

INTERNATIONAL CIVIL AVIATION ORGANIZATION



**REPORT OF THE FIFTH MEETING OF THE
ASIA/PACIFIC AIRSPACE SAFETY MONITORING TASK FORCE
(APASM TF/5)**

BANGKOK, THAILAND, 24 – 26 FEBRUARY 2003

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

Adopted by the Task Force
and published by the ICAO Asia and Pacific Office

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PART I – HISTORY OF THE MEETING

1. Introduction

1.1 The Fifth Meeting of the Asia/Pacific Airspace Safety Monitoring Task Force (APASM TF) was held in Bangkok from 24 to 26 February 2003 at the ICAO Asia/Pacific Office.

2. Attendance

2.1 The meeting was attended by 17 experts from 7 States and 1 International Organization. A list of participants is at **Appendix A** to this report.

3. Officers and Secretariat

3.1 Mr. Jeffrey Bollard, Chief Engineer – Technical Standards of Airservices Australia, acted as Chairperson and presided over the meeting throughout its duration.

3.2 Mr. David J. Moores, Regional Officer ATM, was the Secretary for the meeting.

4. Opening of the Meeting

4.1 Mr. David J. Moores, on behalf of Mr. Lalit Shah, Regional Director of the Asia and Pacific Regional Office, welcomed participants to Bangkok. He drew attention to the short period remaining before the thirteenth meeting of the ATS/AIS/SAR Sub Group to be held 19-23 May 2003, which would review progress of the APASM Task Force to present its recommendations on the establishment of the Asia Pacific Airspace Safety Advisory Group (APASAG) to the fourteenth meeting of the Asia Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG/14) to be held from 4 to 8 August 2003. The continued support and efforts of participants was highly appreciated, and there were high expectations for the successful outcome of the work of the Task Force that would establish an airspace safety organization for the Asia/Pacific Region.

4.2 Mr. Bollard in his opening remarks welcomed participants and summarized his expectations for the meeting, which should focus on completing the outstanding work to finalize the plan for the establishment of APASAG to present to APANPIRG/14. He emphasized the importance of being well prepared to present the APASM Task Force report to APANPIRG/14. In this regard, the meeting was encouraged to complete the outstanding tasks as soon as practicable. At this meeting two key priorities were to resolve financial and governance issues. Mr. Bollard acknowledged and welcomed the participation of the representative from the Civil Aviation Authority of New Zealand who was attending the meeting for the first time.

5. Language and Documentation

5.1 All discussions were conducted in English. Documentation was issued in English. A total of 4 Working Papers and 3 Information Papers were considered by the meeting. A list of the Working and Information Papers is at **Appendix B**.

PART II - REPORT ON AGENDA ITEMS

Agenda Item 1: Adoption of Agenda

1.1 The meeting considered the provisional agenda and adopted it as the agenda for the meeting:

Agenda Item 1: Adoption of Agenda

Agenda Item 2: Airspace monitoring requirements

- a) describe airspace monitoring requirements in accordance with ICAO provisions;
- b) follow the development of guidelines for RVSM RMAs by the Separation and Airspace Safety Panel;
- c) develop a handbook detailing requirements for horizontal monitoring including State responsibility to provide data;
- d) develop a handbook detailing requirements for communications/navigation systems including State responsibility to provide data; and
- e) determine initial requirements for airspace safety monitoring and safety assessment services.

Agenda Item 3: Development of the organization and structure for APASAG

- a) develop the plan for APASAG;
- b) organizational models for the ASASAG structure; and
- c) procedures for selecting Core Team members;

Agenda Item 4: Financial arrangements

- a) cost of performing current monitoring services;
- b) funding requirements;
- c) funding arrangement;
- d) level of user charges for airspace safety monitoring; and
- e) coordinate with other regional monitoring organizations to harmonize charges for air navigation services.

Agenda Item 5: Implementation issues

- a) States/agencies able to provide airspace safety monitoring and assessment services;
- b) responsibility and coverage of monitoring agencies (regional, by State, by function or major traffic flow);
- c) additional States/agencies to provide airspace safety monitoring and assessment services;
- d) sample format and examples of contracts currently in use for airspace monitoring services; and
- e) task force working arrangements and information distribution.

Agenda Item 6:	Amendment to the Asia Pacific Air Navigation Plan for establishment of APASAG
Agenda Item 7:	Review the action plan
Agenda Item 8:	Future Work – Meeting Schedule
Agenda Item 9:	Other Business

Agenda Item 2: Airspace monitoring requirements

2.1 The meeting was presented with information by India on progress to establish their national monitoring agency, the Indian Airspace Safety Monitoring Agency (IASMA), which was planned to be operational in December 2004 for implementation of reduced vertical separation minimum (RVSM) in the Indian Flight Information Regions.

2.2 The meeting clarified with India that the establishment of IASMA would result in India performing full State responsibility for monitoring RVSM.

2.3 The meeting recognized that under Annex 11 provisions for airspace safety management, States are responsible to establish and operate airspace safety monitoring activities for their FIRs. In this regard, States may operate their own monitoring services or delegate this to another State or service provider. In line with ICAO guidance in the *Manual on Implementation of a 300 m (1000 ft) Vertical Separation Minimum Between FL 290 and FL 410 Inclusive* (Doc 9574), a Regional Monitoring Agency (RMA) should be established for RVSM operations in international airspace with States concerned contributing relevant technical information and data to the RMA.

2.4 In regard to State national RVSM monitoring agencies, they would be expected to provide all necessary technical data and other relevant information associated with monitoring requirements to the RMA in accordance with ICAO guidance. The meeting noted that the RVSM RMA handbook being developed by ICAO would provide guidance to RMAs and States on information and data required by the RMA. However, information pertaining to RVSM national monitoring agencies and their interaction with RMAs requires further consideration and this will be taken into account at the next meeting.

2.5 The meeting noted that for implementation of RVSM in the Asia Region, APANPIRG/13 had endorsed the establishment of the Monitoring Agency for the Asia Region (MAAR) to be operated by AEROTHAI of Thailand, as the RMA. The RVSM Task Force is planning for the implementation of RVSM on the ATS route structure Asia to Middle East/Europe South of the Himalayas (EMARSSH) on 27 November 2003 in accordance with the APANPIRG RVSM implementation plan. With the establishment of the IASMA, India confirmed that they would provide all necessary information and coordinate with the RMA, i.e. MAAR.

2.6 India pointed out that in addition to RVSM, IASMA would monitor other airspace operations in their FIRs. In this regard, India would be consolidating all airspace safety monitoring functions in IASMA. The meeting noted that States would be establishing national monitoring agencies and recognized the need where international airspace was involved, to coordinate and harmonize these monitoring activities. Further, APANPIRG had recognized this potential problem, hence they established the APASM TF to achieve a regional approach for coordination and harmonization of airspace safety monitoring activities, and to provide assistance to States as required.

RVSM handbook for RMAs

2.7 The meeting was updated on the development of the *Handbook for a Regional Monitoring Agency Supporting Implementation and Continued Safe Use of the Reduced Vertical Separation Minimum* by the Separation and Airspace Safety Panel (SASP). The meeting noted the changes incorporated in Version 2, which had been further updated at the February meeting of the handbook drafting group. Also, a new Appendix B was included containing information on Contracting States and the RMA to which they would provide details of RVSM approvals. The final version of the handbook was expected to be circulated by ICAO for comment in May 2003. A view was expressed that consideration would need to be given to the mutual sharing of information between State national monitoring agencies and relevant RMAs.

2.8 The meeting noted that the RMA handbook (paragraph 1.5 refers) included guidance on the safety oversight responsibilities necessary to support the implementation and continued safe use of RVSM, and included wording in paragraph 1.5.1 (1) *inter alia*, “the organization must receive authority to act as an RMA as the result of a decision by a State, a group of States or a regional planning group, or by regional agreement”. The meeting understood that the appointment of an RMA would be established by a PIRG, and not as stated above by a State declaring its monitoring organization to be an RMA. It was recognized that a State could set up and approve their own national monitoring agencies or engage a service provider to undertake State monitoring activities. The meeting agreed that this matter required further clarification by SASP.

Handbook for monitoring required navigation performance (RNP) applications

2.9 The United States presented information on an outline for a handbook (**Appendix C** refers) to be used as a guide for monitoring in connection with application of Required Navigation Performance (RNP) in the international airspace of the Asia Pacific Region. The APASM TF had agreed to develop an RNP handbook aimed at standardizing the principles and practices of RMAs. The purpose of such a handbook would be for use in connection with the RNP10 requirement applicable in various portions of international airspace within the Region and for future use of RNP 4 as contemplated, at least, in certain volumes of the airspace of the southern Pacific portion of the Region. Because requirements associated with smaller RNP values is still a matter of ongoing development within various bodies, the handbook being developed is not considered applicable to airspace with an RNP less than 4.

2.10 In developing a handbook for application of RNP, it is important to note that RVSM is a separation standard, whereas RNP is a navigational requirement, which can be used as part of the basis for establishing a separation minimum. An additional factor related to the evolving interpretation of RNP further complicates the task of developing a RNP handbook. Deliberations within the SASP and other forums appear to be converging on a common view that a statement of requirements associated with RNP values of 4 or greater, consists of a specification of navigational accuracy only. In contrast, a statement of requirements associated with RNP values of less than 4 must address other factors such as the availability, continuity of service and integrity of the source of navigation.

2.11 In view of the anticipated use of RNP within the international airspace of the Asia/Pacific Region, the RNP handbook being developed is intended to serve the monitoring needs associated with an RNP value of 4 or greater.

2.12 The meeting acknowledged the work being undertaken by the United States to develop the draft handbook, which was expected to make a significant contribution to the RNP monitoring activities in the region, and also could be considered for global application.

Handbook for monitoring Air Traffic Service data link applications

2.13 The meeting was presented information prepared by the United States and Japan concerning a draft handbook (**Appendix D** refers) for monitoring of ATS data link systems in the Asia/Pacific Region. The purpose of this guidance material is to provide a set of working principles common to all States or regions implementing ATS data link systems. The handbook is intended to assist States implementing ATS data link systems with detailed guidance on the requirements for establishing and operating a monitoring programme. It is intended that this handbook will help promote a standardized implementation approach among regions and operators. The handbook will also help to promote interchange of information among different regions in support of achieving common operational monitoring procedures. The meeting noted that unlike in the case of RVSM, there is no ICAO guidance for the establishment of regional monitoring programmes and RMA functions for data link applications. Also, the meeting recognized that there was a need for detailed information on data link performance criteria, which States would need to address in their national airspace safety monitoring programme. The meeting agreed that these matters should be investigated further.

2.14 The APASM TF noted that requirements for monitoring aircraft height-keeping performance and the safety of RVSM operations had been more comprehensively developed than for other ATM services, such as reduced horizontal separation based on RNP, and monitoring of ATS data link systems. For RVSM, a handbook with detailed guidance on the requirements for establishing and operating an RMA was at an advanced stage of development by the SASP, and was expected to be available in 2003 or 2004. There was no comparable document under development by ICAO for horizontal separation or data link communication applications.

2.15 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 ADS and CPDLC performance for both aircraft and ground systems, has provided a valuable resource on which to develop monitoring requirements. As there is considerable material available, the APASM TF agreed that a handbook along the lines of the RVSM handbook should be developed for ATS data link monitoring requirements.

2.16 The meeting expressed its appreciation to the United States and Japan for preparation of the draft handbook, and agreed that this material would provide essential guidance to States for implementing and ongoing operations of ATS data link applications in the Asia/Pacific Region. The view was expressed that because of the generic nature of the material, the handbook could be suitable for global use.

Agenda Item 3: Development of the organization and structure for APASAG*Plan for establishment of APASAG*

3.1 The meeting reviewed the proposed revisions to the Plan for the Establishment of the Regional Airspace Safety Monitoring Agency (RASMA) as developed by the Task Force. In light of the decision taken by APASM TF/4 (December 2002), the duties and responsibilities envisaged for RASMA had significantly changed. In this regard, APASM TF/4 had revised the role of the organization to an advisory group named the Asia Pacific Airspace Safety Advisory Group (APASAG) to coordinate, harmonize and assist States fulfill their airspace safety monitoring obligations. To establish the governance of APASAG, the meeting considered a proposed charter prepared by Australia.

3.2 The meeting considered the proposals and felt that the organization that best met the envisaged role of APASAG could be established as a Sub Group of APANPIRG. The meeting considered that by removing the need for financial arrangements to operate APASAG, this would simplify the establishment of the organization, and allow for financial matters to be more efficiently dealt with directly between the users and providers. Also, it would not be necessary to put in place a formal instrument such as a charter or multi-

national agreement. The meeting agreed that the Sub Group could be established in accordance with the APANPIRG Procedural Handbook. Accordingly, the meeting established a drafting group to develop the terms of reference and operational plan for APASAG, which would be considered at the next meeting. The meeting recognized that in the work of APASAG there would be a need for flight operations and airworthiness expertise, and the drafting group should take this into account. The drafting group members would be provided by Australia, Japan and the United States, and IATA would be invited to participate. The United States agreed to act as rapporteur for the drafting group, and the work of the group would be carried out by correspondence.

3.3 The meeting developed a draft structure and terms of reference for APASAG to be taken into account by the drafting group as contained in **Appendix E**.

Agenda Item 4: Financial arrangements

4.1 In regard to the cost of operating regional airspace safety monitoring services, the meeting recalled that at APANPIRG/13, concerns had been expressed that not all States would be in a position to provide funding for such activities, and it was clarified that the APASM TF expected that there would be no cost to States, as all costs would be met through user charges. The meeting noted that IATA had agreed to this position, as airspace safety monitoring services were a legitimate cost to be met through user charges. The meeting recognized that the main issue to be resolved was to identify a level of reasonable charges for these services and a means for collection and distribution.

4.2 In view of the importance to make progress and complete the work to determine a funding mechanism for providing monitoring services, as requested by APANPIRG, the meeting established a finance drafting group to prepare a paper on the arrangements needed. The members of the group would be provided by Australia, India, Japan, New Zealand, Thailand, and the United States, and IATA would be invited to participate and act as rapporteur. The work of the drafting group would be undertaken by correspondence, and the group would be expected to present its paper to APASM TF/6 (5-7 May 2003).

4.3 In undertaking this task, the drafting group would take into account the practices of other monitoring organizations to cover the cost of providing such services from route charges. The meeting noted that any charges applied for this purpose should be in accordance with ICAO's policies contained in *ICAO's Policies on Charges for Airports and Air Navigation Services* (Doc 9082). Further, the meeting agreed that sample formats and examples of contracts currently in use for airspace monitoring services should be provided by members of the Task Force to the drafting group through the Secretary.

4.4 In follow-up to the APASM TF/4 meeting, Thailand provided information on the estimated annual operational expenditure of MAAR. The meeting was also advised that AEROTHAI had completed its organizational arrangements with the assistance of APARMO, and was ready to commence RVSM monitoring operations on approval by APANPIRG/14.

4.5 Detailed financial information on the estimated total operational expenditure of MAAR is provided in Table 1 below:

- 7.15 million Baht (0.16 million USD) for the first year; and
- 5.82 million Baht (0.13 million USD) for each of the later years.

Items	Baht (?) Per Year	US(\$) Per Year	Remarks
1. Staff Cost			
1.1 Salary	4,200,000	95,455	
1.2 Welfare	378,000	8,591	
1.3 Provident Fund	420,000	9,545	
2. Depreciation			
2.1 Computers (6 machines)	30,000	682	
2.2 Printers (2 printers)	6,000	136	
2.3 Accessories	2,000	45	
2.4 Building (Office)	-	-	
3. Training Expenses	1,329,328	30,212	First Year Only
4. Traveling Expenses	511,600	11,627	
5. Utilities & Communications expenses	273,508	6,216	
Total Expenditure	7,150,436	162,510	
Total Expenditure without Training Expenses	5,821,108	132,298	

Table 1. - Estimated operational expenditure of MAAR

4.6 The meeting was informed by Thailand that the total operational expenditure of MAAR for the first year is higher than later years because training expenses were included in the first year of operation. The training involved a comprehensive training programme conducted by the FAA for a group of AEROTHAI specialists. The training program addressed five primary functions of the RMA, as follows:

- 1) Establish and maintain a database of State RVSM approvals;
- 2) Monitor aircraft height-keeping performance and the occurrence of large height deviations against established requirements, and report results appropriately;
- 3) Conduct safety assessments and report results appropriately;
- 4) Inspect operator compliance with State approval requirements after RVSM implementation; and
- 5) Initiate necessary remedial actions if RVSM requirements are not met.

Agenda Item 5: Implementation issues

5.1 The meeting noted that provision for airspace safety monitoring services was part of the implementation plan established by APANPIRG for implementation of airspace improvements and related air traffic services in accordance with the Asia/Pacific ANP. The detailed monitoring requirements included identification of States and agencies able to provide airspace safety monitoring and assessment services. The meeting agreed that APASAG would not be required to undertake this role. As APASAG would have expertise that could assist the implementation process, it was envisaged that APASAG would closely coordinate with the planning and implementation groups.

5.2 In considering the introduction of new airspace safety monitoring services for implementation of ADS and CPDLC applications, the meeting recognized that a FIT/CRA programme would need to be established similar to the arrangements made by IPACG and ISPACG for implementation of these services in the Pacific Region. The meeting noted that there is a requirement in the Asia Pacific ANP to introduce ADS and CPDLC services, and that States in the South China Sea and Bay of Bengal areas were considering commencing operational trials. Also, States are implementing these systems in their national airspace. In this regard, the meeting was informed that to operate ADS and CPDLC services for air traffic

control, it would be necessary to evaluate and validate the end-to-end performance of these systems. This required specialized capability and arrangements to be established to obtain and analyse relevant data from aircraft, ATM systems and telecommunications service providers.

5.3 The meeting recognized that monitoring requirements for ADS and CPDLC performance were considerably more complex than those required for RVSM and RNP monitoring. The meeting was advised that the specialized test equipment required was not widely available, and at present, only two aircraft manufacturers, i.e. Airbus and Boeing had this capability. Therefore, to establish a FIT/CRA monitoring programme, it would be necessary to obtain these services. Further, the meeting was advised by the United States that Boeing initially funded the ADS/CPDLC monitoring programme for the Pacific Region but now provides these services under contract. In the future, for any new monitoring programmes to be introduced, funding would be necessary.

5.4 In light of the above, the meeting recognized that to continue to make progress to implement CNS/ATM systems as envisaged in the *Global Air Navigation Plan for CNS/ATM Systems* and contained in the *Asia/Pacific Regional Plan for the New CNS/ATM Systems*, it will be necessary to provide a source of funding for ADS and CPDLC monitoring programmes. The meeting acknowledged the substantial support provided by Boeing to enable the early introduction of ADS and CPDLC services in the Pacific Region. The operational and technical knowledge gained through the FITs/CRA programmes has provided invaluable information that has led to improvements in aircraft and ground data link systems, and ATM operational procedures

5.5 In regard to the tables developed at APASM TF/4 contained in Appendix C to the report for the provision of airspace safety monitoring and assessment services, the meeting agreed that further development of these tables was a matter for the implementation task forces, and there was no longer a requirement to continue this work. The information developed would be coordinated by the Secretary with the groups concerned.

Agenda Item 6: Amendment to the Asia Pacific Air Navigation Plan for establishment of APASAG

6.1 In view of the changes to the functioning of APASAG, and to establish it as a Sub Group of APANPIRG, the meeting agreed that there was no requirement to amend the Asia/Pacific ANP.

Agenda Item 7: Review the action plan

7.1 The meeting reviewed the action plan as formulated at APASM TF/4 and updated the plan as contained in **Appendix F**.

Agenda Item 8: Future Work – Meeting Schedule

8.1 The meeting reviewed progress to date to complete the work programme, and confirmed that the APASM TF/6 meeting would be held at Honolulu from 5 to 7 May 2003. Details of the venue will be provided by the United States and circulated to members by the Secretary in due course.

8.2 The Chairman reminded the meeting that APANPIRG/14 would be held from 4 to 9 August 2003 and there would be limited time after the APASM TF/6 meeting to finalize outstanding items. Therefore, it was important that the remaining work items are completed at APASM TF/6. Although provision has been made for a meeting of APASM TF/7 tentatively scheduled in July 2003 at Bangkok, the meeting agreed that it was preferable not to hold the seventh meeting, as there would be insufficient time to follow-up on any substantial issues not resolved by APASM TF/6.

8.3 The provisional agenda for the APASM TF/6 meeting is provided in **Appendix G**.

Agenda Item 9: Other business

9.1 The meeting emphasized the importance of having a web site operating as soon as practicable, as this would facilitate completion of the work programme. The Secretary advised the meeting that action had been taken since the last meeting to establish a web site for the APASM TF on the Asia/Pacific Regional Office web site at <http://www.icao.int>. This work is being undertaken by the web master at ICAO Headquarters. The Secretary will follow up to expedite establishing the web site and advise members when it is available.

APASM TF/5
Appendix A to the Report

LIST OF PARTICIPANTS

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Appendix A to the Report

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Appendix A to the Report

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LIST OF WORKING AND INFORMATION PAPERS

WORKING PAPERS

WP No.	Date	Agenda Item	Presented by	Subject
1	24/2/03	1	Secretariat	Provisional Agenda
2	24/2/03	2 d)	Secretariat	Handbook for a Regional Monitoring Agency Supporting Implementation and Continued Safe Use of the Reduced Vertical Separation Minimum (31 Oct 2002)
3	24/2/03	3	Secretariat	Plan for the Establishment of an Asia Pacific Airspace Safety Advisory Group (APASAG)
4	24/2/03	5	Australia	Proposal for APASAG Charter
5	22/2/03	2	United States & Japan	Draft Handbook For A Regional Monitoring Agency Supporting Implementation And Continued Safe Use Of Data Link Systems For Air Traffic Services
6	24/2/03	2	United States	Outline of A Handbook to Guide Monitoring in the International Airspace of the Asia/Pacific Region in Connection With Introduction and Continued Safe Use of an Horizontal-Plane Separation Minimum Where Required Navigation Performance (RNP) is Applied

INFORMATION PAPERS

IP No.	Date	Agenda Item	Presented by	Subject
1	24/2/03	-	Secretariat	List of Information and Working Papers
2	24/2/03	2	India	Action Plan of India in Airspace Safety Monitoring for Implementing RVSM in the Indian Flight Information Regions
3	24/2/03	4	Thailand	Estimated Operational Expenditure of Monitoring Agency for Asia Region (MAAR)

DRAFT

**HANDBOOK TO GUIDE MONITORING
IN THE INTERNATIONAL AIRSPACE OF THE ASIA/PACIFIC REGION
IN CONNECTION WITH INTRODUCTION AND CONTINUED SAFE USE OF AN
HORIZONTAL-PLANE SEPARATION MINIMUM WHERE
REQUIRED NAVIGATION PERFORMANCE (RNP) IS APPLIED**

Outline of A Handbook to Guide Monitoring in the International Airspace of the Asia/Pacific Region in Connection With Introduction and Continued Safe Use of an Horizontal-Plane Separation Minimum Where Required Navigation Performance (RNP) Is Applied

Part 1

1. Introduction

1.1 Background

- . APANPIRG establishment of APASM/TF to develop overall monitoring function for international airspace of Asia/Pacific Region;
- . RNP-10 as part of basis for introduction of horizontal-plane separation minima in several portions of Region;
- . desire to standardize monitoring practices associated with airspace where RNP is a requirement for operation and a portion of basis for safe use of separation minimum;
- . anticipate application of RNP values smaller than 10 in future; and
- . recognize SASP work to standardize RMA principles and procedures.

1.2 Purpose of Handbook:

- . introduce common set of principles and practices for monitoring in connection with horizontal-plane minima based in part on application of RNP.

1.3 Duties and Responsibilities of an Organization Providing Airspace Monitoring in Connection With RNP-based Horizontal-Plane Separation Minimum:

- (1) establish and maintain database of State RNP approvals;
 - (2) coordinate monitoring of horizontal-plane navigational performance and the identification of large horizontal-plane errors;
 - (3) archive results of navigational performance monitoring and contribute to conduct of annual assessment in light of agreed Regional safety goals;
 - (4) monitor compliance of operators with State RNP approval requirement after implementation of RNP-based horizontal-plane separation minimum;
 - (5) initiate necessary remedial actions and coordinate with specialist groups as necessary in light of monitoring results; and
 - (6) contribute to Regional database of monitoring results.
- . Appendix A: more elaboration of list of duties and responsibilities.

1.4 Standards for Designation of an Organization as a Provider of Monitoring Services:

- (1) competence as demonstrated by:
 - (a) previous monitoring experience;
 - (b) participation in ICAO panel or other body which developed RNP requirements or criteria for establishing separation minima based on RNP; and
 - (c) established formal relationship with organization qualified under (a) or (b).
- (2) recommendation by State or group of States within Region, or by duly constituted task force within Region; and
- (3) approval by APANPIRG.

1.5 List of Abbreviations and Acronyms

1.6 List of Definitions

Part 2

2.1 Establishment and Maintenance of Database of State RNP Approvals:

- . citation of ICAO published the Manual on Required Navigation Performance (RNP) (ICAO Document 9613) in May 1994, as subsequently revised;
- . citation of applicable State approval documents (for example, FAA Order 8400;
- . requirement for State RNP approval in order to operate in airspace where RNP-based separation minimum applied;
- . Appendix B: Forms for obtaining record of RNP approvals from State; and
- . Appendix C: Minimum informational content of record of RNP approval to be maintained in electronic form.

2.2 Coordination of Monitoring of Horizontal-Plane Navigational Performance

- . responsibility of States/ATS providers to cooperate in monitoring horizontal-plane navigational performance through use of secondary surveillance radar;
- . responsibility of States/ATS providers to identify large navigational errors and file report with monitoring organization;
- . role of monitoring organization is data-concentration, follow-up of reports of large navigational errors with States and operators; and
- . Appendix D: Sample letter to State authority citing a report of a large navigational error.

2.3 Archive results of navigational performance monitoring and contribute to conduct of annual assessment in light of agreed Regional safety goals:

- . minimum duty of monitoring organization is assembly of annual monitoring results;
- . monitoring organization may also conduct assessment of monitoring results against agreed Asia/Pacific target level of safety of 5×10^{-9} fatal accidents per flight hour due to loss of planned (lateral/longitudinal) separation;
- . alternatively, monitoring organization may forward annual monitoring results to APASAG for Region-wide assessments; and
- . Appendix E: Contents of annual report of navigational performance –
 - number of monitored flights;
 - estimate of standard of lateral/longitudinal errors;
 - number of large errors; and
 - frequency table of (signed) large errors.

- 2.4 Monitor compliance of operators with State RNP approval requirement after implementation of RNP-based horizontal-plane separation minimum:
- . emphasize importance of ensuring that only aircraft with State RNP approval operate in designated airspace; and
 - . Appendix F: Sample letter to State authority when unapproved operator is observed in airspace where State RNP approval is required.
- 2.5 Initiate necessary remedial actions and coordinate with specialist groups as necessary in light of monitoring results:
- . monitoring organization must review reports of large height deviations – as well as annual summary of navigational performance for adverse trends; and
 - . monitoring organization must establish liaison with specialist groups – such as operations/airworthiness and ATS – within Region as well as specialist groups within other regions, ICAO panels, industry groups such as RTCA or EUROCAE, and manufacturers in order to provide information related to systematic problems observed in monitoring and encourage development of remedial actions.
- 2.6 Contribute to Regional database of monitoring results:
- . Regional database allows sharing among monitoring organizations within Region; and
 - . Appendix G: Minimum contents of monitoring organization’s contribution to Regional database of monitoring results.

DRAFT VERSION 1.0

**HANDBOOK FOR A REGIONAL MONITORING AGENCY
SUPPORTING IMPLEMENTATION AND CONTINUED SAFE USE OF
DATA LINK SYSTEMS FOR AIR TRAFFIC SERVICES**

**HANDBOOK FOR A REGIONAL MONITORING AGENCY SUPPORTING IMPLEMENTATION
AND CONTINUED SAFE USE OF AIR TRAFFIC SERVICE
DATA LINK SYSTEMS**

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1. Background

The APASM task force noted that requirements for monitoring aircraft height-keeping performance and the safety of RVSM operations had been more comprehensively developed than for other ATM services, such as reduced horizontal separation based on RNP, and monitoring of Air Traffic Services (ATS) data link systems. For RVSM, a handbook with detailed guidance on the requirements for establishing and operating Regional Monitoring Agencies (RMAs) was at an advanced stage of development by the SASP and was expected to be completed early next year (2003 or 2004?). There was no comparable document under development by ICAO for horizontal separation or data link communication applications. The APASM task force decided to develop a draft handbook covering ATS data link applications for submission to ICAO.

The experience gained by the IPACG and ISPACG FANS Interoperability Teams (FITs) and the supporting Central Reporting Agency to monitor ADS and CPDLC performance for both aircraft and ground systems, has provided a valuable resource on which to develop monitoring requirements. As there is considerable material available, the APASM task force agreed that a handbook along the lines of the RVSM handbook should be developed for ATS data link monitoring requirements.

2. Purpose of Guidance Material

The purpose of this guidance material is to provide a set of working principles common to all States or Regions implementing ATS data link systems. The handbook is intended to assist States implementing ATS data link systems with detailed guidance on the requirements for establishing and operating a RMA. It is hoped that this handbook will help promote a standardized implementation approach among regions and operators. The handbook will also help to promote interchange of information among different regions in support of promoting common operational monitoring procedures.

3. ATS Data Link Regional Monitoring Agency Description

Unlike many other systems, the technologies adopted to provide ATS data link functionality exist in several different domains (e.g. aircraft, space, ground network, Air Traffic Services Unit, human) and the elements in all domains must be successfully integrated. Avionic and ground equipment from many different vendors, as well as the subsystems of several different communication networks, must inter-operate to provide the required end-to-end system performance. In addition, procedures must be coordinated among many different airlines and countries to provide the desired operational performance. Technical and operational elements must then coalesce to allow the environment to demonstrate mature and stable performance. Only then can essential benefits be realized.

Realization that a Regional Monitoring Agency (RMA) approach was essential to the success of any ATS data link implementation was an important lesson learned by the Informal South Pacific ATS Coordinating Group (ISPACG), the group who first implemented FANS. After all domains had worked together well during the initial development and subsequent certification of FANS-1/A, ISPACG members expected benefits from FANS in short order. Even though a problem-reporting system was in place when FANS operations commenced, there were many problems and it was not immediately possible to adopt the new operational procedures that would result in higher traffic capacity and more economic routes. A RMA originally called the FANS Interoperability Team (FIT), was formed to address both technical and procedural 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/or significant research were required if the many issues were to be adequately resolved. To address these concerns, the FIT created a dedicated sub-team, called the Central Reporting Agency (CRA), to perform the daily monitoring, coordination, testing, and problem research tasks outlined by the FIT. This approach is similar to that taken for RVSM

implementation where supporting groups such as APARMO provides aircraft height keeping monitoring services.

The principal members of an Interoperability Team are the major stakeholders of the systems that must interoperate to achieve the desired system performance and end-to-end operation. In the case of ATS data link systems, such as FANS or ATN, the major stakeholders are aircraft operators, air traffic services providers, network service providers, and airframe manufacturers. Other stakeholders such as regulators, pilot and controller associations, as well as international organizations, also play an important role.

Interoperability Teams are established to oversee the problem reporting and end-to-end system performance monitoring processes. They monitor system performance for a given region and act on reported problems. Any safety-related issues discovered by the team would be referred to the appropriate state or regulatory authorities for action. These processes were designed to ensure that the ATS data link systems meet established performance and interoperability requirements and to confirm that operations and procedures are working as planned. As a result of these aims and of subsequent evolution, the terms of reference for an interoperability team monitoring ATS data link systems are the following:

Problem Identification and Resolution

- Reviewing de-identified problem reports, and determining appropriate resolution.
- Identifying trends.
- Developing interim operational procedures to mitigate the effects of problems until such time as they are resolved.
- Monitoring the progress of problem resolution.
- Preparing summaries of problems encountered and their operational implications.

System Performance

- Determining and validating system performance requirements.
- Assessing system performance based on information in Central Reporting Agency monthly reports.
- Authorizing and coordinating system testing.
- Identifying accountability for each system element. Developing, documenting and implementing a quality assurance plan that will provide a path to a more stable system.
- Identifying configurations of the end-to-end system that provide acceptable data link performance, and ensuring that such configurations are maintained by all stakeholders.

Achieving Benefits

- Formulating plans for long-term procedural enhancements that take advantage of ATS data link benefits.
- Coordinating testing and implementation of enhanced operational procedures such as:
 - Nightly, Dynamic Airborne Route Planning (DARP) procedures have been implemented on South Pacific routes providing some of the first tangible benefits from FANS.
 - User-preferred routing, in which operators define their own flexible tracks, promises to provide greater incremental economic benefits than DARP.

Note.? Benefits available from ATS data link systems will differ from region to region. The benefits listed above are an example of benefits being sought by the South Pacific FIT.

Reporting

- Providing annual summary reports to appropriate steering groups.
- Team members forward reports from the FIT to other interested industry teams.

4. Central Reporting Agency Description

In order for an RMA to achieve its important goals of problem resolution, system performance assurance, and planning and testing of operations that will enable benefits, work must be done on a daily basis. To address these concerns a dedicated sub-team, called the Central Reporting Agency (CRA), is required to do the daily monitoring, coordination, testing, and problem research tasks outlined by the terms of reference for the RMA.

4.1 Central Reporting Agency Resource Requirements

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

Tool requirements are as follows. The CRA must be able to simulate an ATS ground station to the extent of exercising all combinations and ranges of controller-pilot data link communications (CPDLC) uplinks and automatic dependent surveillance (ADS) reports. The CRA must also have access to airborne equipment. For the airborne side, a test bench is adequate; however, engineering simulators that can be connected to either the ARINC or SITA network can offer additional capability. In support of the data link audit analysis task, the CRA must have software that can decode data link service provider audit data and produce usable reports. Without these tools it is virtually impossible for a CRA to resolve problems identified by the RMA.

Coordination is also a large 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 many stakeholders. The CRA has the primary responsibility to provide this coordination function as delegated by the RMA.

4.2 Central Reporting Agency Task and Resource Requirements Table

Following is a list of CRA tasks and associated resource requirements.

CRA Task	Resource Requirement
<ul style="list-style-type: none"> • Manage data confidentiality agreement with all FIT members who provide problem reports 	Legal services, technical expertise
<ul style="list-style-type: none"> • Develop and administer problem report process <ul style="list-style-type: none"> • De-identify all reports • Enter de-identified reports into a data base • Keep the identified reports for processing • Request audit data from data link service providers • Assign responsibility for problem resolution where possible • Analyze 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)
<ul style="list-style-type: none"> • Schedule, coordinate FANS procedures testing 	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
<ul style="list-style-type: none"> • Administer and monitor an informal end-to-end configuration process. 	Technical expertise
<ul style="list-style-type: none"> • Develop (as recommendations) new end-to-end system performance requirements. 	Technical expertise, operational expertise
<ul style="list-style-type: none"> • Receive, decode, and process monthly end-to-end system performance reports from the air traffic service providers 	Database tools, technical expertise
<ul style="list-style-type: none"> • Coordinate and test the implementation of proposed benefit enhancing procedures resulting from ATS data link systems for a given region (i.e. Dynamic Airborne Route Planning and or User Preferred Routes) 	Technical expertise, operational expertise

5. Standards for Establishment and Operation of an ATS data link RMA and CRA

Recognizing the safety oversight responsibilities necessary to support the implementation and continued safe use of ATS data link systems, the following standards apply to any organization intending to fill the role of an RMA:

- a) The organization must receive authority to act as an RMA as the result of a decision by a State, a group of States or a regional planning group, or by regional agreement;
- b) The organization acting as an RMA should have personnel with the technical skills and experience to carry out the following CRA functions:

Develop and administer problem report process
De-identify all reports
Enter de-identified reports into a database
Keep the identified reports for processing
Request audit data from data link service providers
Assign responsibility for problem resolution where possible
Analyze the data,

Receive, decode, and process monthly end-to-end system performance reports from the air traffic service providers,

Coordinate and test the implementation of proposed benefit enhancing procedures resulting from ATS data link systems for a given region,

Administer and monitor an informal end-to-end configuration process,

Manage data confidentiality agreements with all RMA members who provide problem reports,

Identify trends.

6. Working Principles Common to all Regional Monitoring Agencies

As stated, the intent of this handbook is to introduce a common set of working principles for RMAs. These principles have been agreed as the result of the combined experience of the NAT FANS Implementation Team, South Pacific FANS Interoperability team, Pacific FANS Interoperability Team, and the FANS Action Team for the Bay Of Bengal and the supporting Central Reporting Agencies. The principles are presented within this chapter in the context of the four main RMA functions listed in Section 3. The handbook provides a description of the overall activities associated with each function. In providing for the conduct of each function, it also provides agreed data formats, required communication linkages and appropriate references to ICAO documents and regional materials.

The sections listed below are still in work.

6.1 Problem Identification and Resolution

- Reviewing de-identified problem reports, and determining appropriate resolution.
- Identifying trends.
- Developing interim operational procedures to mitigate the effects of problems until such time as they are resolved.
- Monitoring the progress of problem resolution.
- Preparing summaries of problems encountered and their operational implications.

Note.? Need to add a more comprehensive description of what each one of these functions entails. This will help readers better understand the expertise and processes required to fulfill the RMA/CRA responsibilities

6.2 System Performance

- Determining and validating system performance requirements.
- Assessing system performance based on information in Central Reporting Agency monthly reports.
- Authorizing and coordinating system testing.
- Identifying accountability for each system element. Developing, documenting and implementing a quality assurance plan that will provide a path to a more stable system.
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6.4 Reporting

- Providing annual summary reports to appropriate steering groups.
- Team members forward reports from the FIT to other interested industry teams.

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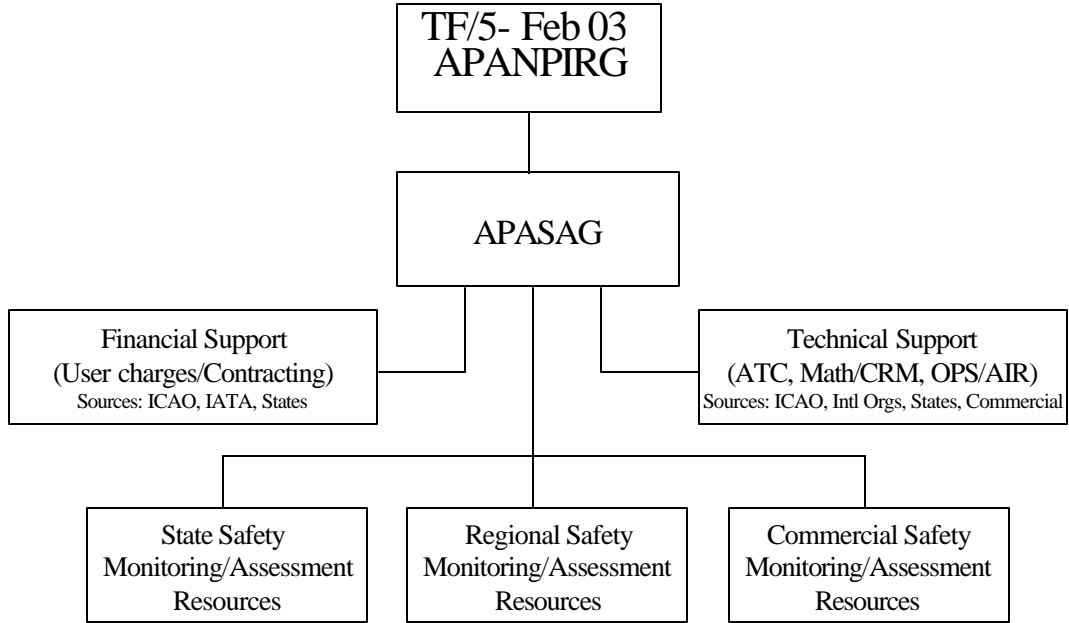
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**ASIA PACIFIC AIRSPACE SAFETY ADVISORY GROUP (APASAG)
STRUCTURE AND TERMS OF REFERENCE**

(To be considered by the Drafting Group)

DRAFT APASAG Structure

(To be consideration by the Drafting Group)



DRAFT APASAG TORs

(To be considered by the Drafting Group)

- Coordinate safety management efforts for CNS/ATM implementations and ongoing operation, including safety monitoring, safety assessment and ongoing skill development, in international airspace, for example:
 - Data Link
 - Separation Standards
- Promote remedial actions
- Facilitate application of regional safety monitoring and safety assessment resources
- Promote the financing of regional safety resources as necessary
- Compile, review and report international airspace safety status

APASM TF/5
Appendix F to the Report

Description	Start	Finish	Resource Names
Clearly describe airspace safety monitoring requirements in accordance with ICAO provisions	12-Dec-01	5-May-03	Task Force
Follow the development of ICAO Separation and Airspace Safety Panel guidance as it relates to RVSM regional monitoring agencies	12-Dec-01	5-May-03	Task Force
Send State letter to identify States wishing to enter into arrangements for airspace safety monitoring and/or safety assessment services	12-Dec-01	1-Mar-03	ICAO
Develop handbook detailing requirements for horizontal monitoring including State responsibility for providing data	12-Dec-02	5-May-03	Australia, US, Singapore
Develop handbook detailing requirements for communications/surveillance system monitoring including State responsibility for providing data	12-Dec-02	5-May-03	Japan, US, Boeing
Develop the organization and structure of an airspace safety monitoring organization for the Asia/Pacific Region	12-Dec-01	5-May-03	Task Force
Develop the APASAG plan for the establishment of an airspace safety advisory group	14-Dec-01	5-May-03	Task Force, Drafting Group
Consider organizational models and provide comments to support a decision	12-Dec-02	5-May-03	Task Force
Specify procedures for selecting Core Team and APASAG staff	13-Sep-02	5-May-03	Task Force
Identify the cost of operating monitoring services and a system for its funding	14-Dec-01	5-May-03	Task Force
Obtain information on the cost of performing current monitoring services	14-Dec-01	5-May-03	Boeing, Japan, US
Determine funding requirements	12-Dec-02	5-May-03	Task Force, Drafting Group
Propose a recommended funding arrangement	12-Dec-02	5-May-03	Task Force
Financial drafting group to take into consideration that inter-regional harmonization of charging for monitoring services is equitable	14-Dec-01	5-May-03	ICAO, Task Force
Examine information to determine an appropriate level of cost recovery for airspace safety monitoring in APAC	13-Sep-02	5-May-03	Task Force

APASM TF/5
Appendix F to the Report

Description	Start	Finish	Resource Names
Identify airspace safety monitoring and assessment resources	14-Dec-01	5-May-03	Task Force
Encourage current States/agencies providing airspace safety monitoring services to share technology and information	14-Dec-01	Ongoing	Australia, Japan, US, Singapore, Boeing, CSSI
 Provide information on India's height monitoring equipment plans	12-Dec-02	24-Feb-03	India
APASAG implementation issues			
 Identify States/agencies available to provide airspace safety monitoring and assessment services	13-Sep-02	5-May-03	Task Force
 Determine responsibility and coverage of monitoring agencies (regional, by State, by function, or major traffic flow)	13-Sep-02	5-May-03	Task Force
 Determine need for additional States/agencies to provide airspace safety monitoring and assessment services	12-Dec-02	5-May-03	Task Force
Provide to the financial drafting group sample format and examples of contracts currently in use for airspace safety monitoring services	12-Dec-02	1-Apr-03	Japan, US, Boeing
Prepare an appropriate amendment to the Asia Pacific Regional Air Navigation Plan for the establishment of APASAG	13-Sep-02	5-May-03	Task Force Chairperson, US, ICAO
Report progress			
Report progress to ATS/AIS/SAR/SG/13	24-Feb-03	19-May-03	Task Force Chairperson
Report progress to CNS/ATM/IC/SG/10	24-Feb-03	14-Jul-03	Task Force Chairperson
Report progress to CNS/MET/SG/7	24-Feb-03	14-Jul-03	Task Force Chairperson
Report to APANPIRG/14	5-May-03	4-Aug-03	Task Force Chairperson

PROVISIONAL AGENDA FOR APASM TF/6 MEETING

- Agenda Item 1: Adoption of Agenda
- Agenda Item 2: Airspace monitoring requirements
- a) follow the development of guidelines for RVSM RMAs by the Separation and Airspace Safety Panel;
 - b) develop a handbook detailing requirements for horizontal monitoring including State responsibility to provide data; and
 - c) develop a handbook detailing requirements for communications/navigation systems including State responsibility to provide data.
- Agenda Item 3: Development of the organization and structure for APASAG
- a) review the terms of reference of APASAG; and
 - b) review the operations plan for APASAG.
- Agenda Item 4: Financial arrangements
- a) review the finance paper taking into account the following
 - cost of performing current monitoring services;
 - level of user charges for airspace safety monitoring; and
 - harmonization of charges for air navigation services.
- Agenda Item 5: Review the action plan
- Agenda Item 6: Review the draft reports to APANPIRG and Sub Groups
- Agenda Item 7: Future Work – Meeting Schedule
- Agenda Item 8: Other Business

— END —