICAO Airspace Planning Manual, Doc 9426, Part II, Para 4.10.3.8. This information, while related to monitoring for minimum navigation performance specification (MNPS), was considered to be conceptually applicable.

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

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

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

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

4.18 It was therefore agreed by the meeting that a single event in which airspace safety monitoring identified that the target level of safety had been exceeded, was not sufficient cause to cease the application of the separation minimum. However, it would be important to consider use of the steps stated above, continue monitoring and re-assess the safety on a regular basis to ensure that there was not an unsafe trend.

4.19 The meeting recognized the importance of providing guidance to States in respect of the TLS issues discussed above and agreed to add an item to the RASMAG Task List in this regard, for future action. In this respect, PARMO briefed the meeting in regard to activities of a “Scrutiny Group” in the South American region. In addition ATM expertise, the Scrutiny Group had been expanded to include airworthiness and flight operations personnel. This allowed a holistic scrutiny to be undertaken of each issue, rather than just considering input from an ATM perspective. PARMO suggested that it may be beneficial if the participation at RASMAG was widened to include airworthiness and flight operations personnel in the same manner as the Scrutiny Group. The meeting endorsed the proposal and requested that the Regional Office include information in this regard to States with the invitation letter to the next RASMAG meeting

Report of MAAR’s RMA activities

Bay of Bengal

4.20 The Monitoring Agency for the Asia Region (MAAR) presented a report on their review of airspace safety for the RVSM implementation in the Asian region. In respect of the Bay of Bengal area, MAAR noted that there were a number of instances where some States had not provided the required data for analysis. However, MAAR considered that the lack of data, while of note, did not impact significantly on the review in a statistical sense. MAAR reported that total time allocated to LHD since 2003 in the BOB totaled 48.4 minutes resulting from 9 reports. The meeting was informed that in the BOB airspace, the technical risk was calculated as 6.14×10^{-10} and the operational risk as 2.56×10^{-9} . The total risk was assessed as 3.18×10^{-9} , therefore current provisional estimates of both technical and total risks satisfy the agreed TLS value of no more than 2.5×10^{-9} and 5.0×10^{-9} fatal accidents per flight hour respectively.

Western Pacific/South China Sea

4.21 MAAR informed the meeting that in the case of the Western Pacific (WPAC) and South China Sea (SCS) airspace there were significant issues regarding the lack of data provision by States which impacted on the level of confidence that could be placed in the results of the safety assessment. In contrast to the data from the BOB, the SCS review evidenced a total time allocated to LHD since 2003 as 237.3 minutes resulting from 104 reports. This was in comparison to the 9 LHD reports (48.4 minutes) submitted in respect of the Bay of Bengal. MAAR noted that 88 of the WPAC/SCS reports (85%) related to Category M reports or ATC-unit to ATC-unit transfer/transition message.

4.22 The meeting was informed that the technical risk for the WPAC/SCS area was provisionally calculated as 5.66×10^{-10} and the operational risk as 4.34×10^{-9} . The total risk was provisionally assessed as 4.90×10^{-9} . MAAR expressed their significant concern that the TLS may have been exceeded given the calculated high risk value and the fact that there was a significant amount of data unavailable from some States. Accordingly, the information from MAAR should be considered as provisional and MAAR would update the safety assessment when the missing data became available.

4.23 The Regional Office queried whether the numbers of LHDs identified in the WPAC/SCS assessment were related to the transition activity at the boundary of SCS airspace. MAAR commented that the main reason for the errors was the lack of coordination for the changes of flight level assignment between 2 adjacent FIRs in WPAC/SCS. However, it was difficult to ascertain whether the errors were directly caused by the transition issues. More information would be required from the States concerned. In this regard, MAAR recommended that the issue be discussed in detail in the next RVSM/TF (FLOS Review) when the comprehensive material is available to MAAR.

4.24 The meeting thanked MAAR for the excellent assessment work undertaken by them in reviewing the BOB and the WPAC/SCS and for bringing the issues related to a lack of data to RASMAG's attention. The meeting strongly endorsed the recommendation made to States by the MAAR regarding the need to mitigate identified LHD occurrences of the type M category, fully endorsing MAAR's statement that:

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

4.25 The meeting requested that the Regional Office circulate a letter to affected States, alerting them to the issues raised by MAAR and seeking their urgent attention in respect of remedial actions.

Tripartite RMA meeting

4.26 Australia noted that in comparing the reports of the three RMAs, there were still some areas where it was possible that different values were being used in the modeling. Australia had identified some concerns regarding the way that TCAS reports were being included. As a result, Australia considered that there were a number of standardization issues relevant to the risk modeling methodologies used by the three RMAs that needed to be addressed as a matter of urgency. Following discussion with representatives from PARMO and MAAR, Australia proposed to the meeting that it would be a productive exercise for the three RMAs to meet with an aim to standardize their work methods and to clarify the issues raised by Australia. The meeting supported this proposal and requested the RMAs to coordinate in order to facilitate this work. Australia agreed to coordinate such a meeting.

Issues associated with Free Text Messaging in CPDLC

4.27 Australia presented details of potential safety issues that could arise where data link free-text messages were used inappropriately. The meeting was informed that with the more widespread use of CPDLC within the Region, there was evidence to suggest that free text messages may be inadvertently increasing workload for both controllers and flight crews. This was the result of both uplinks and downlinks being sent in free text format when suitable pre-formatted messages were available.

4.28 The meeting was informed that Airservices Australia had been undertaking additional monitoring activities of CPDLC messages for a considerable time and that they had identified a number of

situations where use of free-text messages has been ambiguous, open to interpretation and consequently failed to adequately close the communication loop. Australia considered that RASMAG should be made aware of these issues and that States should consider undertaking similar monitoring of CPDLC messages.

4.29 The meeting was also advised that States should ensure that the CPDLC interface displays a number of pre-formatted message elements when each message category is selected (or other more intuitive functionality) to restrict the amount of scrolling/searching required by controllers in order to find the necessary message element. Additionally it was suggested that States monitor message uplink use to ensure that message lists accessed by controllers are ordered with the most used messages at the top, rather than being stored in order of message set element number, in order to make these commonly used messages easier for controllers to access.

4.30 The meeting thanked Australia for providing the results of their monitoring efforts and agreed that the information provided should be disseminated among States within the Region.

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

4.31 Japan updated the meeting in respect of its offer to provide CRA services via the CRA of Japan for the FANS Implementation Team for the South East Asia region (FIT-SEA). Japan advised that the CRA of Japan was operated by the Air Traffic Control Association Japan (ATCA-J) which is a non-profit technical organization authorized by the Ministry of Land, Infrastructure and Transport. JCAB has contracted with the ATCA-J for the activity of CRA of Japan in Tokyo FIR.

4.32 Japan had advised SEACG/12 (May 2005) that the provision of CRA services would be an extension of the existing CRA Japan activities in the Tokyo FIR as aircraft were operating from the Tokyo FIR to the South-East Asia area. This would also provide continuous CRA services across this geographical area. CRA

4.33 During SEACG/12, the Philippines, Singapore, IATA and IFALPA had thanked CRA Japan for their offer to set up the CRA and the preparation work that they had done, and supported the proposal. The Regional Office also expressed its appreciation and endorsed CRA Japan's proposal. Viet Nam and Indonesia requested that the Regional Office inform the respective DGCA's officially of the financial, technical and operational aspects of the CRA and seek their position on CRA Japan's offer. Accordingly, the Regional Office had written to these two States, requesting a response in regard to Japan's offer by 30th June 2005.

4.34 Japan informed the meeting that at the time that FIT-SEA made a formal decision in respect to the long term provision of CRA services, if the CRA of Japan was selected to continue as the CRA for FIT-SEA consideration would need to be given for the funding of any ongoing services provided by the CRA of Japan, and this matter should be taken into account in the CRA funding discussions in due course.

4.35 In respect of the formation of the FIT-SEA CRA, Japan presented draft copies of the proposed TOR and the Operational Manual (refer **Appendices C and D**), detailing roles and procedures of the FIT-SEA CRA, for review and feedback from the RASMAG/3. Japan informed that the proposed FIT-SEA CRA Operating Manual had been developed to harmonize with the draft "*Guidance Material for End-to-End Safety and Performance Monitoring of Air Traffic Service Datalink Systems in the Asia/Pacific Region*" also under consideration by RASMAG/3.

4.36 The meeting reviewed the proposed TOR and Operations Manual, providing feedback to Japan in this respect. The meeting supported the proposal by CRA of Japan to provide CRA services to the FIT-SEA, noting that under this interim proposal there would be no initial charge for setting up and operating the CRA.

RVSM Pre-Implementation Safety Assessment in the Japan Domestic Airspace

4.37 Japan provided information in respect of the establishment of the Airspace Safety Monitoring Unit (JASMU) in JCAB in April 2004, and the method of airspace safety assessment used by this Unit to facilitate the implementation of RVSM in the Japan domestic airspace scheduled in late September 2005, and the provisional results of preliminary safety assessment. The risk estimation was made by the Electronic Navigation Research Institute (ENRI). Japan Civil Aviation Bureau (JCAB) would make a decision of implementation of RVSM in Japanese domestic airspace based on final results of further assessment.

4.38 A preliminary assessment was conducted for a period between July 2004 and May 2005, during which 10 Large Height Deviation (LHD) reports were received in the Japanese domestic airspace where RVSM would be implemented in September 2005. An additional assessment would be conducted prior to the RVSM/TF/26 meeting in July.

4.39 Of the 10 LHD reports, 5 were caused by ATC operational errors relating to transfer (TRF) between ATC units. Cooperative actions were undertaken by the ATC units concerned with the aim of preventing further recurrence of similar errors. Since then, no LHD report caused by ATC transfer error has been observed, suggesting that the remedial actions taken had been effective.

4.40 Initial analyses by ENRI found that passing frequency values on ATS route G581 exceeded the Global System Performance Specification “a passing frequency equal to 2.5 opposite-direction passing per aircraft flight hour” described in the ICAO RVSM Manual (Doc. 9574 2nd Edition). In order to reduce that excessive passing frequency value, JCAB realigned G581 and developed additional two uni-directional parallel route systems on both sides of G581. As a result, the passing frequency was successfully decreased below the standard.

4.41 The Table below provides the estimates of Technical Risk calculated by collision risk model, the Operational Risk calculated by collision risk model and the consequent Overall Risk for the RVSM implementation in the Japanese domestic airspace.

Risk Estimates for the RVSM Implementation in the Japan domestic airspace

Source of Risk	Lower Bound Risk Estimation [accidents / flight hour]	TLS [accidents / flight hour]	Remarks
Technical Risk	1.3×10^{-9}	2.5×10^{-9}	Below Technical TLS
Operational Risk	3.5×10^{-9}		
Overall Risk	4.8×10^{-9}	5.0×10^{-9}	Below Overall Risk

4.42 Based on the collision risk estimates, the technical risk for the RVSM implementation in the Japan domestic airspace was 1.3×10^{-10} fatal accidents per flight hour. The total risk attributed to all causes was 4.8×10^{-9} . Therefore, the current provisional estimates of both technical and total risks satisfy the agreed TLS value of no more than 2.5×10^{-9} and 5.0×10^{-9} fatal accidents per flight hour due to the loss of a correctly established vertical separation standard of 1,000 ft, and to all causes, respectively.

4.43 Japan confirmed that full reporting of the safety analyses conducted in support of RVSM implementation for the Japan domestic airspace implementation would also be presented to the RVSM/TF/26 meeting in Tokyo on July 4-8, at which meeting it was intended the final Go/No Go implementation decision would be made.

RVSM Monitoring Service Arrangement for Japan/Republic of Korea

4.44 At the Special ATS Coordination Meeting on the RVSM Implementation in the Incheon, Naha and Tokyo FIRs (SCM/RVSM-Japan/Republic of Korea) held in Bangkok from 5 to 7 July 2004, the meeting reviewed the monitoring and safety assessment required as part of the RVSM implementation process. As PARMO was heavily committed to the scheduled implementation of RVSM in the USA, Canada and Mexico scheduled for 20 January 2005, MAAR agreed to provide necessary services for the pre-RVSM implementation in Incheon, Naha and Tokyo FIRs scheduled for 29 September 2005.

4.45 JCAB had established the Airspace Safety Monitoring Unit in ATC Division of JCAB (JASMU) in April 2004 for the purpose of conducting safety assessment required for the domestic RVSM implementation, and monitoring airspace safety for post implementation. At this stage, the work of JASMU is limited to safety assessment relating to the domestic RVSM implementation, and does not include assessment for horizontal separation reduction and ATS data link.

4.46 In addition, the meeting noted that JASMU would have a capability for independent safety assessment and monitoring for RVSM operations in the Japanese domestic airspace one year after the RVSM implementation, and was willing to work with other RMAs to reduce their burden. JCAB would consider expanding the functions and responsibilities for other services, such as RNP and ATS datalink in the international airspace over the Pacific within Japanese FIR, and becoming one of regionally recognized safety monitoring agencies in the Asia/Pacific region.

4.47 In this respect, Japan offered to assist the work of PARMO by undertaking some preliminary treatment of the raw data from Japan before sending it to PARMO. PARMO accepted the kind offer from Japan and agreed to coordinate with Japan in this regard, in order to clarify the roles of both parties.

4.48 MAAR and PARMO confirmed that it was intended that MAAR would conduct the safety analyses required for the 90 day post implementation review of the implementation of RVSM in the Incheon, Naha and Tokyo FIRs. Subsequent to the 90 day review meeting of the RVSM/TF, PARMO would resume responsibility for the Incheon, Naha and Tokyo FIRs. Timely coordination amongst MAAR, PARMO, Republic of Korea and Japan would be conducted to make this transition of responsibility.

Monitoring of Aircraft Navigation Errors for RNP 10 Operations over the South China Sea

4.49 The meeting recalled that when the revised South China Sea route structure was implemented on 1 November 2001, an essential aspect of the project was the establishment of RNP 10 monitoring arrangements along four of the routes, *i.e.* L625, M771, N884 and N892. Hong Kong China, Philippines and Singapore were made responsible for the collection of relevant data concerning flight operations along these routes, including examples of Gross Navigational Errors (GNE, >15NM lateral displacement) and a letter of agreement was established in this respect. These States were also required to forward the data collected, each month, to the Civil Aviation Authority of Singapore (CAAS), which is the monitoring authority for RNP 10 operations over the South China Sea.

4.50 Singapore advised the meeting that no occurrences of GNE had been reported in the 12 month period leading up to the meeting.

Safety assessment for RNP10 Operations in the SCS area

4.51 In regard to the need to establish safety assessment services for implementation of RNP 10 operations in the SCS in November 2001, a safety analysis was carried out prior to implementation in order to confirm that the navigation accuracy and other safety considerations expected to be achieved would not exceed the agreed TLS. As this task required mathematical expertise that was not generally available within the South China Sea ATS Route Structure Implementation Task Force, assistance was requested from Australia to carry out the safety assessment. The safety assessment conducted by Airservices Australia concluded that the lateral collision risk would be less than the required TLS of 5×10^{-9} fatal accidents per flight hour.

4.52 SCS/TF/7 (January 2002) noted that the results of this safety assessment suggested that a new traffic movement sample should be collected to complete the safety assessment once the revised route structure had been implemented because the traffic data used for this preliminary assessment did not reflect the revised route structure. The Task Force agreed that a further safety assessment for RNP 10 operations in the revised South China Sea ATS route structure based on the actual traffic movement should be conducted.

4.53 SCS/TF/8 (December 2002) endorsed the position described above. SEACG/11 (May 2004) considered the matter and added an action item to the SEACG Action Plan. APANPIRG/15 noted that SEACG/11 had agreed to update the safety assessment in relation to the implementation on 1 November 2001 of RNP 10 and 60 NM lateral separation on the South China Sea routes. APANPIRG/15 also noted that RASMAG/1 had identified a need for a safety monitoring group to be responsible for safety assessment activities, and that there would be a need to designate such a safety organization for the SCS area.

4.54 SEACG/12 (May 2005) noted the delays in updating the safety assessment, acknowledging that as no updated safety assessment had been undertaken since implementation of the route system in November 2001 nearly 4 years ago, a review of the safety assessment was long overdue.

4.55 SEACG/12, recognizing the background to the present situation, agreed that setting up of safety monitoring services was essential and this would be given priority. As RASMAG was the body with appropriate expertise, the meeting requested RASMAG's assistance. Detailed information was also required on the cost of setting up and operating a SMA.

4.56 Due to the limited meeting time available as a result of the seminar, the meeting was unable to consider in detail the information provided in respect of funding issues and arrangements, however agreed the funding issues were very significant in overcoming obstacles to the provision of safety monitoring services and added an item to the task list in this respect. The meeting noted the information from MAAR in respect of the probable expansion of MAARs services, to include SMA services.

4.57 In respect of the issues associated with the outstanding follow up safety assessment for the SCS route structure, the matter was considered under Agenda Item 5 of this meeting.

Agenda Item 5: Provision by States of safety related data

Delay to the Review of FLOS in the WPAC/SCS Area

5.1 The meeting was informed that during the review of regional Flight Level Allocation Scheme (FLOS) issues undertaken by RVSM/TF/22 (September 2004), States reached agreement in regard to commencing a work programme aimed at reviewing and amending the modified single alternate FLOS presently in use in the Western Pacific (WPAC) and South China Sea (SCS) areas.

5.2 The review of FLOS arrangements had been precipitated as a result of the RVSM implementation in the Bay of Bengal and Beyond area in November 2003 using a single alternate FLOS, requiring RVSM transition arrangements between the modified single alternate FLOS used in the WPAC/SCS areas. MAAR had provided an update to RVSM/TF/22 of reported large height deviation (LHD) occurrences in the RVSM airspaces submitted by States in both the WPAC/SCS and Bay of Bengal and Beyond areas. Based on the incomplete information submitted, MAAR had found that the LHD occurrences were more significant in the WPAC/SCS transition areas.

5.3 In accordance with ICAO safety management provisions, RVSM/TF/22 recognized that any change to the current FLOS arrangements required the successful completion of appropriate safety assessment activities before a change could be authorized. At that time, it was expected that the required safety assessment activities could be completed in time for review by a further meeting of the RVSM/TF scheduled in late April 2005 for this purpose.

5.4 In support of the proposed changes, in addition to State safety assessments, the Monitoring Agency for Asia Region (MAAR) was required to carry out a safety assessment for the Western Pacific/South China Sea that included, amongst others, consideration of the revised level assignments proposed and resulting transition areas and associated procedures. In order to undertake these activities, MAAR required the provision by States of complete traffic sample data (TSD) for the month of July 2004, and RVSM Large Height Deviation (LHD) data for a continuous 12 month period.

5.5 Although many affected States were able to provide data to MAAR as requested, in spite of frequent reminders by MAAR and a State letter issued by the Regional Office, several States responsible for significant portions of the airspace in the South China Sea area failed to submit the required data in time for MAAR to complete the safety assessment to be reviewed at the scheduled April FLOS review meeting.

5.6 As a result, the MAAR safety analysis had been unable to be completed and will not be able to be completed until appropriate data has been provided by the States concerned. In the absence of the MAAR safety assessment, no change to the existing FLOS arrangements could be authorized.

5.7 Without suitable safety assessments being available for review, very little could be achieved by continuing with the April 2005 FLOS review meeting as scheduled. Accordingly, the Regional Office advised States that the scheduled April RVSM/TF/26 FLOS review meeting had been postponed. In recognition of the Regional Office meeting schedule and the MAAR responsibilities resulting from the implementation of RVSM in Japan (domestic) and Republic of Korea FIRs in early September 2005, the FLOS review meeting was tentatively rescheduled during 5 – 9 September 2005, as RVSM/TF/27.

5.8 During SEACG/12 (May 2005) Hong Kong, China expressed concern over the number of changes that had taken place in the SCS airspace in recent years with the introduction of the revised SCS route structure and reduced lateral separation in 2001 followed by RVSM in 2002. Also, the Japan and Republic of Korea RVSM implementation schedule had changed from June 2005 to November 2005, and

at RVSM/TF 25 in Incheon on 21-25 March 2005 the date was again revised to 29 September 2005. Hong Kong, China found it difficult to keep readjusting their training schedule.

5.9 With the RVSM FLOS review meeting tentatively re-scheduled shortly before the Japan/Republic of Korea implementation on 29 September 2005, Hong Kong, China considered that it would not be viable to complete all activities related to the RVSM FLOS change. Also, the Japan/Republic of Korea implementation would use a single alternate FLOS, therefore requiring additional RVSM transition arrangements in respect of the SCS FLOS. It was suggested that any change to the SCS FLOS should be delayed until after the 90-day review meeting of the Japan/Republic of Korea RVSM implementation.

5.10 SEACG/12 recognized the difficulties of coping with frequent changes to the operational environment and agreed that a period of stability should be allowed for after the Japan/Republic of Korea implementation and recommended to the RVSM/TF to postpone the FLOS review meeting until after the 90-day review, which would be held in January 2006. The Regional Office would schedule the FLOS review meeting accordingly, probably in February 2006.

5.11 The meeting recognized that the safety concerns intended to be addressed by RVSM/TF/22 in respect of RVSM transition arrangements would not be addressed until appropriate data had been provided to MAAR for analysis and a RVSM/TF meeting had considered the outcomes of the safety assessment. The meeting also recognized that the non-provision of safety data by some States and consequent inability of MAAR to complete the safety assessment would lead to a deferment of at least 10 months in the implementation of the proposed changes to the SCS FLOS.

5.12 The meeting, noting that the proposed changes to the SCS FLOS were derived in order to address identified operational safety concerns reviewed during RVSM/TF/22, expressed strong concerns in respect of the delay. In this regard, the meeting also noted the matters raised by MAAR's recent reporting (discussed at paragraphs 4.21 to 4.25 in this report) in respect of the large numbers of Large Height Deviations (LHDs) recorded for the SCS airspace and the implications in respect of the RVSM transition arrangements, expressing very strong concerns that arrangements agreed at RVSM/TF/22 were expected to assist in reducing the numbers of LHDs and therefore should be progressed with the minimum of delay. The meeting strongly supported the concerns raised by MAAR (as recorded at paragraph 4.24 of this report) urging States to put in place, as soon as possible, remedial actions to mitigate the numbers of LHDs.

Non Submission by States of Safety Related Data

5.13 RASMAG/2 (October 2004) was concerned that some States had failed to fulfill their obligations towards ICAO safety requirements for ongoing operation of RVSM, noting a number of disturbing issues that had been identified by MAAR and PARMO that required urgent follow up:

- a) missing traffic sample data;
- b) missing large height deviation reports;
- c) incomplete and non-reporting of State approvals registry data; and
- d) incomplete information on follow-up monitoring of aircraft height-keeping performance in accordance with the minimum monitoring requirements.

5.14 RASMAG/2 recognized that these problems should be made known to State safety authorities to reinforce the need for due diligence in their safety management programmes and to fully cooperate with the regional RVSM monitoring programme. Accordingly, RASMAG/2 prepared a draft

letter (**Appendix E** refers) highlighting these concerns and requesting the immediate submission of safety data. Letters of this type were transmitted by the Regional Office during early December 2004 to 13 States of the Asia and Pacific Regions who were identified as not having submitted data in accordance with the requirements of approved RMAs. Whilst many States provided safety data in response to the letter, some States have still not provided suitable data to MAAR.

5.15 The follow up actions that have had to be continually undertaken by the Regional Office and regional RMAs in an effort to ensure States provide suitable safety data in respect of their responsibilities under Annex 11 - *Air Traffic Services* provisions are excessive and cannot be sustained.

5.16 The non provision by States of appropriate safety data in a timely manner, in accordance with ICAO provisions and the requirements of RMAs appointed by APANPIRG means that the safety performance of the regional airspaces in which reduced separation has been implemented cannot be fully demonstrated.

5.17 The meeting expressed significant concern in respect of the non-provision of data, noting that the MAAR review of WPAC/SCS airspaces reported in Agenda Item 4 had been unable to be fully completed because of the lack of data. The provisional calculation based on the limited data available had raised concerns in respect of the ability to meet the TLS and, coupled with the very high number of reported LHDs, raised significant concerns in regards to the safety performance of this airspace. Also, the lack of data had meant that the safety assessment in respect of the proposed variation to the WPAC/ SCS FLOS had been unable to be completed, necessitating the continued operation of the existing FLOS despite the safety concerns that had been identified by RVSM/TF/22.

5.18 In respect of the outstanding follow up safety assessment for the SCS Route structure (discussed in paragraphs 4.51 to 4.57), the meeting noted that SEACG/11 (May 2004) had agreed that a traffic sample data collection was required to update the SCS routes safety assessment, and requested States concerned to collect the data for the month of July 2004 and submit this to the Regional Office by 1 September 2004 for consideration by RASMAG/2. This data sample had not been received by the Regional Office.

5.19 The meeting continued with discussion concerning the action that needed to be taken to resolve the issue of a lack of data provided by some States. To this end the meeting agreed that it would be preferable to make a strong recommendation to APANPIRG for their consideration as to the action required. The mood of the meeting was that the current situation had been allowed to continue for too long without satisfactory resolution and as a result recent implementations of reduced separation could be compromised by the inability to demonstrate an on-going acceptable level of safety. To that end the meeting drafted a statement and conclusion for presentation to APANPIRG. This statement was finalized following protracted discussion and amendment, and is recorded below.

RASMAG is aware that despite efforts to encourage States to provide data to enable the assessment of mandated safety targets for the implementation of reduced separation minima, some States have not met their responsibilities.

RASMAG considers that the failure of some States to provide monitoring data as required in accordance with Annex 11 provisions and Regional Supplementary Procedures (Doc 7030), has led to an inability to update required safety assessments. This leads to a lack of confidence in the safety of the operating system, in particular with respect to reduced separation applications i.e. an inability to demonstrate whether target levels of safety are being achieved.

Accordingly RASMAG has drafted the following two conclusions for consideration by APANPIRG/16:

Draft Conclusion 16/xx1

That, recognizing that some States had not adequately complied with safety management provisions, further implementation of reduced separation minima within the Asia and Pacific Region 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.

Draft Conclusion 16/xx2

That the non provision by States of safety related data to approved monitoring agencies be included in the APANPIRG Deficiencies List in respect of a deficiency in a safety management system, in order to promote the resolution of these issues.

5.20 The Chairman noted that whilst adoption of these draft Conclusions by APANPIRG would rectify the longer term problem of assuring safety in future implementations, it left the short term data availability problem unresolved. PARMO suggested that in line with activities that the PARMO had undertaken with States in the North American region, RMAs could consider the establishment of bi-lateral letters of agreement concerning the exchange of data directly with a point of contact with States. The proposal was put to the meeting that this could be a means of facilitating the data provision issue in the Asia/Pacific region. The meeting agreed that RMAs should consider this process and include it for discussion at the proposed tripartite RMA meeting.

5.21 In addition there was some concern regarding the lack of a follow-up safety assessment undertaken for the route structure in the SCS airspace for RNP10 operations. AEROTHAI, in acknowledging that there was an immediate need for this to be completed, noted that although MAAR was intending to expand its role to provide SMA services, it was unlikely that MAAR could undertake this work in the short or medium term. Noting that Australia had conducted the original pre-implementation safety assessment, the meeting requested that Australia again be approached and requested to complete the post implementation safety assessment. The Chairman undertook to discuss this option with Airservices Australia and, following a telephone call, reported back to the meeting that it was possible this could be accomplished. The Chairman agreed to coordinate a more formal response with the Regional Office in the next few weeks.

Outcomes of the 41st DCGAs Conference

5.22 In accordance with the concerns raised by RASMAG/2 in respect of the non provision of data by States, the Regional Office had presented a discussion paper in relation to RASMAG to the 41st Conference of the Director Generals of Civil Aviation of the Asia and Pacific Region (the 41st DGCA's Conference), held in Hong Kong, China during November 2004. In respect of this discussion paper, the meeting noted that the Report of the 41st DGCA's Conference recorded the following:

RASMAG/2 (October 2004) emphasized that the implementation and continued application of RVSM and other reduced separation minima were predicated on safety assessments being performed and updated, and the target level of safety being demonstrated as having been met. Accordingly, RASMAG/2 requested that the 41st Conference of the Director Generals of Civil Aviation of the Asia and Pacific Region be advised, in order to alert DGCA's to the disturbing problem of the non provision of safety data by many States and the consequent inability to demonstrate the current safety

performance of some aspects of regional operations, including those related to the application of reduced separation minima.

5.23 As a result of the Conference discussions, the 41st DGCA's Conference formulated 10 action items. One of these actions items was in respect of RASMAG and is recorded as follows:

DGCA Action Item 41/6

Recognizing the ICAO provisions on implementing Safety Management Systems, the Conference urged all Administrations in the Asia Pacific Region to fully support the APANPIRG Regional Airspace Safety Monitoring Advisory Group (RASMAG)

Agenda Item 6: Airspace safety monitoring documentation and regional guidance material

Approval of Amendment 43 To Annex 11 and complementary amendments to Annex 6

6.1 The Regional Office briefed the meeting in regard to amendments to Annex 11 and Annex 6 – *Operation of Aircraft*. On 2 March 2005, the ICAO Council adopted Amendment 43 to Annex 11 and amendments 29, 24 and 10 to Annex 6 (Parts I, II and III, respectively), prescribing 11th July 2005 as the date upon which they would become effective and 24th November 2005 as the applicability date. State Letters, dated 24 March 2005, had been issued describing the nature and scope of the amendments to Annexes 6 and 11.

6.2 Amendment 43 to Annex 11 introduced a Standard that required States to establish a monitoring programme for aircraft height keeping performance in RVSM airspace. Complementary provisions have been added to Annex 6, which specify the responsibility of the relevant State authority to take prompt and appropriate action if the monitoring results indicate that the height keeping performance of a particular aircraft or an aircraft type group exceeded prescribed limits.

RMA Manual and RVSM Minimum Monitoring Requirements

6.3 The First Edition (May 2004) of the ICAO *Manual of Operating Procedures and Practices for Regional Monitoring Agencies in relation to the use of a 300m (1000ft) Vertical Separation Minimum above FL290* (the RMA Manual) had been developed in order to provide guidance to Regional Monitoring Agencies (RMAs) in the performance of their functions associated with RVSM operations. These include aspects of system performance monitoring during implementation planning and post-implementation operational use of RVSM and the consideration of aircraft technical and operational requirements for RVSM operations. The Manual has recently been published as an unedited version to the ICAO internal data network – the “ICAO Net”.

6.4 The RVSM minimum monitoring requirements (MMRs) recommended by ICAO were contained in the RMA Manual. The meeting was advised that there were some differences between the MMRs in the RMA Manual and the MMRs currently used by MAAR and PARMO. As well, MAAR would shortly distribute the updated MAAR/PARMO MMRs which became effective from 1 July 2005 to all concerned States, operators and RMAs, and post the MMRs on the MAAR website (**Appendix F** refers).

6.5 The meeting recognized that the differences between these MMRs and the MMRs in the RMA Manual were slight and that work would continue to align the two sets of MMRs. In this regard, the meeting agreed that upon the alignment of the MAAR/PARMO MMRs with the RMA Manual, the RMAs

of the Asia/Pacific Region should adopt the MMRs contained in the Manual, as amended from time to time, for regional application.

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

6.6 The meeting reviewed the draft *Guidance Material for End-to-End Safety and Performance Monitoring of Air Traffic Service (ATS) Data Link Systems in the Asia/Pacific Region* (**Appendix G** refers) noting the development of the material that had occurred since it was initially presented at RASMAG/1. The *Guidance Material* was intended to provide a set of working principles for ATS data link system performance monitoring that would be applied by all States implementing these systems, as well as providing detailed guidance on the requirements for establishing and operating a FANS-1/A Interoperability/Implementation Team (FIT) and Central Reporting Agency (CRA). It was intended that this *Guidance Material* would help promote a standardized approach for monitoring the performance of ATS data link systems within the Region.

6.7 The Regional Office reported that as well as the progress that had been made by RASMAG in refining this material, the draft material had recently been circulated to the FIT-BOB, FIT-SEA, IPACG and ISPACG forums to allow enhancements to be made based on the ADS/CPDLC experience of these groups. Feedback from these groups had been incorporated into the current draft version.

6.8 After final discussions in respect of the content of the draft *Guidance Material*, the meeting considered that the document was suitable for application as regional guidance material and requested that the Regional Office submit the draft *Guidance Material* to the ATM/AIS/SAR/SG/15 meeting in July 2005 with a request that the material be considered for submission to APANPIRG/16 in August 2005 for endorsement as regional guidance material.

Standard Reporting Format

6.9 The meeting recalled that RASMAG/1 (April 2004) had reviewed the reporting procedures adopted by the various groups in the region, and agreed that all reports by the authorized groups related to safety management activities carried out for the international airspace of the Asia/Pacific Region should be made available to the RASMAG. RASMAG would review the reports and present a consolidated annual report to APANPIRG on the state of the safety of the international airspace in the region. In addition, RASMAG/1 agreed that a standard reporting format would be useful for safety monitoring agencies to use in reporting the results of their work to RASMAG and recommended that all regional safety monitoring groups should adopt a standard report style.

6.10 The meeting reviewed a proposed reporting template and associated completion instructions and agreed that draft template provided a suitable format to record and present information to RASMAG. The meeting adopted the standard reporting format included as **Appendix H**. The Regional Office agreed to circulate the standard reporting format to safety monitoring agencies with a recommendation from RASMAG that they adopt the standard format in all reporting to RASMAG.

Agenda Item 7: Funding of Regional Safety Monitoring Activities

Funding of Airspace Monitoring Activities

7.1 The meeting acknowledged that there were many issues associated with the need to effectively fund and operate multinational infrastructure and air navigation services, including services related to airspace safety. In this regard, the meeting recalled that RASMAG 1 & 2 had identified the need to establish airspace safety monitoring services to support the application of reduced horizontal separation minima for the South China Sea and EMARSSH routes (60 and 50 NM lateral route spacing respectively), and for any future implementation such as 50 NM longitudinal separation and 30 NM lateral and longitudinal separation.

7.2 The meeting was also advised that at the ISPACG/19 meeting (Brisbane, February 2005), the United States had informed the meeting that the funding of the ISPACG CRA by the FAA would expire in September 2005, and other funding arrangements would need to be considered.

7.3 The meeting recognized that the provision of safety monitoring services was essential for continued operation of reduced separation minima including RVSM. It was therefore important to understand how States could best organize to provide necessary safety monitoring services and to consider the wider issues of funding necessary for the provision safety services for the international airspaces in the region such as for the application of RVSM and reduced horizontal separation.

7.4 The meeting took into account that the *Convention on International Civil Aviation* (Chicago, 1944) (Doc 7300/8) establishes relevant principles for air navigation charges, especially uniformity in conditions of use and equity in charging. The obligation for providing safety monitoring services for air navigation resides with each State but there are policies, guidelines and mechanisms for recovering appropriate costs as documented in the recently revised publication, *ICAO's Policies on Charges for Airports and Air Navigation Services* (Doc 9082/7).

7.5 To elaborate on the guidance contained in Doc 9082/7, the Council of ICAO had agreed that as a general principle, where air navigation services were provided for international use, the providers may require the users to pay their share of the related costs. The meeting was invited to note that the Council recommends that when establishing the cost basis for air navigation services charges, the following principles (among others) should be applied:

- a) The cost to be shared is the full cost of providing the air navigation services, including appropriate amounts for cost of capital and depreciation of assets, as well as the costs of maintenance, operation, management and administration.
- b) The costs to be taken into account should be those assessed in relation to the facilities and services, including satellite services, provided for and implemented under the ICAO Regional Air Navigation Plan(s), supplemented where necessary pursuant to recommendations made by the relevant ICAO Regional Air Navigation Meeting, as approved by the Council. Any other facilities and services, unless provided at the request of operators, should be excluded, as should the cost of facilities or services provided on contract or by the carriers themselves, as well as any excessive construction, operation, or maintenance expenditures.
- c) Air navigation services may produce sufficient revenues to exceed all direct and indirect operating costs and so provide for a reasonable return on assets (before tax and cost of capital) to contribute towards necessary capital improvements.

7.6 The Council had observed that Governments may choose to recover less than full costs from the users in recognition of local, regional, or national benefits. Furthermore, the Council noted that it was up to each State to decide for itself whether, when, and at what level air navigation services were provided.

7.7 The Council also recognized the desirability of consultation with users of air navigation services before changes in charging systems or levels of charges were introduced. The purpose of consultation was to ensure that the provider gave sufficient information to users relating to the proposed change and gave proper consideration to views of users and the effects the charges would have on them. The aim should be that, wherever possible, changes be made in agreement between users and providers.

7.8 The policies and guidelines indicated above, however, did not preclude States from entering into formal mechanisms to support cooperative approaches in the provision and financing of air navigation services. In respect of ICAO provisions, the four broad mechanisms to consider are:

- a) An International Operating Agency - a separate entity assigned the task of providing air navigation services, principally route facilities and services, within a defined area on behalf of two or more sovereign States (e.g. EUROCONTROL);
- b) A Joint Charges Collection Agency - an agency that collects route air navigation service charges on behalf of all of the participating States, including those that were over-flown;
- c) A Multinational Facility/Service – a mechanism included in an ICAO regional air navigation plan for the purpose of serving international air navigation in airspace extending beyond the airspace services by a single State in accordance with that regional air navigation plan. The participation of States in the provision of a multinational facility/services 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 shoulder its share of the costs involved. Having done this, the participating States would need to formalize in an agreement the terms under which the multinational facility/service was to be provided; or
- d) An ICAO Joint Financing Agreement – an agreement involving two or more States sharing in the costs of implementing and operating air navigation facilities and services for international air transport operations.

CRA for the Bay of Bengal

7.9 The Regional Office presented the meeting with a review of the background and work undertaken to date to put viable funding arrangements in place for Central Reporting Agency (CRA) to support an operational trial for implementation and operation of ADS and CPDLC in the Bay of Bengal area.

7.10 In preparing to implement a trial of ADS/CPDLC in the Bay of Bengal, the Bay of Bengal ATS Coordination Group (BBACG) and FANS Implementation Team for the Bay of Bengal (FIT-BOB) had identified that the provision of CRA services would require funding and, in order to establish a suitable funding mechanism, a Special Coordination Meeting (SCM) was held at the Regional Office in December 2003.

7.11 The SCM considered various funding models that could be used by States to cooperate with each other to establish the CRA and provide for the necessary funding. Recommendations were made

to the FIT-BOB/3 meeting (February 2004) on how to set up the funding arrangements. In this regard, FIT-BOB adopted the following recommendations made by the SCM:

That, recognizing that the participating States in the FIT-BOB were responsible for the airspace safety management programmes for the provisions of ATS in the FIRs where ADS/CPDLC would be implemented in the Bay of Bengal area, FIT-BOB would:

- a) establish a CRA to evaluate the ground and airborne ADS/CPDLC systems performance during the operational trial;
- b) determine the budget for the CRA in consultation with the CRA service provider, the participating States and users, and to establish the funding arrangement to provide funds for the CRA, taking into account the framework provided by the December 2003 SCM;
- c) request IATA to collect funds for the CRA from airlines and other stakeholders as advised by FIT-BOB, and establish an arrangement for the provision of CRA services with a service provider subject to available funds for a trial period of one year;
- d) seek contributions from other parties to contribute to the cost of operating the CRA and make these funds available to the CRA service provider; and
- e) keep the funding arrangements under review during the operational trial period, and to review the efficiency and effectiveness of the funding arrangements prior to the end of the operational trial.

7.12 In considering a suitable service provider for the FIT-BOB CRA, Boeing, who was operating the CRA for the Pacific Region, had confirmed that they would be willing to provide CRA services to the States participating in the FIT-BOB to support the operational trial for the implementation of ADS and CPDLC services. Boeing's offer to provide CRA services for the Bay of Bengal operational trial was accepted by FIT-BOB/3. To set up and operate the CRA, the FIT-BOB States participating in the operational trial requested IATA and Boeing to establish a contractual arrangement for the provision of these services and its funding.

7.13 India commenced an operational trial of ADS and CPDLC in the Chennai and Kolkata FIRs on 19 February, 2004. Thailand was also participating in the trial. Other States involved were expected to join the trial when their data link systems became available.

7.14 During the FIT-BOB/5 meeting (April 2005), IATA was pleased to advise that they were at the final stage of reaching agreement with Boeing and expected that a contract would be signed by the end of this month. IATA provided details of the contract with Boeing and how the funding mechanism would work.

7.15 The contract would be effective for 18 months. IATA would be a principal contracting partner with Boeing, and as such would be responsible for meeting the cost incurred by Boeing for operating the CRA in accordance with the defined requirements. Boeing would be paid in arrears and it should be possible to commence CRA services as soon as the contract was signed. All users of the data link services would be required to pay for the CRA services and a single charge would be levied on airlines by IATA in accordance with agreements with the States concerned. States would not bear any expense in this process and would not be required to participate in the invoicing and collection of charges other than providing the data and publishing their AIP Supplements (SUP).

7.16 Although the initial contract between IATA and Boeing would be for 18 months, FIT-BOB/5 was advised that it would be possible to extend the arrangement on an annual or triennial basis thereafter, should this interim approach to funding the CRA prove successful for the parties concerned.

7.17 However, to bring the CRA into operation, it would be necessary for IATA also to enter into a formal arrangement with the States concerned to ensure provision of the necessary data and to enable IATA to collect charges from the users of the data link services. This would require States to notify users that charges would be levied for the provision of ADS and CPDLC and that IATA was authorized by the States concerned to invoice and collect charges specifically for the operation of the CRA. In regard to the notification to be issued by States on user charges and operation of the CRA, IATA would provide an example of wording that could be used in an AIP SUP and coordinate with the States concerned to complete the arrangements.

7.18 A further special coordination meeting was held on 2-3 June 2005 in order to finalize agreements in respect of the IATA/States arrangements and responsibilities. Suitable legal agreements were drafted and AIP Supplements were prepared for issuance by States, thereby permitting IATA to invoice users in respect of a 'CRA Charge', initially established at USD4 per flight. Pending final editorial refinement, it is anticipated that the agreements will be signed in July 2005, allowing the provision of CRA services for the ADS/CPDLC operational trial to commence.

Commercial availability of SMA services

7.19 The meeting was presented information on behalf of CSSI relating to its interest in assuming the duties and responsibilities associated with the provision of airspace monitoring in connection with RNP-based horizontal-plane separation minima. The meeting was informed of CSSI's capabilities and experience as they related to the region's need for safety monitoring. CSSI specialized in system analysis and engineering, application development, information technology, and technical program management. Its principal clients include the Federal Aviation Administration (FAA), the National Aeronautics and Safety Administration (NASA), and the U.S. Department of Defense (DoD).

7.20 The meeting also was advised that CSSI has been an active participant in ICAO regional and safety forums, which developed RNP requirements and the associated criteria for establishing separation minima based on RNP and RVSM.

7.21 The information provided by CSSI indicated to the meeting that the current capabilities and prior experience of CSSI allowed it to immediately fulfil the roles and responsibilities of the SMA, and CSSI was willing to start work as soon as Asia/Pacific States may require. As CSSI was a private business company, it would be necessary to charge for its services.

7.22 The meeting noted and appreciated the information provided by CSSI.

MAAR Current and Future Role

7.23 Since 2 September 2003, when MAAR assumed the RMA duties and responsibilities for the Asia Region, MAAR had provided safety monitoring for RVSM implementation in the Bay of Bengal (BOB) and Western Pacific/South China Sea (WPAC/SCS). MAAR's current duties and responsibilities included:

- Establishing and maintaining Point of Contact (POC) database,
- Establishing and maintaining a central registry of State RVSM approvals of operators and aircraft using RVSM airspace,
- Administering height-keeping performance monitoring for aircraft intended to operated in the RVSM airspace,

- Establishing and maintaining a database containing the results of height keeping performance monitoring,
- Providing timely information on changes of the monitoring requirements for aircraft type classifications to State authorities and operators,
- Using height-keeping performance monitoring results to assess compliance of operators and aircraft with RVSM height-keeping performance requirements,
- Providing the means for identifying non-RVSM approved aircraft using the RVSM airspace where RVSM is applied, and the means for notifying the appropriate State Approval Authority,
- Monitoring all altitude deviations of 300 ft or more (Large Height Deviation–LHD), within airspace where RVSM is applied,
- Conducting safety assessments before the planned RVSM implementation, and
- Providing safety oversight after RVSM implementation in the regional airspace.

7.24 In addition, because of the limited availability of PARMO resulting from the workload associated with the implementation of RVSM in wide areas of the US, Canada and Mexico in January 2005, MAAR had assisted ICAO in assessing the safety of the RVSM implementation in Japan and Republic of Korea (ROK) domestic airspace planned for September 2005.

7.25 MAAR updated the meeting in respect of future activities, expressing its intention to fulfill the role of Safety Monitoring Agency (SMA) to support the implementation of RNP-based horizontal-plane separation minima in the Asia Region, in addition to its current RMA duties.

7.26 In regards to the provision of airspace safety monitoring for the implementation of the RNP-based horizontal-plane separation minima in the Asia Region, although the technical capability and prior experience of MAAR as an RMA provided valuable expertise, MAAR would still need to acquire the specific technical/operational know-how for the provision of RNP-based horizontal-plane separation minima airspace monitoring. MAAR reported that in this regard, they were in consultation with the FAA Technical Center and coordinating a business arrangement with CSSI in order to allow MAAR to fulfill the roles and responsibilities of the SMA for the Asia Region.

7.27 MAAR reported that in order to expand its role to provide SMA services in addition to the RMA services currently provided at no charge, MAAR would require financial support on a cost-recovery basis. Also, aircraft operators intending to conduct height keeping performance monitoring for RVSM-approved aircraft through AEROTHAI would be charged on a cost-recovery basis.

7.28 The meeting expressed appreciation for MAAR's existing RMA work and encouraged MAAR to continue to its present initiatives in respect of moving towards the provision of SMA services. The options to obtain SMA services regionally were very limited and having an operational SMA readily accessible would assist States in meeting their obligations in respect of ICAO safety provisions.

Agenda Item 8: Any Other business**RASMAG/3 Safety Seminar**

8.1 The meeting recalled the background in respect to the decision by RASMAG to conduct the 3-day safety seminar that had been arranged immediately subsequent to the RASMAG/3 meeting. RASMAG/1 had expressed concern that, because the Annex 11 provision on safety management programme only came into effect on 27 November 2003, there was little lead time for States to establish safety management systems and to develop safety assessment expertise to address complex airspace environments where reduced separation minima was being implemented and operating. It was recognized that States who had implemented safety management systems and used a systematic approach to evaluating operational risk and managing ongoing operations, were much better equipped to deal with airspace safety matters. States that had little experience with safety management systems and had not put in place arrangements specifically to deal with ATS safety matters, would find it difficult to manage complex airspace and reduced separation that required safety assessments to be performed.

8.2 In this regard, the meeting was of the opinion that regional and State implementation programmes for the introduction of reduced separation, must pay special attention to this matter. Furthermore, the meeting recognized that obtaining accurate information on operational errors, in particular involving ATC errors, would be difficult where the safety culture was not conducive to open and transparent reporting of errors. The human factors consideration was likely to be one of the weakest links in the safety equation.

8.3 RASMAG/1 had recognized that these issues had a significant impact on the ability of the RMAs, CRAs and safety monitoring groups to undertake their work effectively and agreed that more attention needed to be given to education, and a start could be made by holding an ATS safety management workshop on the matters described above with an emphasis on practical hands-on experience.

8.4 The meeting considered that these concerns were still valid and endorsed the conduct of the seminar. The meeting noted that the original proposals had included provision for the Seminar material to form the basis for a small team of experts to travel to States and provide on site safety management training. The meeting was informed that, despite the generous commitment of IATA to assist with travel arrangements, the concept of presenting a traveling safety workshop to States of the region was not able to proceed as a result of resource limitations of the Regional Office and some of the States involved.

8.5 The meeting expressed regret in respect of these circumstances. The Regional Office advised that a CD-ROM of the presentations to the Seminar would be widely available to States. Whilst recognizing the value of a CD-ROM, the meeting acknowledged that simply reading the material on the CD would be of significantly less value than hearing the commentary that went with the CD presentations and proposed that arrangements be made to produce a video or DVD of the seminar. As it was too late to make arrangements for this seminar, the meeting elected to pursue the idea further at a later time and requested that the 3 regional RMAs include this matter in the discussions at their proposed joint meeting. Additionally there was agreement that the proposal to take the safety seminar developed by RASMAG to specific States should be pursued. The three RMAs agreed they could undertake this activity with the support of IATA and would develop a programme and schedule. The matter was included in the RASMAG task list.

8.6 The meeting recognized that the safety seminar over the next few days would comprise a trial and evaluation of the safety presentations and the material presented would need to be formally evaluated in respect of relevance and suitability. The meeting agreed to add an action item to the task list to ensure that a review of the seminar was conducted during RASMAG/4.

8.7 The meeting was aware that the current ICAO Asia/Pacific COSCAP-SA, SEA and NA programmes which address safety oversight of flight operations and airworthiness may be expanded to address ATS safety oversight in the near future. The meeting recommended that the Regional Office note the problems that have been identified by RASMAG with regard to the lack of effective ATS safety management in some States, as evidenced by the inability to meet Annex 11 Chapter 2 obligations for airspace safety monitoring. The meeting agreed that those States that are presently having difficulty in this matter would greatly benefit from receiving training of personnel to conduct safety monitoring of airspace in accordance with Annex 11, Chapter 2.

Special Implementation Project on ATS safety management

8.8 The Regional Office provided information in regard to the establishment by the Regional Office of a Special Implementation Project (SIP) approved by the Council of ICAO to evaluate ATS safety management (including safety assessment) programmes necessary for implementation and operation of RVSM and reduced horizontal separation minima in the Asia Region.

8.9 The SIP had as its main objective to ensure that all concerned States have set up a proper mechanism to ensure the safe implementation and operation of RVSM and reduced horizontal separation in accordance with Annex 11 provisions, and to assist States as necessary, to draw up an action plan with a view to meeting their obligations thereto.

8.10 The previous Regional Office SIP conducted during late 2004 covered a number of States in the Bay of Bengal area and included consideration of operational safety matters. The 2005 SIP would focus on the South-East Asia area. Under the proposed SIP arrangements, a series of visits was being planned by the Regional Office during 2005 to Cambodia, Indonesia, Philippines and Viet Nam.

8.11 Based on the outcome of the evaluation visits to the States concerned, the SIP was expected to propose that a regional strategy be developed to assist States to establish safety management programmes in accordance with Annex 11. This was essential for implementation of airspace changes and assurance of ongoing safety of operations of the airspaces concerned.

ICAO Language Proficiency Requirements

8.12 The meeting was presented with information on the new ICAO language proficiency provisions in Annexes 1, 6, 10 and 11 requiring that as of 5 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 the level specified in the language proficiency requirements of ICAO documentation. The minimum level that must be achieved by this group is Level 4.

8.13 ICAO published the *Manual on the Implementation of the ICAO Language Proficiency Requirements* (Doc 9835-AN/453) in September 2004 addressing the various training and evaluation issues related to the implementation of ICAO language proficiency provisions to assist States to comply with the provisions.

8.14 In implementing the proficiency provisions, the attention of States is drawn to considering, aspects of:

- mechanisms to identify current proficiency levels amongst operational staff;
- mechanisms for the provision of language enhancement training;

- whether to establish in-house programs for assessment and enhancement training, or utilize external language services providers;
- if using external language services providers, mechanisms to identify appropriate providers;
- numbers of pilots or controllers that can be simultaneously taken off line, and for what period of time, for assessment and/or enhancement training;
- contingency considerations in the event that insufficient staff attain Level 4 proficiency; and
- whether language proficiency tests should be introduced as part of the initial recruiting process.

8.15 Pursuant to Article 42 of the Convention on International Civil Aviation, the introduction of the new language proficiency provisions were becoming applicable progressively. As of 27 November 2003, operational staff shall demonstrate the ability to speak and understand the language used for radio telephony. Until 5 March 2008, the licensing authority of each State is permitted to determine the way in which this ability is demonstrated.

8.16 From 5 March 2008, the demonstration of the ability to speak and understand the language used for radio telephony communications shall be conducted in accordance with the holistic descriptors and rating scale published by ICAO as attachment and appendices to Annex 1.

8.17 The meeting recognized that States could be expected to undertake substantial work in the preparation and application of language testing instruments in order to assess the present ability of pilots, radio operators and air traffic controllers to meet the SARPs. Also they would have to examine issues of aviation language training aimed at enhancing the language skills of operational staff to achieve at least the minimum operational Level 4.

8.18 The meeting noted that the Regional Office did not have particular language expertise and any further assistance to States would best be sought from ICAO Headquarters, or use made of expertise in the public or private sectors. In this regard, use of a limited number of language services providers regionally was likely to result in increased standardization of the SARP requirements and would also probably result in efficiencies in time and cost for airlines and ATS providers.

8.19 The meeting recognized that there was little material available on testing for language proficiency and how to retrain personnel who failed to meet the Level 4 standard or wished to achieve a higher standard. The Regional Office advised that this matter would be referred to the ATM/AIS/SAR/SG/15 as it had relevance regionally.

30/30 Implementation in the Tasman Sea

8.20 The Regional Office provided information in relation to Australia's implementation of 30/30 separation minima based on ADS and RNP/4. On 20 January 2005, following satisfactory completion of the safety review, 30 NM lateral/30 NM longitudinal separation (based on RNP4 between FANS 1/A approved aircraft) was introduced across the Honiara FIR (Solomon Islands), Nauru FIR (Republic of Nauru), Nadi FIR (Fiji) and the oceanic portions of the Brisbane FIR (Australia) and Auckland FIR (New Zealand).

8.21 The Regional Office drew the attention to this implementation, as it provided valuable information in regard to the safety management and working group processes that had been undertaken during the implementation of the reduced separation minima, thereby providing a model for use by other States in respect of similar implementations.

Agenda Item 9: Date and venue of RASMAG/4 meeting

9.1 The meeting was alerted to the recent reduction in ATM staff at the Regional Office and the consequent reduced ability to conduct State meetings.

9.2 RASMAG had been meeting at approximately 6 monthly meetings since inception in April 2004 in order to assess and progress safety services in the region. The meeting considered whether the regional safety work under the jurisdiction of RASMAG was sufficiently advanced that the meeting periodicity could be increased to 12 months intervals. However, in light of the many issues that had arisen during this meeting and the reduced meeting time that had been available as a result of the ATS Safety Management Seminar, the meeting considered that a further RASMAG meeting within 6 months would be necessary. Accordingly, the RASMAG/4 meeting was scheduled over a four day period from 25-28 October 2005, to be held at the Regional Office facilities in Bangkok.

10. Closing of the meeting

10.1 The Chairman, Mr. Butcher, thanked the meeting participants for the excellent work undertaken over the two days of the meeting. He commented that the meeting had managed to resolve some significant issues impacting on the safety of the Asia and Pacific airspace and that in other cases progress had been made in identifying tasks that would hopefully resolve outstanding issues in the near future. Mr. Butcher was confident that great strides had been taken to encourage States to provide data necessary for safety assessment activities where this data may not have previously been available.

PART III - REPORT ON SEMINAR PRESENTATIONS

1. In considering the development of safety management systems in the Asia and Pacific Region, the initial meeting of RASMAG (RASMAG/1, April 2004) recognized that because the Annex 11 provisions in relation to safety management programmes had only recently become effective on 27 November 2003, there had been little lead time for States to establish safety management systems and to develop safety assessment expertise to address complex airspace environments, in particular where reduced separation minima were being implemented. RASMAG/1 agreed that more attention needed to be given to education, and commenced planning for an ICAO ATS Safety Management Seminar with a focus on practical hands-on experience, to be conducted as an integral component of the next RASMAG meeting.

2. The RASMAG/2 meeting (October 2004) was critical of the fact that the seminar could not be accommodated at that time, however noted the resource limitations at the Regional Office and a clash with a regional safety management seminar scheduled in Beijing, China during November 2004. RASMAG/2 continued to progress the seminar planning, deferring the seminar until RASMAG/3.

3. The 3-day ATS Safety Management Seminar was conducted from 8 to 10 June 2005 at the ICAO Asia/Pacific Regional Office, immediately following the RASMAG/3 meeting. The seminar was moderated by Mr. Andrew Tiede, Regional Officer Air Traffic Management. He was assisted by the Chairman of RASMAG, Mr Robert Butcher, of Airservices Australia.

4. The objective of the seminar was to raise the awareness of States in the Asia and Pacific Region in relation to the ICAO provisions regarding safety management systems, with emphasis on compliance with Annex 11- *Air Traffic Services* provisions regarding the implementation of systematic and appropriate ATS safety management programmes.

5. The seminar was attended by 42 participants from 16 States and 2 International Organizations. The seminar was divided up in to five sessions over three days, as follows:

Wednesday, 8th June 2005

5.1 Session 1:

- a) ICAO ATS Safety Management Provisions
Mr. Andrew Tiede, ICAO Regional Officer, ATM
- b) The Need for and Fundamentals of Safety Management Systems
Mr. Robert Butcher, Airservices Australia
- c) The Need for Safety Assessments and Safety Monitoring in Reduced Vertical and Horizontal Separation Implementation
Mr. Brian Colamosca, US Federal Aviation Administration

5.2 Session 2:

- a) The Role of the Airlines in risk assessment activities and their contribution to safety analyses undertaken by States
Mr. Neil Jonasson, IATA Asia/Pacific Office

- b) Implementation of ICAO Safety Management Requirements – The Monitoring of Safety Levels in Hong Kong ATC Operations
Mr. Fan Wai Chuen Lucius, Civil Aviation Department, Hong Kong, China
- c) Central Reporting Agency for the FANS Implementation Team for South-East Asia (FIT-SEA CRA)
Mr. Yoshiro Nakatsuji, Air Traffic Control Association, Japan

Thursday, 9th June 2005

5.3 Session 3:

- a) RVSM – Safety Considerations in Planning and Implementation
Mr. Sydney Maniam, RVSM/TF Chairman, Civil Aviation Authority of Singapore
- b) MAAR's Activities with regard to RVSM Safety Assessments, Traffic Sampling, State Reporting Formats, Analyses and Reporting
Dr. Paisit Herabat, Monitoring Agency for the Asia Region (MAAR), AEROTHAI
- c) How Safety Assessments and Monitoring are conducted – The Essential Elements & What States need to provide to MAAR
Dr. Paisit Herabat, Monitoring Agency for the Asia Region (MAAR), AEROTHAI
- d) Outline of Recommended Guidelines for ADS/CPDLC Deployment
Mr. Hiroshi Matsuda, Air Traffic Control Association, Japan
- e) Incident Reporting and Data Collection
Mr. Robert Butcher, Airservices Australia

5.4 Session 4:

- a) Description of the Roles, Responsibilities and Functions of Airspace Safety Organizations – RASMAG, RMAs, SMAs, CRAs, FITs etc.
Mr. Andrew Tiede, ICAO Regional Officer ATM
- b) Collision Risk Modelling, Technical Risk, Risk from Operational Errors, Target Level of Safety – An Explanation in Simple Terms
Mr. Brian Colamosca, US Federal Aviation Administration
- c) Safety Assessment and Monitoring in Japan's domestic RVSM Implementation
Mr. Takashi Imuta, Civil Aviation Bureau, Japan

Friday, 10th June 2005

5.5 Session 5:

- a) Finance Arrangements – Mechanisms to facilitate collaborative funding of safety monitoring agencies
Dr. Paul Hooper, ICAO Regional Officer, Air Transport

- b) Risk Analysis
Mr. Toby Farmer, Civil Aviation Authority of New Zealand
- c) Hazard Identification Methodologies and Hazard Mitigation Strategies
Mr. Robert Butcher, Airservices Australia
- d) ICAO Regional Airspace Planning, Implementation and Safety Arrangements
Mr. Andrew Tiede, ICAO Regional Officer ATM

5.6 The seminar participants, in noting the professional and very relevant presentations that had been provided during the seminar, expressed their appreciation to the presenters for their time and energy in preparing and delivering the seminar material.

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TERMS OF REFERENCE

REGIONAL AIRSPACE SAFETY MONITORING ADVISORY GROUP (RASMAG)

Terms of Reference of the RASMAG

The objectives of the Group are to:

- a) facilitate the safe implementation of reduced separation minima and CNS/ATM applications within the Asia and Pacific Regions in regard to airspace safety monitoring; and
- b) assist States to achieve the established levels of airspace safety for international airspace within the Asia and Pacific Regions.

To meet these objectives the Group shall:

- a) review airspace safety performance in the Asia and Pacific Regions at the regional level and within international airspace;
- b) review and develop as necessary guidance material for airspace safety monitoring, assessment and reporting activities;
- c) recommend and facilitate the implementation of airspace safety monitoring and performance assessment services;
- d) review and recommend on the competency and compatibility of monitoring organizations;
- e) review, coordinate and harmonize regional and inter-regional airspace safety monitoring activities;
- f) review regional and global airspace planning and developments in order to anticipate requirements for airspace safety monitoring and assessment activities;
- g) address other airspace safety related issues as necessary;
- h) facilitate the distribution of safety related information to States, and
- i) provide to APANPIRG comprehensive reports on regional airspace safety and coordinate with other contributory bodies of APANPIRG as appropriate.

Task List

To review the safety monitoring programmes in the Asia and Pacific Regions for implementation and operation of:

- a) reduced vertical separation minimum (RVSM);
- b) reduced horizontal (lateral and longitudinal) separation minima using RNP; and
- c) aircraft separation applications using data link, e.g. ADS and CPDLC.

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RASMAG/3 & ICAO ATS Safety Management Seminar
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RASMAG/3 — TASK LIST

(last updated 7 June, 2005)

ACTION ITEM	DESCRIPTION	TIME FRAME	RESPONSIBLE PARTY	STATUS	REMARKS
1	Review the Terms of Reference for RASMAG	RASMAG/3	Secretariat, all members	Open Completed	APANPIRG/15 agreed amendment to TOR After review, RASMAG/3 removed consideration of TOR as a standing Agenda item.
2	Coordinate with IPACG/ISPACG to formalise reporting from Pacific CRAs/FITs direct to RASMAG.	RASMAG/3	Secretariat, IPACG/ISPACG Co-Chair (L. McCormick, USA)	Open Completed	Some reports received by RO, RASMAG/2-WP/3 refers.
3	Review draft guidance material for End-to-End datalink systems performance monitoring.	RASMAG/3	New Zealand (T. Farmer); All members; Secretariat	Open Completed	Preliminary update reviewed by RASMAG/2—RASMAG/2-WP/12 refers.. RASMAG/3-WP/11—agreed to present draft material to ATM/AIS/SAR/SG and APANPIRG with recommendation that material be adopted as regional guidance material
4	Facilitate the required RVSM reporting to RASMAG from Australian RMA.	RASMAG/3	Australia (R. Butcher)	Open Completed	APANPIRG/15 designated Australia as RMA & SMA for relevant airspaces—RASMAG/2-WP/8 refers.
5	Coordinate by letter to ALL RMAs, CRAs and FITs requesting safety assessment and monitoring reports as per RASMAG/1 report, para 9.11. Draft to be circulated to members of RASMAG prior to despatch.	1/6/04	Secretariat	Open Completed	ISPACG and IPACG providing reports to RO, includes FIT & CRAs. FIT BOB and FIT SEA are ICAO meetings
6	Coordinate by letter to ALL States in Asia/Pacific in accordance with RASMAG/1 report, para 8.5 reminding them of their responsibilities with regards to safety assessments, monitoring and follow-up as per the reference. Draft to be circulated to members of RASMAG prior to despatch.	1/6/04	Secretariat	Open Completed	Letter dated 28 January 2004 circulated to BOB States (ref T3/10.1.7—AP006/04ATM)

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ACTION ITEM	DESCRIPTION	TIME FRAME	RESPONSIBLE PARTY	STATUS	REMARKS
7	Monitor outcome of FLOS discussions at next RVSM TF meeting and report back to RASMAG.	1/10/04 RASMAG/3 4	Secretariat	Open	<p>RASMAG/2 updated regarding outcomes of RVSM/TF/22 – RASMAG/2 WP/7 refers. Further update to RASMAG/3 required.</p> <p>RASMAG/3 WP/3 refers. RASMAG/3 raised draft Conclusions for consideration by APANPIRG in respect of non provisions of safety data by States</p>
8	Develop generic reporting template and instructions for use by RMA's and other bodies to report RVSM, RNP and Data link monitoring activity to RASMAG.	1/6/04	USA (L. McCormick), All members	Open Completed	RASMAG/3 adopted suitable template and instructions
9	Facilitate safety workshop for States as add-on activity to the next RASMAG meeting in accordance with RASMAG/1 report, para 8.5.	1/8/04 RASMAG/34	Secretariat, All members	Open Completed	<p>Superseded by Regional Seminar, Beijing 15-19 Nov 04</p> <p>Workshop/Seminar will take place over 3 days prior to 2 day RASMAG/3 meeting</p> <p>3 day ATS Safety Management Seminar scheduled 8-10 June 2005, subsequent to RASMAG/3 meeting on 6 & 7 June.</p> <p>Seminar held during RASMAG/3</p>
10	In accordance with RASMAG TOR, review regional and global airspace and ATM implementation plans to identify requirements for airspace safety monitoring and assessment activities.	1/10/04 Report Progress to RASMAG/4	Secretariat, All members	Open	Ongoing
11	Provide update on reporting by States of safety data for airspace safety monitoring programmes in accordance with RASMAG/1 report, para 8.4.	1/10/04 RASMAG/3-4	Secretariat	Open	<p>RASMAG/2 updated, further update due for RASMAG/3</p> <p>Regional Office is planning an ATM SMS SIP in some South China Sea States during first half of 2005 – RASMAG/3 IP/3 refers</p>

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ACTION ITEM	DESCRIPTION	TIME FRAME	RESPONSIBLE PARTY	STATUS	REMARKS
12	Coordinate current draft end to end guidance material with FIT SEA, FIT BOB, IPACG and ISPACG, incorporate feedback into the guidance material.	In time to feedback to RASMAG/3	Secretariat	Open Completed	Coordinated with IPACG, ISPACG March 2005, requested feedback by 30 April 2005. Coordinated with FIT SEA and FIT BOB April 2005, requesting feedback by 27 May 2005 All feedback incorporated by RASMAG/3
13	Issue State letter to States (including Pacific States) who have not provided MAAR or PARMO with up to date TSD, large height deviation reports, RVSM approvals register and airframe height keeping monitoring.	IMMEDIATE	Secretariat	Open Completed	Series of State Letters issued by Regional Office during November/December 2004
14	Prepare and deliver on location safety workshop for States.	Confirm to Chairman by Feb 2005 re ability to deliver presentations RASMAG/4	Secretariat Identified members, IATA	Open	Presentations to be sufficiently developed to be delivered to the Workshop/Seminar to be held in conjunction with RASMAG/3 RASMAG/4 to review Seminar held during RASMAG/3, enhance and consolidate material, consider formulation of video and/or DVD
15	Develop SMA Handbook.	Report progress to RASMAG/34	Chairman (R. Butcher), United States (L. McCormick), Secretariat	Open	Ongoing
16	Develop guidance on ADS/CPDLC ground system minimum equipment Specifications, requirements and deployment considerations	Report progress to RASMAG/34	New Zealand (T. Farmer), Japan All members, Secretariat	Open	Ongoing RASMAG/3 included Japan in responsible parties in respect of expertise in relation to deployment considerations

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ACTION ITEM	DESCRIPTION	TIME FRAME	RESPONSIBLE PARTY	STATUS	REMARKS
17	Prepare submission to the DGCA Conference (Nov 2004) regarding lack of compliance by States with safety monitoring requirements including lack of data submission to RMAs.	November 2004	Secretariat	Open Complete	Secretariat presented DP/5/1 'RASMAG' to 41 st Conference of DGCA's. Action Item DGCA 41/6 raised urging all administrations to fully support RASMAG.
18	Clarify discrepancy between RVSM large height deviation categories 'M' & 'N' in use by MAAR and PARMO but not used by Airservices Australia.	November 2004	Australia (R. Butcher)	Open Completed	Australia advised RASMAG/3 that discrepancy had been corrected
19	Coordinate the month of December (commencing December 2005) with RVSM/TF as the standard month for traffic sample data (TSD) collection for FIRs under MAAR jurisdiction.	In time to feedback to RASMAG/3	Secretariat, MAAR	Open Completed	Month of December for TSD from December 2005 raised by Secretariat during at least BBACG/16 (IP/5, Feb05), SEACG/12 (WP/13, May05) RVSM/TF/25 (WP/7, March 2005), RVSM/TF/24 (WP/7, Nov04) and routinely during other ICAO meetings.
20	Provide details of States who have not provided MAAR or PARMO with up to date TSD, large height deviation reports, RVSM approvals register and airframe height keeping monitoring to Secretariat for follow up in accordance with RASMAG/2 work plan item 13.	IMMEDIATE	MAAR, PARMO, Secretariat	Open Completed	As a result of information received from respective RMA's, letters sent by RO to States in accordance with action item 13.
21	The RASMAG/2 meeting agreed that in an effort to remove any confusion, a recommendation should be put to APANPIRG to amend APANPIRG Decision 15/5 to read as follows: <i>That, the term Safety Monitoring Agency (SMA) be used to describe an organization approved by regional agreement to provide airspace safety services for international airspace in the Asia/Pacific region for implementation and operation of reduced horizontal separation.</i>	APANPIRG/16 Report progress to RASMAG/4	Secretariat	Open	
22	Provide guidance to States in respect of the issues surrounding quantum and application of Target Levels of Safety (TLS).	Report progress to RASMAG/4	RASMAG members Secretariat	Open	RASMAG/3 discussed "What is a TLS" and agreed to undertake further work in respect of providing guidance to States

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ACTION ITEM	DESCRIPTION	TIME FRAME	RESPONSIBLE PARTY	STATUS	REMARKS
23	Consider funding issues in respect of the provision of multi national infrastructures e.g. safety monitoring services.	Report progress to RASMAG/4	RASMAG members Secretariat, including Air Transport Officer	Open	RASMAG/3 noted that difficulties in funding were a significant impediment to the provision of safety monitoring services
24	<p>The RASMAG/3 meeting agreed that a recommendation should be put to APANPIRG/16 in the following terms:</p> <p><i>Draft Conclusion 16/xx1</i></p> <p><i>That, recognizing that some States had not adequately complied with safety management provisions, further implementation of reduced separation minima within the Asia and Pacific Region 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.</i></p>	<p>APANPIRG/16</p> <p>Report progress to RASMAG/4</p>	Secretariat	Open	
25	<p>The RASMAG/3 meeting agreed that a recommendation should be put to APANPIRG/16 in the following terms:</p> <p><i>Draft Conclusion 16/xx2</i></p> <p><i>That the non provision by States of safety related data to approved monitoring agencies be included in the APANPIRG Deficiencies List in respect of a deficiency in a safety management system, in order to promote the resolution of these issues.</i></p>	<p>APANPIRG/16</p> <p>Report progress to RASMAG/4</p>	Secretariat	Open	
26	RASMAG Chairman to coordinate with Airservices Australia and request that a follow up safety assessment for the South China Sea route structure be completed as soon as possible	<p>APANPIRG/16</p> <p>Report progress to RASMAG/4</p>	RASMAG Chairman, Secretariat	Open	

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ACTION ITEM	DESCRIPTION	TIME FRAME	RESPONSIBLE PARTY	STATUS	REMARKS
27	Convene tripartite meeting of the three regional RMAs to standardize operations.	Report progress to RASMAG/4	Regional RMAs	Open	The three regional RMAs agreed that a tripartite meeting to standardise RMA operations would be beneficial. Agenda to include consideration, with IATA, of mechanisms to ensure widest possible coverage of material from the RASMAG/3 safety seminar.

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**PROPOSED TERMS OF REFERENCE (TORs)
FANS IMPLEMENTATION TEAM FOR SOUTH EAST ASIA REGION
CENTRAL REPORTING AGENCY
(FIT-SEA CRA)**

The objective of FIT-SEA CRA is to assist the FIT-SEA for safe implementation of ADS/CPDLC in the South China Sea area in monitoring ADS/CPDLC trials and operations and sharing technical and operational information through CRA activities.

To meet the above objective, the FIT-SEA CRA shall:

- a) share the technical and operational information with the FIT-SEA members on the planning and implementation of ADS and CPDLC systems.
- b) process the problem reports received from the FIT-SEA members in the manner prescribed in the FANS 1/A Operations Manual (FOM) and the Guidance Material for End-to-end Safety and Performance Monitoring of ATS Datalink Systems in the Asia/Pacific Region.
- c) disseminate the de-identified information on individual Problem Report to the FIT-SEA members by means of the CRA Japan website; and
- d) prepare the summary report to FIT-SEA and RASMAG.

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FIT-SEA CRA Operating Manual (DRAFT)

1. Purpose of FIT-SEA Central Reporting Agency (CRA) Operating Manual

The purpose of this manual is to:

- a) description of the CRA in relation to the FIT-SEA
- b) provide a set of working principles of FIT-SEA CRA
- c) provide detailed activities
- d) promote information sharing among FIT-SEA members.

2. Tasks of FIT-SEA CRA

The FIT-SEA CRA should work on a daily basis for FIT-SEA to achieve its important goals of problem resolution, system performance assurance and information sharing to prepare the seamless and safe ADS/CPDLC environment in the South China Sea area.

The functions of FIT-CRA are to:

- a) develop and administer problem report processes
- b) maintain a database (website) of problem reports
- c) process monthly end-to-end system performance reports reported from ATSU's
- d) manage data confidentiality agreements as required
- e) identify trends
- f) report to FIT-SEA.

3. Description of FIT-SEA CRA

3.1 Applicable FIRs

The FIT-SEA CRA undertakes the roles of CRA activities in the following FIRs where implementation of ADS/CPDLC and subsequent ATS datalink services are expected in the South China Sea area:

Applicable FIRs to be determined

3.2 FIT-SEA CRA Contact Point

1. Name Air Traffic Control Association Japan as CRA Supporting Agency (CRASA)
2. Postal Address K-1 Building, 1-6-6 Haneda airport, Ota-ku, Tokyo 144-0041, Japan
3. E-mail crasa@cra-japan.org
4. Phone/Fax +81-3-3747-1231+81-3-3747-0856

3.3 FIT-SEA CRA Website

<http://www.crasa.cra-japan.org>

3.4 FIT-SEA CRA Staffing

Yoshiro Nakatsuji (Mr)	Manager
Hiroshi Fujita (Mr)	Chief Engineer
Hiromi Suzuki (Ms)	Senior Engineer
Masami Hatakenaka (Mr)	Senior Engineer
Natsue Kijima (Ms)	Engineer

4. Working Principles

The working principles in this operating manual result from the experience of activities of CRA of Japan in the FANS Interoperability Team of Informal Pacific ATC Coordinating Group (IPACG).

4.1 Confidentiality Agreements

According to paragraph 3.6.2 of the FOM, and paragraph 7.2 of the Guidance Material for End-to-end Safety and Performance Monitoring of ATS Datalink Systems in the Asia/Pacific Region (hereinafter refer to 'ADS/CPDLC Monitoring GM'), the confidentiality of information is an established principle for problem reporting, and so reports must be de-identified before being made accessible to other agencies. However, it is necessary for the CRA to retain the identity of the original reports so that problem resolution and follow-up action can be taken.

Therefore, FIT-SEA member States, aircraft operators, ATSUs, datalink service providers are requested to sign the confidentiality agreement with the FIT-SEA CRA. (FIT-BOB/5, FIT-SEA/2 and ATFM/TF/1-WP/10, Update FIT-SEA Work Plan refers)

4.2 Submission of Problem Report to FIT-SEA CRA

Problem Reports are submitted by the FIT-SEA members, usually ATSU, aircraft operator, or datalink service provider. Most of the problem reports are sent to the CRA via e-mail with the following items; (Attachment FOM 3.10 "FANS 1/A Problem Report Form" refers)

- Date and time of the event (UTC)
- Aircraft registration
- Flight number
- Aircraft model/type
- ATC Sector (ATSU)
- Originator
- Organization
- Active center
- Next center
- Position
- Detailed description

Note: FANS 1/A Problem Report Form is available on FIT-SEA CRA website.

4.3 Problem Identification and Resolution

4.3.1 It is recommended for the originator to submit the problem reports to the FIT-SEA CRA filling the FANS 1/A Problem Report form. If the form was not used, the CRA may request the additional information to the person reporting the problem.

4.3.2 Upon receiving a problem report, the CRA initiates to obtain recordings and/or logs for appropriate period of time from the ATSU and/or datalink service providers involved. With the task of analysing these data, the CRA re-constructs the event to locate the problem cause(s) or factor(s) in cooperation with the appropriate FIT members.

Note: As the period of retaining records is limited, problem reports are requested to send to the CRA as earlier as possible so as to make sure the records available.

- 4.3.3 Problem resolution is the responsibility of appropriate FIT members. The FIT-SEA coordinates with the affected parties to secure a resolution and recommendation of interim procedures. (FOM 3.8 refers)
- 4.4 Datalink Performance Analyses
- 4.4.1 The datalink system performance analyses and its assessment should be continued on a regular basis to give assurance that the safety requirements continue to be met. ATSU should provide the CRA with regular measurements of these parameters. The CRA consolidates the information to provide FIT-SEA for the system performance assessments. (ADS/CPDLC Monitoring GM 7.5 refers)
- 4.4.2 The datalink system performance analyses contain:
- Round-trip time for uplinks measured by time difference between time stamps of sending uplink and reception of the MAS.
 - Performance criteria value: 2 min./95% and 6 min./99%
 - End to end one way time for downlinks measured by the time difference between message time stamp and receipt time.
 - Performance criteria values: 1 min./95% and 3 min./99%.
Note: Though an ADS report does not have the message time stamp, when ADS report performance would be requested, the time of Basic can be used instead of the message time stamp. However, the performance data may contain a loss time conceivably caused by the processing data at avionics.
 - Undelivered messages determined by receipt of MAF, or when MAS or aircraft response not received within 900 seconds.
 - Criterion value: Less than 1% of all attempted messages undelivered.
 - Availability: the ability of the network datalink service to perform a required function under given conditions at a given time.
 - Criterion value: 99.9%.
 - Reliability: the ability of a datalink application/system to perform a required function under given conditions for a given time interval (MTFF: Mean Time Between Failure), performance criterion value TBD
 - Integrity: The probability of an undetected failure, event or occurrence within a given time.
* Criterion value: 10^{-6} /hour
- 4.5 Information Sharing
- 4.5.1 The CRA is the organization tasked with the regular dissemination of de-identified statistical data based on monthly status reports (Periodic Status Report) from ATSU's. Also, the CRA tracks problem reports and publishes de-identified information from those reports for dissemination to FIT-SEA members.
- 4.5.2 The CRA website is accessible to FIT-SEA members who signed the data confidentiality agreement with the CRA. The website contains the problem reports which investigations are in progress and 'lessons learnt'.
- 4.5.3 The FIT-SEA CRA provides the members with the information on ADS/CPDLC systems and operations for the purpose of preparing the seamless and efficient air navigation environment with ATS datalink.

5. Changes to this Material

Changes to this material are effective, after a consultation at the FIT-SEA meeting or a discussion by e-mail.

FANS 1/A PROBLEM REPORT				Number
Date UTC		Time UTC		
Registration		Flight Number		
Sector				
Originator		Aircraft Type		
Organization				
Active Center		Next Center		
Position				
Description				

Generic Example of RASMAG/2 - Regional Office Safety Letter

Dear Director General of Civil Aviation,

Submission of RVSM safety monitoring data to the Regional Monitoring Agency

I would like to bring to your attention and for urgent action the need to update the RVSM safety assessment for the airspaces of the West Pacific and South China Sea areas. As you will be aware, ICAO requires that the implementation and ongoing operation of RVSM is carried out in accordance with ICAO requirements as specified in the *Manual on Implementation of 300 m (1 000 ft) Vertical Separation Minimum between FL 290 and FL 410 Inclusive* (Doc 9574). Essential to this programme are the ongoing safety monitoring activities that provide safety oversight of RVSM operations through periodic updates of safety assessments and compilation and maintenance of the global approvals registry of aircraft and operators approved by States to conduct RVSM operations.

The Asia and Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG) had assigned the RVSM Task Force with the responsibility for the planning, implementation and follow up of RVSM in the Asia and Pacific Region. Please also note that the Regional Airspace Safety Monitoring Agency (RASMAG) was established by APANPIRG/14 (August 2003) under Decision 14/48 to oversee and review airspace safety monitoring activities in the Asia and Pacific Region. To meet the RVSM safety monitoring requirements in the Asia Region, APANPIRG/14 appointed the Monitoring Agency for the Asia Region (MAAR) operated by AEROTHAI, Thailand as the Regional Monitoring Agency.

As an integral component of the RVSM implementation activities, the RVSM Task Force established requirements for the periodic update of the safety assessments for the Western Pacific and South China Sea RVSM operations, and it was agreed that the safety assessment would be updated in September 2004 using traffic sample data (TSD) for July 2004. Please note that to date, the TSD for the XXXXXX FIR has not been received by MAAR. Therefore, you are urged to submit this data on the template provided (see **Attachment A**) to MAAR as soon as possible by email or letter.

I would like to remind your Administration that subsequent to implementation, the continued operation of RVSM and other reduced separation minima require ongoing safety monitoring services to be provided. Accordingly, States and ATS providers are required under Annex 11 provisions to participate in and establish airspace safety management programmes. In regard to ongoing monitoring, MAAR requires up to date information on all aircraft registered by your State approved to operate in RVSM airspace and any changes to the approvals registry, to be submitted on MAAR form F2 (**Attachment B** refers). All MAAR forms and further information are available from the MAAR website at <http://www.aerothai.co.th/maar/>

We would appreciate the cooperation of your Administration to ensure that the ICAO safety requirements for continued RVSM operations in the region are being met.

Yours sincerely,

L. B. Shah
Regional Director

ASIA RVSM MINIMUM MONITORING REQUIREMENTS

AS OF: 1 July 2005

1. UPDATE OF MONITORING REQUIREMENTS CHART AND WEBSITE. As significant data is obtained, monitoring requirements for specific aircraft types may change. When the chart is updated, a letter will be distributed to States and operators. The updated chart will be posted on the MAAR website being maintained by Aeronautical Radio of Thailand, Ltd. (AEROTHAI) on behalf of the International Civil Aviation Organization (ICAO) Asia-Pacific regional planning group. The website address is:

<http://www.aerothai.co.th/maar>

2. INITIAL MONITORING. All Asia operators that operate or intend to operate in airspace where RVSM is applied are required to participate in the RVSM monitoring program. The attached chart of monitoring requirements establishes requirements for initial monitoring associated with the RVSM approval process. In their application to the appropriate State authority for RVSM approval, operators must show a plan for meeting the applicable initial monitoring requirements.

3. AIRCRAFT STATUS FOR MONITORING. Aircraft engineering work that is required for the aircraft to receive RVSM airworthiness approval must be completed prior to the aircraft being monitored. Any exception to this rule will be coordinated with the State authority.

4. APPLICABILITY OF MONITORING FROM OTHER REGIONS. Monitoring data obtained in conjunction with RVSM monitoring programs from other regions can be used to meet Asia monitoring requirements. The Monitoring Agency for Asia Region (MAAR), which is responsible for administering the Asia monitoring program, has access to monitoring data from other regions and will coordinate with States and operators to inform them on the status of individual operator monitoring requirements.

5. MONITORING PRIOR TO THE ISSUE OF RVSM OPERATIONAL APPROVAL IS NOT A REQUIREMENT. Operators should submit monitoring plans to the responsible civil aviation authority that show how they intend to meet the requirements specified in the table below. Monitoring will be carried out in accordance with this table.

6. AIRCRAFT GROUPS NOT LISTED ON THE CHART. Contact the MAAR for clarification if an aircraft group is not listed on the Minimum Monitoring Requirements chart or for clarification of other monitoring related issues. An aircraft group not listed in the table below will probably be subject to Category 2 monitoring requirements.

7. TABLE OF MONITORING GROUPS. A table of monitoring groups is provided in the pages following the Minimum Monitoring Requirements Chart. The table shows the aircraft types and series that are grouped together for operator monitoring purposes.

8. TRAILING CONE DATA. Altimetry System Error estimations developed using Trailing Cone data collected during RVSM certification flights can be used to fulfill monitoring requirements. It must be documented, however, that aircraft RVSM systems were in the approved RVSM configuration for the flight.

9. MONITORING OF AIRFRAMES THAT ARE RVSM COMPLIANT ON DELIVERY. If an operator adds new RVSM compliant airframes of a type for which it already has RVSM operational approval and has completed monitoring requirements for the type in accordance with the attached chart, the new airframes are not required to be monitored. If an operator adds new RVSM compliant airframes of an aircraft type for which it has NOT previously received RVSM operational approval, then the operator should complete monitoring in accordance with the attached chart.

10. FOLLOW-ON MONITORING. Monitoring is an on-going program that will continue after the RVSM approval process. A follow-on sampling program for additional operator aircraft will be coordinated by the Asia-Pacific RVSM Implementation Task Force.

MONITORING AGENCY FOR ASIA REGION (MAAR)

EFFECTIVE AS OF: 1 July 2005

MONITORING IS REQUIRED IN ACCORDANCE WITH THIS CHART, HOWEVER, IT IS NOT REQUIRED TO BE COMPLETED PRIOR TO OPERATIONAL APPROVAL		
MONITORING CATEGORY	AIRCRAFT TYPE	MINIMUM OPERATOR MONITORING FOR EACH AIRCRAFT GROUP
<p>1</p> <p>Group approved <u>and</u> monitoring data indicates performance in accordance with RVSM standards.</p> <p>Group Definition: aircraft have been manufactured to a nominally identical design and build and for RVSM airworthiness approval fall into a group established in an RVSM certification document (e.g., Service Bulletin, Supplemental Type Certificate, Type Certificate Data Sheet).</p>	<p>[A30B, A306], [A312 (GE), A313 (GE)], [A312 (PW), A313 (PW)], A318, [A319, A320, A321], [A332, A333], [A342, A343], A344, A345, A346</p> <p>B712, [B721, B722], [B733, B734, B735], B737(Cargo), [B736, B737/BBJ, B738/BBJ, B739], [B741, B742, B743], B74S, B744 (5" Probe), B744 (10" Probe), B752, B753, [B762, B763], B764, B772, B773</p> <p>CL60(600/601), CL60(604), C560, [CRJ1, CRJ2], CRJ7, DC10, [E135, E145], F100, GLF4, GLF5, LJ60</p> <p>L101, MD10, MD11, MD80 (All series), MD90</p>	<p>Two airframes from each fleet* of an operator to be monitored as soon as possible but not later than 6 months after the issue of RVSM operational approval</p> <p><i>* Note. For the purposes of monitoring, aircraft within brackets [] may be considered as belonging to the same monitoring group. For example, an operator with six A332 and four A333 aircraft may monitor one A332 and one A333 or two A332 aircraft or two A333 aircraft.</i></p>
<p>2</p> <p>Group approved but insufficient monitoring data collected to move aircraft to Monitoring Category 1. Group definition applies.</p>	<p>Other group aircraft other than those listed in Category 1 including:</p> <p>A124, ASTR, B703, B731, B732, BE20, BE40, C500, C25A, C25B, C525, C550**, C56X, C650, C750, CRJ9, [DC86, DC87], DC93, DC95, F2TH, [FA50 FA50EX], F70, [F900, F900EX], FA20, FA10, GLF2(II), GLF(IIB), GLF3, GALX, GLEX, H25B(700), H25B(800), H25C, IL62, IL76, IL86, IL96, J328, L29(2), L29(731), LJ31, [LJ35, LJ36], LJ45, LJ55, SBR1, T134, T154, T204, P180, PRM1, YK42</p>	<p>60% of airframes from each fleet of an operator (round up if fractional), as soon as possible but not later than 6 months after the issue of RVSM operational approval.</p> <p>(*Note: If 60 percent of the fleet yields a fractional number, round up to the next whole aircraft (e.g., for a fleet of 2 aircraft, $0.6 \times 2 = 1.2$; therefore, 2 aircraft must be monitored).</p> <p>** Refer to aircraft group table for detail on C550 monitoring</p>
<p>3</p> <p>Non-Group</p> <p>Non-group Definition: aircraft that do not fall under the group definition <u>and</u> for RVSM airworthiness approval are presented as an individual airframe.</p>	<p>Non-group approved aircraft</p>	<p>100% of aircraft shall be monitored as soon as possible but not later than 6 months after the issue of RVSM operational approval.</p>

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Appendix F to the Report on RASMAG/3 Meeting

**MONITORING GROUPS FOR AIRCRAFT CERTIFIED UNDER GROUP APPROVAL
REQUIREMENTS**

Monitoring Group	ICAO Designator	A/C Type	A/C Series
A124	A124	AN-124 RUSLAN	ALL SERIES
A300	A306 A30B	A300 A300	600, 600F, 600R, 620, 620R, 620RF B2-100, B2-200, B4-100, B4-100F, B4-120, B4-200, B4-200F, B4-220, C4-200
A310-GE	A310	A310	200, 200F,300, 300F
A310-PW	A310	A310	220, 220F,320
A318	A318	A318	ALL SERIES
A320	A319 A320 A321	A319 A320 A321	CJ , 110, 130 110, 210, 230 110, 130, 210, 230
A330	A332, A333	A330	200, 220, 240, 300, 320, 340
A340	A342, A343,	A340	210, 310
A345	A345	A340	540
A346	A346	A340	640
A3ST	A3ST	A300	600R ST BELUGA
AN72	AN72	AN-74, AN-72	ALL SERIES
ASTR	ASTR	1125 ASTRA	ALL SERIES
ASTR-SPX	ASTR	ASTR SPX	ALL SERIES
AVRO	RJ1H, RJ70, RJ85	AVRO	RJ70, RJ85, RJ100
B712	B712	B717	200
B727	B721 B722	B727	100, 100C, 100F,100QF, 200, 200F
B732	B732	B737	200, 200C
B737 (Classic)	B733 B734 B735	B737	300, 400, 500
B737 New Generation (NG)	B736 B737 B738 B739	B737 B737 B737 B737	600 700, 700BBJ 800 900
B737 (Cargo)	B737	B737	700C
B747Classic (CL)	B741 B742 B743	B747	100, 100B, 100F, 200B, 200C, 200F, 200SF, 300
B74S	B74S	B747	SR, SP
B744-5	B744	B747	400, 400D, 400F (With 5 inch Probes)
B744-10	B744	B747	400, 400D, 400F (With 10 inch Probes)
B752	B752	B757	200, 200PF

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Monitoring Group	ICAO Designator	A/C Type	A/C Series
B753	B753	B757	300
B767	B762 B763	B767	200, 200EM, 200ER, 200ERM, 300, 300ER, 300ERF
B764	B764	B767	400ER
B772	B772	B777	200, 200ER, 300, 300ER
B773	B773	B777	300, 300ER
BE40	BE40	BEECHJET 400A	ALL SERIES
BE20	BE20	BEECH 200 -KINGAIR	ALL SERIES
C500	C500	500 CITATION, 500 CITATION I, 501 CITATION I SINGLE PILOT	ALL SERIES
C525	C525	525 CITATIONJET, 525 CITATIONJET I	ALL SERIES
C525-II	C25A	525A CITATIONJET II	ALL SERIES
C525 CJ3	C25B	CITATIONJET III	ALL SERIES
C550-552	C550	552 CITATION II	ALL SERIES
C550-B	C550	550 CITATION BRAVO	ALL SERIES
C550-II	C550	550 CITATION II, 551 CITATION II SINGLE PILOT	ALL SERIES
C550-SII	C550	S550 CITATION SUPER II	ALL SERIES
C560	C560	560 CITATION V, 560 CITATION V ULTRA, 560 CITATION V ULTRA ENCORE	ALL SERIES
C56X	C56X	560 CITATION EXCEL	ALL SERIES
C650	C650	650 CITATION III , 650 CITATION VI , 650 CITATION VII	ALL SERIES
C750	C750	750 CITATION X	ALL SERIES
CARJ	CRJ1, CRJ2	REGIONALJET	100, 200, 200ER, 200LR
CRJ-700	CRJ7	REGIONALJET	700
CRJ-900	CRJ9	REGIONALJET	900
CL600	CL60	CL-600 CL-601	CL-600-1A11 CL-600-2A12, CL-600-2B16
CL604	CL60	CL-604	CL-600-2B16
BD100	CL30	CHALLENGER 300	ALL SERIES
BD700	GL5T	GLOBAL 5000	ALL SERIES
CONC	CONC	CONCORDE	ALL SERIES
DC10	DC10	DC-10	10, 10F, 15, 30, 30F, 40, 40F
DC86-7	DC86, DC87	DC-8	62, 62F, 72, 72F
DC93	DC93	DC-9	30, 30F
DC95	DC95	DC-9	SERIES 51
E135-145	E135,	EMB-135, EMB-145	ALL SERIES

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Monitoring Group	ICAO Designator	A/C Type	A/C Series
	E145		
F100	F100	FOKKER 100	ALL SERIES
F2TH	F2TH	FALCON 2000	ALL SERIES
F70	F70	FOKKER 70	ALL SERIES
F900	F900	FALCON 900, FALCON 900EX	ALL SERIES
FA10	FA10	FALCON 10	ALL SERIES
FA20	FA20	FALCON 20 FALCON 200	ALL SERIES
FA50	FA50	FALCON 50, FALCON 50EX	ALL SERIES
GALX	GALX	1126 GALAXY	ALL SERIES
GLEX	GLEX	BD-700 GLOBAL EXPRESS	ALL SERIES
GLF2	GLF2	GULFSTREAM II (G-1159),	ALL SERIES
GLF2B	GLF2	GULFSTREAM IIB (G-1159B)	ALL SERIES
GLF3	GLF3	GULFSTREAM III (G-1159A)	ALL SERIES
GLF4	GLF4	GULFSTREAM IV (G-1159C)	ALL SERIES
GLF5	GLF5	GULFSTREAM V (G-1159D)	ALL SERIES
H25B-700	H25B	BAE 125 / HS125	700B
H25B-800	H25B	BAE 125 / HAWKER 800XP, BAE 125 / HAWKER 800, BAE 125 / HS125	ALL SERIES/A, B/800
H25C	H25C	BAE 125 / HAWKER 1000	A , B
IL86	IL86	IL-86	NO SERIES
IL96	IL96	IL-96	M , T, 300
J328	J328	328JET	ALL SERIES
L101	L101	L-1011 TRISTAR	1 (385-1), 40 (385-1), 50 (385-1), 100, 150 (385-1-14), 200, 250 (385-1-15), 500 (385-3)
L29B-2	L29B	L-1329 JETSTAR 2	ALL SERIES
L29B-731	L29B	L-1329 JETSTAR 731	ALL SERIES
LJ31	LJ31	LEARJET 31	NO SERIES, A
LJ35/6	LJ35 LJ36	LEARJET 35 LEARJET 36	NO SERIES, A
LJ40	LJ40	LEARJET 40	ALL SERIES
LJ45	LJ45	LEARJET 45	ALL SERIES
LJ55	LJ55	LEARJET 55	NO SERIES B, C
LJ60	LJ60	LEARJET 60	ALL SERIES
MD10	MD10	MD-10	ALL SERIES
MD11	MD11	MD-11	COMBI, ER, FREIGHTER, PASSENGER
MD80	MD81,	MD-80	81, 82, 83, 87, 88

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Monitoring Group	ICAO Designator	A/C Type	A/C Series
	MD82, MD83, MD87, MD88		
MD90	MD90	MD-90	30, 30ER
P180	P180	P-180 AVANTI	ALL SERIES
PRM1	PRM1	PREMIER 1	ALL SERIES
T134	T134	TU-134	A, B
T154	T154	TU-154	A , B, M, S
T204	T204, T224, T234	TU-204, TU-224, TU-234	100, 100C, 120RR, 200, C
YK42	YK42	YAK-42	ALL SERIES

**DRAFT GUIDANCE MATERIAL FOR
END-TO-END SAFETY AND PERFORMANCE MONITORING OF
AIR TRAFFIC SERVICE (ATS) DATALINK SYSTEMS
IN THE ASIA/PACIFIC REGION**

1 Background

1.1 The Asia Pacific Airspace Safety Monitoring (APASM) Task Force established by the Asia Pacific Air Navigation Planning Implementation Regional Group (APANPIRG) noted that requirements for monitoring aircraft height-keeping performance and the safety of reduced vertical separation minimum (RVSM) operations had been more comprehensively developed than for other Air Traffic Management (ATM) services, such as reduced horizontal separation based on required navigation performance (RNP), and monitoring of Air Traffic Services (ATS) datalink systems. For RVSM, a handbook with detailed guidance on the requirements for establishing and operating Regional Monitoring Agencies (RMA) was at an advanced stage of development by the ICAO Separation and Airspace Safety Panel (SASP). (The RMA Handbook has since been completed and is expected to be adopted by ICAO in 2005). There was no comparable document under development by ICAO for ATS datalink applications and so the APASM Task Force developed draft guidance material for the Asia/Pacific Region covering safety and performance monitoring for ATS datalink applications.

1.2 The experience gained by the Informal Pacific ATC Coordinating Group (IPACG) and the Informal South Pacific ATS Coordinating Group (ISPACG) FANS Interoperability Teams (FITs) and the supporting Central Reporting Agency (CRA) to monitor automatic dependent surveillance (ADS) and controller pilot datalink communication (CPDLC) performance for both aircraft and ground systems was used as a resource on which to develop monitoring guidance material.

1.3 The APASM Task Force was succeeded by the Regional Airspace Safety Monitoring Advisory Group (RASMAG) of APANPIRG, which decided to adopt this APASM material and further develop it to become the standard guidance material for end-to-end safety and performance monitoring of ATS datalink systems in the Asia Pacific region.

1.4 Within the remainder of the Asia Pacific Region, the Bay of Bengal and South East Asia Coordinating Groups are mirroring what has been done by IPACG and ISPACG and have created implementation teams and CRAs to accomplish this activity. These implementation teams also perform the interoperability activities which will continue after the implementation is complete. This guidance material focuses on interoperability issues, both prior to and following implementation.

2 Requirements for Safety and Performance Monitoring

2.1 Annex 11, at 2.26.5, states:

“Any significant safety-related change to the ATC system, including the 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. When appropriate, the responsible authority shall ensure that adequate provision is made for post-implementation monitoring to verify that the defined level of safety continues to be met.”

2.2 ATS datalink applications, such as ADS, CPDLC and ATS interfacility data communication (AIDC), are increasingly being used in support of separation and particularly of reduced separation minima. Accordingly, it is necessary to provide the monitoring required by Annex 11 to those

datalink services. Datalink services comprise both a technical and an operational element. These guidelines, which apply only to the technical element, propose a structure and methodology for monitoring the technical end-to-end safety performance of air-ground and ground-air datalink services. The operational aspects of datalink monitoring are carried out by the appropriate Safety Monitoring Agency (SMA).

2.3 Ground-ground datalink systems supporting applications such as AIDC are essentially simpler and more direct than air-ground systems, and monitoring can be achieved directly between the concerned ATS providers. However, it should be noted that States have a responsibility to ensure that monitoring of ground-ground datalink systems is carried out in support of the implementation of reduced separation minima. Monitoring of ground-ground datalink performance is outlined in Appendix A.

2.4 The requirement for on-going monitoring after implementation is based on several factors, including both degradation of performance with time and changes to equipment which may occur, either through modification or under renewal programmes. The use of ADS-B to support separation and the introduction of the Aeronautical Telecommunication Network (ATN) will bring significant changes to the system that will require monitoring programmes.

3 Purpose of Guidance Material

3.1 The purpose of this guidance material is to:

- a) Provide a set of working principles common to all States implementing ATS datalink systems.
- b) Provide detailed guidance on the requirements for establishing and operating an interoperability team.
- c) Provide detailed guidance on the requirements for establishing and operating a Central Reporting Agency.
- d) Promote a standardized approach for implementation and monitoring within the Region.
- e) Promote interchange of information among different Regions to support common operational monitoring procedures.

4 Establishment and Operation of an Interoperability Team and CRA

4.1 Recognizing the safety oversight responsibilities necessary to support the implementation and continued safe use of ATS datalink systems, the following standards apply to any organization intending to fill the role of an interoperability team:

- a) The organization must receive authority to act as an interoperability team as the result of a decision by a State, a group of States or a regional planning group, or by regional agreement.
- b) States should appoint a CRA that has the required tools and personnel with the technical skills and experience to carry out the CRA functions.
- c) States should ensure that the CRA is adequately funded to carry out its required functions.

5 Interoperability Teams

5.1 The technologies adopted to provide ATS datalink functionality exist in several different domains (e.g. aircraft, satellite, ground network, air traffic service units and human factors) and these elements must be successfully integrated across all domains. Airborne and ground equipment from many different vendors, as well as the sub-systems of several different communication networks, must inter-operate successfully to provide the required end-to-end system performance. In addition, standardised procedures must be coordinated among many different airlines and States to provide the desired operational performance. Technical and operational elements must then coalesce to allow the various applications to demonstrate mature and stable performance. Only then can essential benefits be realized.

5.2 A team approach to interoperability is essential to the success of any ATS datalink implementation, an important lesson learned by the ISPACG, whose members were the first to implement CNS/ATM applications using FANS 1/A systems. Stakeholders had worked closely together during the initial development and subsequent certification of FANS-1/A, but even though a problem-reporting system was in place when FANS-1/A operations commenced, many problems went unresolved and it was not possible in the short term to adopt the new operational procedures that would provide the expected benefits of higher traffic capacity and more economic routes. Therefore, an interoperability team was formed to address both technical and operational issues and help to ensure that benefits would result. However, the ISPACG also realized that a traditional industry team approach would not be effective. Daily attention and sometimes significant research would be required if the many issues were to be adequately resolved. To address these concerns, the interoperability team created a dedicated sub-team, the CRA, to perform the daily monitoring, coordination, testing, and problem research tasks outlined by the team. This approach is similar to that taken for RVSM implementations where supporting groups provide aircraft height keeping monitoring services.

5.3 Although the monitoring process described above was developed for FANS-1/A based CPDLC and ADS applications, it applies equally to ATN-based ATS applications. This was validated during the Preliminary EUROCONTROL Test of Air/ground data Link (PETAL) implementation of ATN-based ATS datalink services in Maastricht Area Control Centre.

5.4 Role of the Interoperability Team

5.4.1 The role of the interoperability team is to address technical and operational problems affecting the transit of datalink aircraft through international airspace. To do this, the interoperability team must oversee the end-to-end monitoring process to ensure the datalink system meets, and continues to meet, its performance, safety, and interoperability requirements and that operations and procedures are working as specified.

5.4.2 The specific tasks of an interoperability team are:

- a) Initiate and oversee problem reporting and problem resolution processes.
- b) Initiate and oversee end-to-end system performance monitoring processes.
- c) Oversee the implementation of new procedures.
- d) Report to the appropriate State regulatory authorities and to the appropriate ATS coordinating group.

5.4.3 Terms of reference for an interoperability team are shown at Appendix B.

5.5 Interoperability Team Members

5.5.1 The principal members of an interoperability team are the major stakeholders of the sub-systems that must interoperate to achieve the desired system performance and end-to-end operation. In the case of ATS datalink systems, the major stakeholders are aircraft operators, ATS providers, and communication service providers. Other stakeholders such as international organizations, and airframe and avionics manufacturers also play an important role and should be invited by the major stakeholders to contribute their expertise.

6 Central Reporting Agencies

6.1 Work must be done on a daily basis for an interoperability team to achieve its important goals of problem resolution, system performance assurance, and planning and testing of operations that will enable benefits. A dedicated sub-team, the CRA, is required to do the daily monitoring, coordination, testing and problem research tasks for the interoperability team. Appendix C shows a table of CRA tasks and the associated resource requirements.

6.2 A CRA should be established in order to determine the safety performance of the datalink systems before the implementation of reduced separation minima in a particular area, and it should remain active throughout the early stages of implementation. However, as the performance of the systems stabilises to a satisfactory level, it should be possible to reduce the number of CRAs in the region by combining responsibility for different areas.

6.3 The functions of a CRA are:

- a) To develop and administer problem report processes.
- b) To maintain a database of problem reports.
- c) To process monthly end-to-end system performance reports from air traffic service providers.
- d) To coordinate and test the implementation of new procedures resulting from ATS datalink systems for a given region.
- e) To administer and monitor an informal end-to-end configuration process.
- f) To manage data confidentiality agreements as required.
- g) To identify trends.
- h) To provide regular reports to the interoperability team.

6.4 CRA Resource Requirements

6.4.1 To be effective, the CRA must have dedicated staff and adequate tools. Staffing requirements will depend on the complexity of the region being monitored. There are several factors that affect regional complexity from an ATS monitoring standpoint such as dimensions of the airspace, variety in operating procedures, number of airlines, number of airborne equipment variants, number of air traffic service providers, number of ground equipment variants and number of communication service providers.

6.4.2 The CRA must be able to simulate an ATS ground station operational capability to the extent of exercising all combinations and ranges of CPDLC uplinks and ADS reports. The CRA must also have access to airborne equipment: a test bench is adequate, though engineering simulators that can be connected to either the ARINC or SITA communication network can offer additional capability for problem solving. In support of the datalink audit analysis task, the CRA must have software that can decode communication service provider audit data and produce usable reports. Without these tools it is virtually impossible for a CRA to resolve problems or monitor system performance.

6.4.3 Coordination is an important part of the CRA's job. In the pursuit of problem resolution, action item resolution, monitoring and testing, many issues arise that require coordination among the various stakeholders. The CRA has a primary responsibility to provide this coordination function as delegated by the interoperability team. Coordination between CRAs is also important, particularly to expand the information database on problems and trends; there may be a need for CRA coordination within the region and with CRAs in other regions. An incident may appear to be an isolated case, but the collation of similar reports by a CRA or the CRA coordinating group might indicate an area that needs more detailed examination

7 Working Principles for Central Reporting Agencies

7.1 The working principles in this guidance material result from the combined experience of the North Atlantic FANS Implementation Group, ISPACG FANS Interoperability Team, IPACG FANS Interoperability Team, and the ATN implementation in Maastricht ACC.

7.2 Confidentiality Agreements

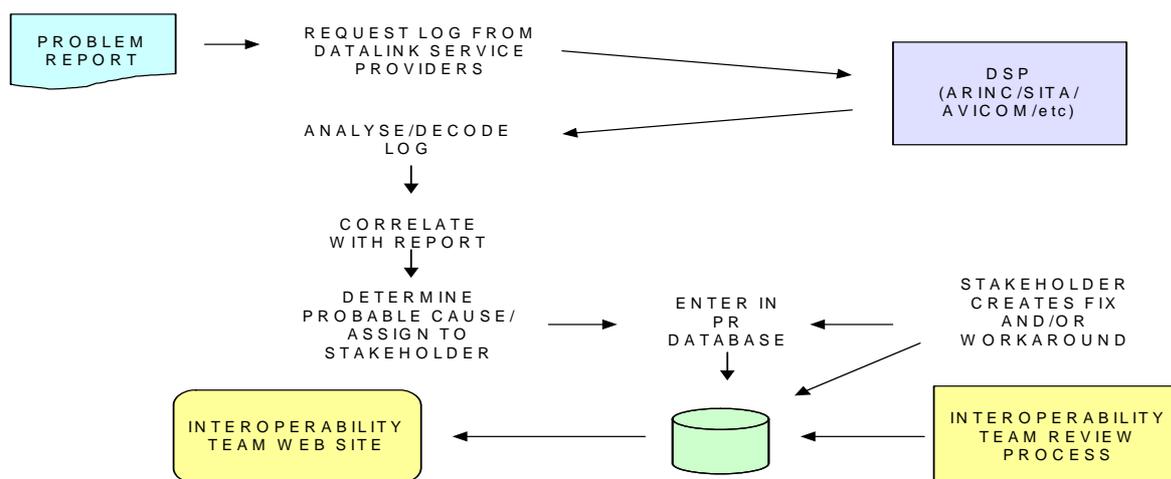
7.2.1 Confidentiality of information is an established principle for problem reporting, and so reports must be de-identified before being made accessible to other agencies. However, it is necessary for the CRA to retain the identity of the original reports so that problem resolution and follow-up action can be taken.

7.2.2 The CRA must initiate and maintain confidentiality agreements with each entity providing problem reports.

7.3 Problem Identification and Resolution

7.3.1 The problem identification and resolution process, as it applies to an individual problem, consists of a data collection phase, followed by problem analysis and coordination with affected parties to secure a resolution, and recommendation of interim procedures to mitigate the problem in some instances. This is shown in the diagram below.

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7.3.2 The problem identification task begins with receipt of a report from a stakeholder, usually an operator, ATS provider or communication service provider. If the person reporting the problem has used the problem reporting form provided in the appropriate regional manual, then data collection can begin. If not, additional data may have to be requested from the person reporting the problem.

7.3.3 The data collection phase consists of obtaining message logs from the appropriate parties (which will depend on which service providers were being used and operator service contracts). Today, this usually means obtaining logs for the appropriate period of time from the communication service providers involved. (In the future, with ATN development, additional providers will become involved and airborne recordings as per EUROCAE ED-112 should become available.) Usually, a log for a few hours before and after the event that was reported will suffice, but once the analysis has begun, it is sometimes necessary to request additional data, (perhaps for several days prior to the event if the problem appears to be an on-going one).

7.3.4 Additionally, some airplane-specific recordings may be available that may assist in the data analysis task. These are not always requested initially as doing so would be an unacceptable imposition on the operators, but may occur when the nature of the problem has been clarified enough to indicate the line of investigation that needs to be pursued. These additional records include:

- Aircraft maintenance system logs.
- Built-In Test Equipment data dumps for some airplane systems.
- SATCOM activity logs.

7.3.5 Logs and printouts from the flight crew and recordings/logs from the ATS provider(s) involved in the problem may also be necessary. It is important that the organization collecting data for the analysis task requests all this data in a timely manner, as much of it is subject to limited retention.

7.3.6 Once the data has been collected, the analysis can begin. For this, it is necessary to be able to decode all the messages involved, and a tool that can decode every ATS datalink message type used in the region is essential. These messages include:

- AFN (ARINC 622), ADS and CPDLC (RTCA DO-258/EUROCAE ED-100) in a region operating FANS-1/A.
- Context Management, ADS and CPDLC applications ICAO Doc 9705 and RTCA DO-280/ED-110) in a region using ATN.
- FIS or ARINC 623 messages used in the region.

7.3.7 The analysis of the decoded messages requires a thorough understanding of the complete message traffic, including:

- Media management messages.
- Relationship of ground-ground and air-ground traffic.
- Message envelope schemes used by the particular datalink technology (ACARS, ATN, etc).

7.3.8 The analyst must also have a good understanding of how the aircraft systems operate and interact to provide the ATS datalink functions, as many of the reported problems are airplane system problems.

7.3.9 This information will enable the analyst to determine a probable cause by working back from the area where the problem was noticed to where it began. In some cases, this may entail manual decoding of parts of messages based on the appropriate standard to identify particular encoding errors. It may also require lab testing using the airborne equipment (and sometimes the ground networks) to reliably assign the problem to a particular cause.

7.3.10 Once the problem has been identified, then the task of coordination with affected parties begins. The stakeholder who is assigned responsibility for fixing the problem must be contacted and a corrective action plan agreed.

7.3.11 This information (the problem description, the results of the analysis and the plan for corrective action) is then entered into a database covering datalink problems, both in a complete form to allow continued analysis and monitoring of the corrective action and in a de-identified form for the information of other stakeholders. These de-identified summaries are reported at the appropriate regional management forum.

7.4 Mitigating Procedures

7.4.1 The CRA's responsibility does not end with determining the cause of the problem and identifying a fix. As part of that activity, and because a considerable period may elapse while software updates are applied to all aircraft in a fleet, procedural methods to mitigate the problem may have to be developed while the solution is being coordinated. The CRA should identify the need for such procedures and develop recommendations for implementation by the service providers and operators involved.

7.5 Routine Datalink Performance Reporting

7.5.1 An important part of datalink safety performance is the measurement of the end-to-end performance. This should, of course, be carried out prior to implementation of new separation minima, but should continue on a regular basis to give assurance that the safety requirements continue to be met. Datalink performance assessment is based on round-trip time,

availability, integrity, reliability and continuity, and ATS providers should provide the CRA with regular measurements of these parameters.

7.5.2 The CRA will use the information supplied by ATS providers to produce a performance assessment against the established datalink requirements for the region. These requirements are set according to the separation minima being applied, and so may differ within different areas according to usage.

7.5.3 The CRA performance assessment should be made available to the RMA and SMA for their calculation of system performance against the minimum values defined in the FANS 1/A Operations Manual. The system performance criteria are at Appendix D.

7.5.4 ADS round-trip times are normally measured as the time between sending a contract request and receiving the associated Acknowledgement (ACK) or Message Assurance (MAS) message. CPDLC round-trip times are normally determined from the ATSU end-system time stamps for transmission of the uplink message and reception of the associated MAS.

7.5.5 ADS and CPDLC downlink one-way times are defined by the difference between the aircraft time stamp and the ASTU end-system reception time stamp.

7.5.6 ADS and CPDLC success rates are only available for uplink messages. The success rate is expressed as the percentage of messages that receive a successful ACK or MAS within a specified time.

7.5.7 AIDC round trip times may be obtained from the difference between message transmission and reception of the Logical Acknowledgement Message (LAM). The success rate is expressed as the percentage of messages that are successfully delivered to the destination ATSU.

7.6 Configuration Monitoring

7.6.1 A variety of technical systems are involved in the datalink process and changes, particularly to software and software parameters, are not infrequent; any change may have an impact on the overall performance of the datalink. It is therefore important that the CRA is kept informed of each change of configuration of each system. With this information it is often possible to identify changes that lead to improvements or deteriorations in the datalink performance or that may be associated with particular problems.

7.6.2 All ATS providers, communication service providers, aircraft operators and avionics suppliers should therefore report all system configuration changes to the CRA. The CRA will then maintain a database of configuration changes for each system or sub-system. It is not necessary for the CRA to know the details of changes, but where a change is expected to affect performance, information on the likely effect should be provided.

7.7 New Procedures and Improved Performance Requirements

7.7.1 The CRA may recommend new end-to-end datalink system performance requirements, either to accommodate new operational procedures or to take account of recognised problems.

7.7.2 The CRA may recommend the testing and implementation of new procedures.

APPENDIX A

METHODOLOGY FOR MONITORING AIDC

1 Introduction

1.1 AIDC plays an important role in ATC coordination, and may become a significant element of ATC in the support of reduced separation minima. The performance of AIDC operations should therefore be monitored as part of the required monitoring process prior to the implementation of reduced separation minima.

1.2 AIDC operates essentially over fixed networks and generally has only two or three involved parties: the ATS providers and network providers. It is therefore generally unnecessary to develop a FIT-type approach to safety monitoring; instead such monitoring and problem identification and resolution can be carried out directly by the concerned parties.

1.3 Because, in general, fixed networks are used for AIDC, continuous performance monitoring after implementation of reduced separation minima is not generally necessary, though annual performance and availability checks are recommended. Monitoring should also take place after any changes to the network or the end-user equipment. This will be particularly important during the implementation of the ATN.

2 AIDC Technical Performance

2.1 Two major criteria for monitoring AIDC technical performance are the achievement of acceptable delivery times and the reliability of message delivery. Delivery times can best be measured in terms of the end-to-end round trip time. Reliability is measured as the AIDC message delivery success rate.

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 5 minutes), it will declare a time-out, and the time parameter must be used as the round-trip time.

3.2 Any AIDC message requiring a LAM response may be used; CPL messages are perhaps the most used and therefore the most convenient.

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

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 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

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

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

Where:

LRM = number of received LRMs

TO = number of Time Outs

TOT = total number of messages

4.5 A large number of measurements of delivery success rates should be averaged for performance reporting.

5 Reporting

5.1 ATS providers should report the results of AIDC performance monitoring to RASMAG.

6 Caution

6.1 It is known that there are incompatibilities between some ATS end-systems leading to a situation in which a satisfactorily received message may not be able to be properly processed. In at least one case, the receiving system has been programmed to send neither LAM nor LRM in response to such messages.

6.2 This will result in a distortion of the true round-trip time and success rate for the originating end-system.

6.3 It is recommended that ATS providers ensure that all involved parties are aware of such situations so that affected messages may be excluded from the performance measurement data.

APPENDIX B

TERMS OF REFERENCE FOR AN INTEROPERABILITY TEAM

Reporting and problem resolution processes

- To establish a problem reporting system.
- To review de-identified problem reports and determine appropriate resolution.
- To identify trends.
- To develop interim operational procedures to mitigate the effects of problems until such time as they are resolved.
- To monitor the progress of problem resolution.
- To prepare summaries of problems encountered and their operational implications.

System performance and monitoring processes

- To determine and validate system performance requirements.
- To establish a performance monitoring system.
- To assess system performance based on information from the CRA.
- To authorise and coordinate system testing.
- To identify accountability for each element of the end-to-end system.
- To develop, document and implement a quality assurance plan that will provide a path to a more stable system.
- To identify configurations of the end-to-end system that provide acceptable datalink performance, and to ensure that such configurations are maintained by all stakeholders.

New procedures

- To coordinate testing in support of implementation of enhanced operational procedures

Reporting

- To report safety-related issues to the appropriate State or regulatory authorities for action
- To provide reports to each meeting of the implementation team or ATS coordinating group, as appropriate.
- To provide reports to RASMAG.

APPENDIX C

CRA TASKS AND RESOURCE REQUIREMENTS

NOTE: CHANGE ORDER TO MATCH PARA 6.3

CRA Task	Resource Requirement
Manage data confidentiality agreements as required	Legal services Technical expertise
Develop and administer problem report process: <ul style="list-style-type: none"> • de-identify all reports • enter de-identified reports into a database • keep the identified reports for processing • request audit data from communication service providers • assign responsibility for problem resolution where possible • analyse the data Identify trends	Problem reporting data base ATS audit decode capability Airborne test bench as a minimum, simulator highly recommended ATS simulation capability (CPDLC and ADS)
Coordinate and test the implementation of new procedures	Airborne test bench as a minimum, simulator capability highly recommended ATS simulation capability (CPDLC and ADS) ATS audit decode and report capability Technical expertise Operational expertise
Administer and monitor an informal end-to-end configuration process.	Technical expertise
Report to the interoperability team	Technical expertise

APPENDIX D

FANS 1/A OPERATION MANUAL
SYSTEM PERFORMANCE CRITERIA

The table below defines the minimum values to be met and verified. This does not prevent ATS service providers from negotiating more constraining contractual requirements with their communication service providers if it is thought necessary.

Criteria	Definition	Values
Performance	End to end round trip time for uplinks. (sending and reception of 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 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: The maximum allowed time of continuous unavailability or downtime should be declared MTTR (Mean Time To Repair) *	99.9% 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.

— END —

STANDARD REPORTING FORMAT

**Report on the Outcome of Airspace Safety Monitoring Activities
to the Regional Airspace Safety Monitoring Advisory Group (RASMAG)**

Instructions for Completion

- Line 1: Name of reporting agency/State
- Line 2: Specific monitoring function provided, i.e. “RVSM”, 50/50, CPDLC, etc
- Line 3: List specific traffic flows, flight information regions or sub-regions
- Line 4: Dates of reporting period
- Line 5: Sources of data collected, i.e. reports from ATS providers, incident reports, traffic data collection data bases, etc
- Line 6: List types of data collected
- Line 7: Specify the agreed target level of safety or performance requirement that is to be met
- Line 8: Provide a summary of the analysis performed, including the outcome.
- Line 9: Explain any operational issues, or steps taken to mitigate the risk identified during the analysis
- Line 10: State the estimated target level of safety or assessment of performance of the system based on the analysis
- Line 11: Provide conclusions based on the analysis and the comparison of the target level of safety or performance standard to the standard/requirements

**Report on the Outcome of Airspace Safety Monitoring Activities
to the Regional Airspace Safety Monitoring Advisory Group (RASMAG)**

1	Reporting Agency	
2	Monitoring Function (vertical/horizontal separation, ATS data link, etc.)	
3	Geographic Area(s) of Responsibility	
4	Period of Report	
5	Data Sources	
6	Data Collection Summary (Large height deviations, gross/lateral navigational deviations, problem reports, etc.)	
7	Target Level of Safety/Performance Requirements	
8	Summary of Analysis	
9	Operational Issues/Mitigating Factors	
10	Collision Risk Estimate/Observed Performance	
11	Conclusions/Recommendations	
12	Supporting Documentation (Appendices)	

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Attachment 1 to the Report & Seminar

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LIST OF RASMAG/3 INFORMATION AND WORKING PAPERS

WORKING PAPERS

WP No.	Date	Agenda Item	Presented by	Subject
1	6/6/05	1	Secretariat	Provisional Agenda
2	6/6/05	2	Secretariat	RASMAG Terms of Reference
3	6/6/05	3	Secretariat	Review of RASMAG Work Plan
4	6/6/05	6	Secretariat	Approval of Amendment 43 to Annex 11, Amendment 29 to Annex 6 Part I, Amendment 24 to Annex 6 Part II and Amendment 10 to Annex 6 Part III
5	6/6/05	5	Secretariat	Delay to the Review of Flight Level Allocation Scheme in the Western Pacific/South China Sea area
6	6/6/05	8	Secretariat	Language Proficiency
7	6/6/05	7	Secretariat	Financing Airspace Safety Monitoring Services – The Central Reporting Agency for the Bay of Bengal ADS/CPDLC Operational Trial
8	6/6/05	6	Secretariat	Introduction of the ICAO Regional Monitoring Agency Manual
9	6/6/05	5	Secretariat	Non Submission by States of Safety Related Data
10	6/6/05	4, 7	Secretariat	Safety Assessment for RNP10 in South China Sea, and Safety Monitoring Agency and Central Reporting Agency for South East Asia
11	6/6/05	6	Secretariat	Draft Guidance Material for End-to-End Safety and Performance Monitoring of Air Traffic Service (ATS) Datalink Systems in the Asia/Pacific Region
12	6/6/05	4, 6	United States	Proposed Template for Reporting the Outcome of Airspace Safety Monitoring Activities by Safety Monitoring Agencies
13	6/6/05	4	Australia	Issues associated with Free Text Messaging in CPDLC
14	6/6/05	4	Japan	FANS Implementation Team for South East Asia (FIT-SEA) Central Reporting Agency (CRA)
15	6/6/05	4	Japan	Review of the Current RVSM Monitoring Service Arrangement for Japan/Republic of Korea Implementation
16	6/6/05	4	Australia	RVSM Safety Assessment of the Australian Airspace for the period 1 Jan 2004 through 31 Dec 1004
17	6/6/05	7	MAAR	Future Direction of MAAR
18	6/6/05	6	MAAR	Updated Asia RVSM Minimum Monitoring Requirements
19	6/6/05	4	MAAR	Summary of the Airspace Safety Monitoring Review for the RVSM Implementation in Asia Region

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INFORMATION PAPERS

IP No.	Date	Agenda Item	Presented by	Subject
1	6/6/05	-	Secretariat	List of Information and Working Papers
2	6/6/05	8	Secretariat on behalf of Australia	Implementation of 30/30 Separation Standards in Oceanic Airspace
3	6/6/05	4	Secretariat	Special Implementation Project on ATS Safety Management Programme for the Asia Region
4	6/6/05	7	Secretariat on behalf of CSSI	CSSI Inc.'s Interest in assuming the Duties and Responsibilities associated with the Provision of Airspace Monitoring in connection with RNP-based Horizontal-Plane Separation Minimum
5	6/6/05	5	Secretariat	Outcomes of the 41 st Conference of Directors General of Civil Aviation (Asia and Pacific Regions) in relation to RASMAG
6	6/6/05	4	Japan	RVSM Pre-Implementation Safety Assessment in the Japanese Domestic Airspace
7	6/6/05	4	PARMO	Quarterly Safety Monitoring Reports from the Pacific Approvals Registry and Monitoring Organization
