



*International Civil Aviation Organization*

**Fourteenth Meeting of the APANPIRG ATM/AIS/SAR Sub-Group  
(ATM/AIS/SAR/SG/14)**

Bangkok, Thailand, 28 June – 2 July 2004

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**Agenda Item 4: Consider problems and make specific recommendations concerning the provision of ATM/AIS/SAR in the Asia/Pacific Region**

**FANS IMPLEMENTATION TEAM FOR THE BAY OF BENGAL (FIT-BOB)  
and  
FANS IMPLEMENTATION TEAM FOR THE SOUTH-EAST ASIA REGION  
(FIT-SEA)**

(Presented by the Secretariat)

**SUMMARY**

This paper provides an update on the status and activities of the FANS Implementation Team for the Bay of Bengal (FIT-BOB) and the FANS Implementation Team for the South-East Asia Region (FIT-SEA).

**1. INTRODUCTION**

1.1 During the ATS/AIS/SAR/SG/12 meeting (24-28 June 2002), a Working Group was appointed to consider how best to progress the implementation of key priorities for CNS/ATM within the Region.

1.2 The Working Group subsequently advised ATS/AIS/SAR/SG/12 that the most effective way to progress CNS/ATM implementation in the areas where it was currently being implemented on a coordinated basis was to energize the FANS Action Team – Bay of Bengal (FAT-BOB) and establish a similar group for the Western Pacific/South China Sea.

**2. DISCUSSION**

2.1 As a result of discussion on this matter, ATS/AIS/SAR/SG/12 formulated Draft Conclusion 12/5 – Key Priorities for CNS/ATM Implementation, which was subsequently referred to APANPIRG/13 (9-13 September 2003) for consideration

2.2 APANPIRG/13 formed the opinion that there was a need for overall coordination with those parts of the region that were currently not harmonized with the requirements of the user and the plans of adjoining States and that the implementation effort in these areas needed to be revitalized. APANPIRG/13 noted that there were significant economic, environmental and operational benefits to be realized from this coordinated approach.

2.3 Accordingly, APANPIRG/13 formulated the following Conclusion:

**Conclusion 13/47 – Key Priorities for CNS/ATM Implementation**

That, in order to facilitate the implementation of the Key Priorities for CNS/ATM in the Asia/Pacific Region, ICAO is requested to:

- a) re-convene the FANS Action Team for the Bay of Bengal (FAT-BOB), and form a similar group for the Western Pacific/South China Sea; and,
- b) adopt the broad terms of reference for these groups as follows:
  - i. identify elements of the key CNS/ATM priorities which have not been implemented on a coordinated basis;
  - ii. consider the implementation of these elements, on a prioritized basis, taking into account user operational requirements, cost-benefit and environmental concerns; and,
  - iii. develop action plans for CNS/ATM implementation as appropriate on a collaborative basis.

2.4 The Air Navigation Commission and the Council reviewed the APANPIRG/13 Report (on 30 January 2003 and 19 February 2003 respectively) and took the following action in relation to Conclusion 13/47:

*“Noted the conclusion and that the FANS action team has been reconvened to develop an action plan so as to identify and implement the elements of the key CNS/ATM priorities which have not been implemented on a coordinated basis”.*

2.5 In March 2003, the ICAO Regional Office noted the report of the ANC and Council in support of this APANPIRG initiative and commenced planning on the basis that FAT-BOB would report to the Bay of Bengal ATS Coordination Group (BBACG) and that FAT-SEA would report to the South-East Asia ATS Co-ordination Group (SEACG). A similar arrangement exists in the Pacific, where the PAC-FIT reports directly to the respective IPACG or ISPACG meeting.

2.6 It was also likely that both FAT-BOB and FAT-SEA would need to coordinate their activities directly with the new Regional Airspace Safety Monitoring Advisory Group (RASMAG), in addition to reporting to the BBACG and SEACG respectively.

Nomenclature FAT/FIT

2.7 During discussion at the FAT-BOB/2 meeting (8-12 September 2003), the meeting considered that the name FANS Action Team (FAT) did not accurately reflect the activities of the Group, which was to implement ADS and CPDLC services in the Bay of Bengal area. Therefore, the meeting agreed to change the name to FANS Implementation Team (FIT).

2.8 This nomenclature was also adopted during the formation of the Fans Implementation Team for South East Asia (FIT-SEA).

### FIT-BOB Status

2.9 The BBACG/12 meeting (5-9 June 2000) recognized the need to analyze the performance of CPDLC and ADS over the Bay of Bengal and consequently decided to form the FANS Action Team for the Bay of Bengal, FAT-BOB. Subsequent to the formation of the FAT-BOB, the Revised ATS Route Structure, Asia to the Middle East and Europe, South of the Himalayas (EMARSSH) project established by APANPIRG/11 (October 2000) took over the work programme of the BBACG. Following implementation of the EMARSSH routes on 28 November 2002, the EMARSSH Project had been substantially completed.

2.10 APANPIRG/14 (4-8 August 2003) had noted that the reactivation of the FAT-BOB was considered essential to alleviate the problems presently encountered over the Bay of Bengal due to poor HF air/ground communications. Consequently, the BBACG and FAT (FIT)-BOB were reconvened at a combined BBACG/13 & FAT-BOB/2 meeting in September 2003, after last meeting in June 2000 (BBACG) and August 2000 (FAT-BOB).

2.11 The most recent meeting of the FIT-BOB occurred as the combined BBACG/14 and FIT-BOB/3 meeting in Bangkok, Thailand on 2-6 February, 2004. During the meeting, FIT-BOB considered the revised Terms of Reference and Work Plan proposed at the FAT-BOB/2 meeting and adopted the TOR (**Appendix A**) and a Work Plan (**Appendix B**) that incorporated the action items agreed at the FIT-BOB/3 meeting.

### FIT-SEA Status

2.12 Conclusion 13/47 of APANPIRG/13 required, *inter alia*, the creation of a similar group to FIT-BOB to serve the needs of the Western Pacific and South China Sea. Accordingly, the FIT-SEA/1 meeting was convened, and was conducted in combination with the SEACG/11 meeting on 24-28 May 2004, in Bangkok, Thailand.

2.13 The FIT-SEA/1 was updated by States responsible for the non-radar airspace over the South China Sea (SCS) on their preparedness to implement ADS and CPDLC. Only Singapore had implemented data link services and was operating ADS and CPDLC since 1997 for ATC in the Singapore FIR. The meeting recognized that as a result of the low level of equipage amongst SCS States, there would be some delay in commencing an integrated operational trial of ADS/CPDLC in the SCS area, probably not until 2006/2007.

2.14 The meeting agreed however, that it was important to maintain momentum towards implementation and the establishment of the FIT-SEA would facilitate this process. Preparatory work could be usefully undertaken to minimize delay in implementation once States were in position to commence an operational trial. Accordingly, the meeting agreed to form the FANS Implementation Team for the South-East Asia area (FIT-SEA) and adopted the Terms of Reference that had been proposed (**Appendix C**).

2.15 In light of the delays expected, the meeting agreed that the development of the main work programme for FIT-SEA would be deferred until the next meeting of FIT-SEA, at which time further information was expected to be available on the status of the facility upgrades of a number of States which were currently at an early stage, and the consequent preparedness of States to commence a trial. However, the meeting did adopt a preliminary Work Plan (**Appendix D**) to ensure that progress continued to be made.

### Operations Procedures Document

2.16 The Secretariat briefed the FIT-BOB/3 meeting (February 2004) and the FIT-SEA/1 meeting (May 2004) on the outcome of the APANPIRG 'Review of the *Guidance Material on*

*CNS/ATM Operations in the Asia and Pacific Region* Task Force' meeting hosted by the Federal Aviation Administration (FAA) of the United States at Honolulu, Hawaii, in October 2003.

2.17 The Task Force was set up by APANPIRG/14 under Conclusion 14/2 to review the regional *Guidance Material on CNS/ATM Operations in the Asia and Pacific Region (Guidance Material)*. APANPIRG/14 had taken action on the request of the Air Navigation Commission to ensure that the regional *Guidance Material* was in accordance with the SARPs and PANS, and in particular with Amendment 1 to the *Procedures for Air Navigation Services — Air Traffic Management* (PANS-ATM, Doc 4444). APANPIRG/14 had requested that the Task Force coordinate its work with States responsible for the Pacific Operations Manual (POM) with the intent of harmonizing both documents.

2.18 The Task Force had carried out a detailed review of the *Guidance Material*, and a revision to the document had been prepared which had been harmonized with the POM and incorporated, to the extent possible, the issues and comments raised during the ICAO Headquarters review. In line with ICAO's wish to see common operating procedures for data link applications using the FANS-1/A system, ISPACG and IPACG had agreed to change the title of the POM to the FANS Operations Manual (FOM) and amended the document for global applicability. Version 1 (March 2004) of the FOM is available for use.

2.19 The final harmonisation and update of the *Guidance Material* is on the work programme of the Regional Office and will be undertaken with suitable priority. Upon completion, the revised *Guidance Material* will be coordinated with ICAO Headquarters and presented to APANPIRG for adoption.

#### Selection and Establishment of a Central Reporting Agency (CRA)

2.20 The APANPIRG/14 meeting (4-8 August 2003) noted that the provision of adequate resources to undertake the airspace safety monitoring work was a significant issue and it was essential that funding was made available on a continuous basis to avoid disruption to monitoring services essential to the safety of the airspace concerned. The meeting recalled that, in some instances, airspace data collection, analysis and safety risk assessments had been carried out for the region using human and technical resources provided by some States and organizations at no cost to the user. The meeting recognized that it was expected that user charges would continue to be the main means of funding airspace safety monitoring services. The meeting agreed that provision of monitoring services would need to be provided in a cost effective manner based on cost/benefit considerations.

2.21 A Central Reporting Agency (CRA) performs the essential technical analysis of the performance of operational ADS and CPDLC systems and undertakes the investigation of system failures and other technical malfunctions. The tasks performed by a CRA are highly specialised and require test equipment and simulation capability that is not readily available. Accordingly, the establishment of a CRA is critical in enabling States to implement operational ADS and CPDLC systems.

2.22 The FIT-SEA/1 meeting (May 2004) noted that at the first meeting of RASMAG on 26-30 April 2004, draft guidance material for end-to end safety and performance monitoring of ATS data link systems in the Asia/Pacific Region was being developed, and that this material contained extensive guidance with regard to the activities and responsibilities of the CRA. Accordingly, the FIT-SEA/1 meeting had agreed that the guidance material would be used to set up and operate the data link monitoring services under the CRA for the South-East Asia area. A copy of the guidance material is included as **Appendix E**.

2.23 The BBACG/13 meeting (September 2003) noted the necessity of establishing a CRA to support the operational trial in the Bay of Bengal area and recommended that a special meeting be held to consider the funding issues. Consequently a Special ATS Coordination Meeting on the Central Reporting Agency Funding (SCM/CRA) for the Bay of Bengal was held at the ICAO Regional Office, Bangkok, Thailand, 8 -10 December 2003.

2.24 The SCM/CRA reviewed the various options that could provide a mechanism for collecting funds, and agreed that the model that best met the needs of obtaining funds for the CRA was based on a joint financing arrangement. In this regard, the meeting developed a modified version of the traditional model which provided for IATA to collect a levy on the airspace users, and to include provision for contributions to be made from other sources. Further, the SCM/CRA recognized that the cost of operating the CRA was related to the number of States participating in the operational trial and the complexity of the airspace and the ADS/CPDLC systems. In this regard, FIT-BOB was requested to undertake a detailed review of the participating States and the extent of their commitment to implement ADS/CPDLC services.

2.25 The SCM/CRA made the following recommendations for follow-up action by the FIT-BOB/3 meeting:

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

- 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 in Appendix B to this report;
- 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.

2.26 The meeting reviewed and endorsed the above recommendations. The meeting in consideration of a suitable service provider for the CRA, noted that Boeing who was operating the CRA for the Pacific Region, had confirmed at the FIT-BOB/2 meeting (8-12 September 2003) that they would be willing to provide CRA services to the States of FIT-BOB to support the operational trial and implementation of ADS and CPDLC services.

2.27 The meeting agreed to accept Boeing's offer to provide CRA services for the Bay of Bengal operational trial. Accordingly, IATA and Boeing were requested to pursue the establishment of a contract on behalf of the FIT-BOB States participating in the operational trial for Boeing to set up and operate the CRA. IATA agreed to the arrangements and would work with Boeing to evaluate the

costs of operating the CRA, arrange for a contract with Boeing, and collect the funds from the airspace users concerned. Boeing advised the meeting that they would not be able to commence the CRA operation until a contract was agreed.

2.28 The FIT-SEA/1 meeting (May 2004) noted the outcomes of the SCM/CRA and that contract discussions were continuing between IATA and Boeing regarding funding for the CRA supporting the Bay of Bengal operational trial. The meeting was also apprised of an offer from the CRA of Japan to undertake the role of CRA for the South China Sea States, as an extension to its existing activities.

2.29 The FIT-SEA/1 meeting noted that there would be some delay in commencing an operational trial in the South China Sea area (2006/2007). In light of the delays expected, IATA and a number of States suggested that the selection of a CRA could be delayed until closer to the commencement of the trial. The meeting agreed that the situation would be deferred until the next meeting of FIT-SEA, at which time further information was expected to be available about the CRA Japan proposal and experience would have been gained with the FIT-BOB CRA.

#### Bay of Bengal Operational Trial

2.30 During the FIT-BOB/3 meeting all States present, except Singapore, confirmed that they would be able to participate in the operational trial as planned, proposed to commence on 19 February 2004. Singapore would not be involved in the trial as flights to and from the Bay of Bengal area were operating within radar and VHF coverage when they were under Singapore ATC. The meeting noted that India, Indonesia, Myanmar, Singapore, Sri Lanka and Thailand had already introduced ADS/CPDLC on an operational trial basis.

2.31 The Secretariat advised the meeting that, with regard to the States not present at the meeting, Sri Lanka had been contacted and they indicated they would participate in the trial. In the case of Malaysia, they had notified the Regional Office of their withdrawal. Myanmar had indicated that they could not confirm participation in the trial at this time.

2.32 The FIT-BOB/3 meeting considered the objectives and benefits to be derived from implementation of ADS and CPDLC services in the Bay of Bengal and the following were identified:

- a) introduction of reduced horizontal separation based on distance:
  - 1st Phase - 50 NM longitudinal and intersecting track (50 NM lateral separation already implemented on the parallel route system);
  - 2<sup>nd</sup> Phase - 30 NM lateral and longitudinal separation.
- b) introduction of user preferred routes (UPR);
- c) offsetting for deviation due to weather and contingency procedures including emergencies;
- d) introducing surveillance of non-radar airspace to improve ATM situational awareness;
- e) improved accuracy and reliability of aircraft position reporting;
- f) improve operational efficiency and optimizing flight operations; and

- g) introducing CPDLC as a primary means of communication, thereby improving controller/pilot communications in the HF radio environment and contributing to efficiency and enhancing safety of operations.

2.33 The meeting agreed that ATS providers should use a common NOTAM to notify the introduction of the ADS/CPDLC operational trial, and reminded ATS providers to include the logon address of the ATS Unit providing the ADS/CPDLC service. A sample NOTAM (based on the NOTAM issued by the Chennai ACC on their ADS/CPDLC operation trial) was provided.

2.34 In regard to the logon address of the ATSU, which was essential to establishing a CPDLC connection between the aircraft and the ATSU, the meeting noted that Annex 4 – Aeronautical Charts includes under the components of the ATS system, a requirement to show radio communications facilities with their frequencies, and considered that the data link logon address should be included in this data block on all charts where ATS communications were required. This matter would be brought to the attention of ICAO Headquarters for further study.

2.35 SITA informed the meeting that data link internetworking in the region had been working smoothly, especially since 5 June 2003 when ARINC commenced use of the gateway (ATSXCXA) to support internetworking between ARINC, AEROTHAI and Aviation Data Communications Corporation (ADCC) of China.

2.36 In considering the period of the trial and based on the experience of the ATS providers in the Pacific Region, the meeting agreed to keep the period open-ended as the performance of ADS/CPDLC systems would vary and the readiness dates of ATS providers to commence operational ATC services following the trial period would also vary, making it impossible to adopt a common date. The meeting agreed that the commencement date of the trial would be on 19 February 2004. For ATS providers already operating ADS/CPDLC on a trial basis, this would be the date from which they would submit their reports to the CRA.

### 3 ACTION BY THE MEETING

3.1 The meeting is invited to:

- a) note the status and activities of the FIT-BOB and FIT-SEA
- b) note the broad terms of reference for these groups as provided by APANPIRG under Conclusion C 13/47;
- c) note the reporting arrangements for FIT-BOB and FIT-SEA to BBACG and SEACG respectively, and via ICAO to the RASMAG; and
- d) review and adopt 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 as contained in Appendix E.

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**FANS IMPLEMENTATION TEAM (FIT-BOB)  
FOR THE BAY OF BENGAL****TERMS OF REFERENCE**Composition of FANS Implementation Team (FIT)

The FANS Implementation Team (FIT) will consist of representatives from aircraft and ancillary equipment manufacturers, airlines, data communication service providers (DSP), ATS providers, IATA, ICAO, IFALPA, and IFATCA. Contact details of the FIT members are provided in Attachment A.

Terms of Reference

The FANS Implementation Team for the Bay of Bengal (FIT-BOB) shall be responsible for system configuration and oversee the end-to-end monitoring process to ensure the FANS 1/A systems are implemented and continues to meet its performance, safety, and interoperability requirements.

FIT-BOB shall:

- a) Determine the common operational architecture to support CPDLC and ADS;
- b) Support the implementation and operational benefits of CPDLC and ADS;
- c) Authorize and coordinate system testing and operational trials;
- d) Develop interim operational procedures to mitigate the effects of problems until such time as they are resolved;
- e) Review de-identified problem reports and determine appropriate resolution;
- f) Monitor the progress of problem resolution; and
- g) Assess system performance based on information in Central Reporting Agency periodic reports.

Preparation of Reports

The Central Reporting Agency (CRA) will report, as required, to FIT-BOB. FIT-BOB will report to the Bay of Bengal ATS Co-coordinating Group (BBACG). ICAO will submit reports to appropriate sub-groups of APANPIRG.

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**FIT-BOB/3 WORK PLAN**

	<b>ACTION ITEM</b>	<b>TIME FRAME</b>	<b>RESPONSIBLE PARTY</b>	<b>Status</b>	<b>REMARKS</b>
1.	ATS providers to adopt the FOM and to review and update their ATSU operating procedures to align with the FOM.	Prior to commencement of trial on 19 Feb 04	All States	Ongoing	Important all ATSU adopt common operating procedures
2.	ATS providers to coordinate with adjacent ACCs to review and update letters of agreement for introduction of ADS/CPDLC services on a trial basis	Prior to commencement of trial on 19 Feb 04	All States	Ongoing	Ensure common ATC procedures applied
3.	Issue NOTAM on the commencement of the operational trail in line with the model NOTAM provided by FIT-BOB/3	Immediate	All States		Some States have already issued NOTAM on their operational trial.
4.	Coordinate with BOB States not present at FIT-BOB/3 on implementation of the operational trial.	As soon as practicable	ICAO, Malaysia, Sri Lanka, Myanmar, Bangladesh		Determine status on trial participation
5.	Coordinate with Indian Ocean States on harmonizing implementation of operational trial	As soon as practicable	ICAO APAC BOB and Indian Ocean States		Operational trail underway and to harmonize implementation
6.	Coordinate with Middle East and East African Regional Offices on implementation of operational trial in the Arabian Sea and Indian Ocean	As soon as practicable	ICAO APAC	Ongoing	To harmonize inter-regional implementation of ADS/CPDLC and to ensure common operating procedures established
7.	Collecting of ADS/CPDLC problem reports and submit to CRA	Immediate	States, operators	Ongoing	To be submitted as soon as practicable to facilitate analyzing the reports
8.	Establish provision of monthly monitoring date ADS/CPDLC system performance data to be submitted to the CRA	Monthly	States	Ongoing	Essential for evaluating overall system performance within the trial airspace.

**APPENDIX B**

	<b>ACTION ITEM</b>	<b>TIME FRAME</b>	<b>RESPONSIBLE PARTY</b>	<b>Status</b>	<b>REMARKS</b>
9.	Compile data on aircraft ADS/CPDLC equipped in the trial airspace	6 monthly	States, IATA	Ongoing	To keep record of aircraft participating in the trial and determine overall benefits derived by population of aircraft operating in the trial airspace.
10.	Training of controllers and technical staff on ADS/CPDLC operational procedures based on the FOM.	As soon as practicable	States	Ongoing	
11.	Nominate contact person (ATS and technical) and keep details updated	As soon as practicable	States, operators		Important that CRA has contact with engineering personnel to analyze problem reports and performance data.
12.	Establish data confidentiality agreements with States and operators participating in the trial airspace	Immediate	CRA, States and operators	As required	Necessary to establish agreement with data providers for release of data and to de-identify reports.
13.	Include on aeronautical charts logon address of ATSU's providing ADS/CPDLC services	As soon as practicable	ICAO	Ongoing	Annex 4 amendment to be considered
14.	Update ICAO Guidance material on CNBS/ATNM Operations in APAC Region	As soon as practicable	ICAO	Ongoing	Part III harmonized with FOM.
15.	Inform operators of the implementation of the operational trial.	IATA RCG Meeting, Feb 04	IATA		
16.	Coordinate with FOM editorial group on request for change to the FOM	As required	BOB FOM editor	Ongoing	BOB FOM editor to be nominated

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**FANS IMPLEMENTATION TEAM (FIT-SEA)  
FOR THE SOUTH CHINA SEA****DRAFT TERMS OF REFERENCE****Composition of FANS Implementation Team (FIT)**

The FANS Implementation Team (FIT) will consist of representatives from aircraft and ancillary equipment manufacturers, airlines, data communication service providers (DSP), ATS providers, IATA, ICAO, IFALPA, and IFATCA.

**FIT-SEA Terms of Reference (TOR)**

The FANS Implementation Team for the South East Asia region (FIT-SEA) shall be responsible for system configuration and oversee the end-to-end monitoring process to ensure the FANS 1/A systems are implemented and continue to meet their performance, safety, and interoperability requirements.

FIT-SEA shall:

- a) Determine the common operational architecture to support CPDLC and ADS;
- b) Support the implementation and operational benefits of CPDLC and ADS;
- c) Authorize and coordinate system testing and operational trials;
- d) Develop interim operational procedures to mitigate the effects of problems until such time as they are resolved;
- e) Review de-identified problem reports and determine appropriate resolution;
- f) Monitor the progress of problem resolution; and
- g) Assess system performance based on information in Central Reporting Agency periodic reports.

**Preparation of Reports**

The Central Reporting Agency (CRA) will report, as required, to FIT-SEA. FIT-SEA will report to the South East Asia ATS Co-coordinating Group (SEACG). ICAO will submit reports to appropriate sub-groups of APANPIRG.

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**FIT-SEA WORK PLAN**

1. Develop and sign a data confidentiality agreement between South East Asia States, airlines using FANS 1/A in the South East Asia region, Data Link Service Providers (DSPs) and the CRA. This agreement ensures that team members can submit identified problem reports to the CRA to facilitate problem resolution and that all problem reports will be de-identified before dissemination to the entire FIT-SEA team.

**Action: CRA/States/Airlines/DSPs coordinate with CRA to sign data confidentiality agreement**

2. Adopt the FANS 1/A Operations Manual (FOM) and ICAO regional *Guidance Material on CNS/ATM Operation in the Asia/Pacific Region* to establish operating and reporting procedures in the South East Asia region.

**Action: FIT-SEA members make appropriate arrangements to incorporate technical, training and documentation aligned with the FOM and ICAO Guidance Material.**

3. States/ATSU Providers to ensure controllers are trained to operate their respective FANS 1/A workstations using the FOM and ICAO *Guidance Material on CNS/ATM Operations in the Asia/Pacific Region* as a basis for developing training.

**Action: FIT-SEA ATSUs adopt training requirements.**

4. Participating operators to ensure flight crews are trained to operate their respective FANS 1/A systems using the FOM and ICAO regional *Guidance Material on CNS/ATM Operations in the Asia/Pacific Region* as a basis for developing training. To obtain operational approval for FANS 1/A from their regulatory authorities as required, operators should take into account appropriate technical material such as: FAA documents “*Controller-To-Pilot Data Link Communication Operational Approval Information Package*” dated 25 February 1999 and FAA AC 120-70.

**Action: Operators to implement training requirements as designated by appropriate regulatory authorities.**

5. Co-ordinate with all FANS 1/A equipped operators prior to the start of ADS/CPDLC operational trials and urge them to participate.

**Action: States/ATSUs to coordinate with operators and IATA for FANS 1/A trial participation.**

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**DRAFT GUIDANCE MATERIAL FOR  
END-TO-END SAFETY AND PERFORMANCE MONITORING OF  
AIR TRAFFIC SERVICE (ATS) DATA LINK 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) data link 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 International Civil Aviation Organization (ICAO) ICAO Separation and Airspace Safety Panel (SASP) and was expected to be completed early in 2004. There was no comparable document under development by ICAO for Air Traffic Control data link communication applications. The APASM Task Force agreed that there was a requirement to develop guidance material for the Asia/Pacific Region covering safety and performance monitoring for ATS data link applications, which could also serve as a basis for global guidance.

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 data link communications (CPDLC) performance for both aircraft and ground systems, was used as a resource on which to develop monitoring guidance material.

**2. Purpose of Guidance Material**

2.1 The purpose of this guidance material is to provide a set of working principles common to all States implementing ATS data link systems. The guidance material is also intended to provide assist with detailed guidance on the requirements for establishing and operating a FIT. It is intended that this guidance material will help promote a standardized approach for implementation within the Region. This information will also help to promote interchange of information among different Regions to support common operational monitoring procedures.

**3. Description of an ATS Data Link Regional Monitoring Agency**

3.1 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 service units, human factors) and the elements in all domains must be successfully integrated. Avionic and ground equipment from many different vendors, as well as the sub-systems 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.

**APPENDIX E**

3.2 Realization that an interoperability team approach was essential to the success of any ATS data link implementation was an important lesson learned by the ISPACG, who first implemented CNS/ATM applications using FANS 1/A systems. Stakeholders had worked together well during the initial development and subsequent certification of FANS-1/A. ISPACG members expected benefits from FANS-1/A soon after in-service operations began even though a problem-reporting system was in place when FANS-1/A operations commenced, many problems went unresolved and it was not immediately possible to adopt the new operational procedures that would result in higher traffic capacity and more economic routes. Therefore, a FANS Interoperability Team 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, the 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 implementations where supporting groups provide aircraft height keeping monitoring services.

3.3 Although the monitoring process described above was first developed for FANS-1/A based CPDLC and ADS applications the monitoring process is identical for Aeronautical Telecommunications Network (ATN) based ATS applications as well. This was validated during the Preliminary Eurocontrol Test of Air/ground data Link (PETAL) implementation of ATN based ATS data link services in Maastricht Area Control Center.

3.4 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-1/A or ATN, the major stakeholders are aircraft operators, ATS providers, communications 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.

3.5 Interoperability teams should be 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 should 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**

- establishing a problem reporting system;
- 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; and
- preparing summaries of problems encountered and their operational implications for regional dissemination.

**System Performance**

- determining and validating system performance requirements;
- establishing a system performance monitoring system;
- assessing system performance based on information in CRA 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 in support of implementation of enhanced operational procedures such as:
  - reduced separation;
  - Dynamic Airborne Route Planning (DARP) procedures, such as those which have been implemented on South Pacific routes providing some of the first tangible benefits from FANS-1/A; and
  - 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; and
- Forward reports from the FIT to other interested industry teams.

**4. CRA Description**

4.1 In order 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, work must be done on a daily basis. To address these concerns a dedicated sub-team, such as the CRA, is required to do the daily monitoring, coordination, testing, and problem research tasks outlined by the terms of reference for the interoperability team.

**4.2 CRA Resource Requirements**

4.2.1 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 dimensions of the airspace, variety in operating procedures, number of airlines, number of different airborne equipment variants, number of air traffic service providers,

**APPENDIX E**

number of different ground equipment variants and number of communications network service providers.

4.2.2 The CRA must have the tools to be able to simulate an ATS ground station to the extent of exercising all combinations and ranges of CPDLC uplinks and 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 communication 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 or monitor system performance.

4.2.3 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 interoperability team.

### 4.3 CRA Task and Resource Requirements Table

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

<b>CRA Task</b>	<b>Resource Requirement</b>
<ul style="list-style-type: none"> <li>• Manage data confidentiality agreement with all FIT members who provide problem reports</li> </ul>	Legal services, technical expertise
<ul style="list-style-type: none"> <li>• Develop and administer problem report process               <ul style="list-style-type: none"> <li>• de-identify all reports</li> <li>• enter de-identified reports into a data base</li> <li>• keep the identified reports for processing</li> <li>• request audit data from data link service providers</li> <li>• assign responsibility for problem resolution where possible</li> <li>• analyze the data</li> </ul> </li> <li>• Identify trends</li> </ul>	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"> <li>• Schedule, coordinate procedures testing</li> </ul>	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"> <li>• Administer and monitor an informal end-to-end configuration process.</li> </ul>	Technical expertise
<ul style="list-style-type: none"> <li>• Develop (as recommendations) new end-to-end system performance requirements.</li> </ul>	Technical expertise, operational expertise
<ul style="list-style-type: none"> <li>• Receive, decode, and process monthly end-to-end system performance reports from the air traffic service providers</li> </ul>	Database tools, technical expertise
<ul style="list-style-type: none"> <li>• 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)</li> </ul>	Technical expertise, operational expertise

**5. Standards for Establishment and Operation of an ATS Data Link FIT and CRA**

5.1 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 FIT:

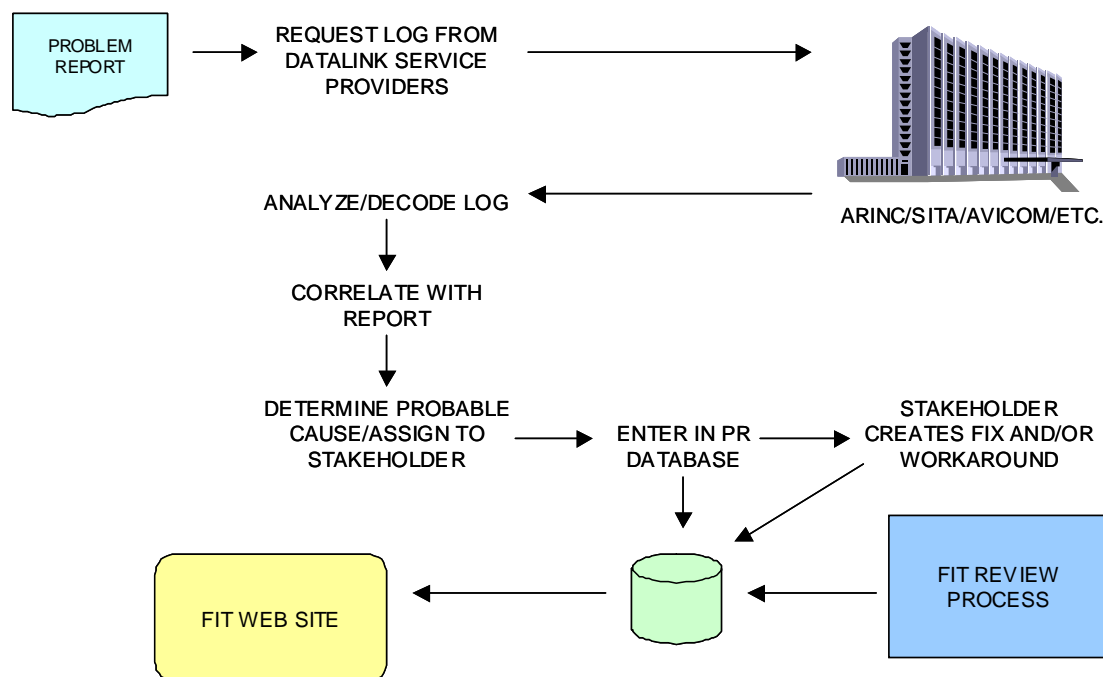
- a) the organization must receive authority to act as an FIT as the result of a decision by a State, a group of States or a regional planning group, or by regional agreement;
- b) the organization acting as an FIT should appoint a CRA the has the required tools and personnel with the technical skills and experience to carry out the following CRA functions:
  1. develop and administer problem report process
  2. de-identify all reports
  3. enter de-identified reports into a database
  4. keep the identified reports for processing
  5. request audit data from data link service providers
  6. assign responsibility for problem resolution where possible
  7. analyze the data
  8. receive, decode, and process monthly end-to-end system performance reports from the air traffic service providers,
  9. coordinate and test the implementation of proposed benefit enhancing procedures resulting from ATS data link systems for a given region,
  10. administer and monitor an informal end-to-end configuration process,
  11. manage data confidentiality agreements with all RMA members who provide problem reports,
  12. identify trends.
- c) the FIT should ensure that the CRA is adequately funded to carry out their required functions.

**6. Working Principles Common to all Interoperability Team Agencies**

6.1 As stated, the intent of this guidance material is to introduce a common set of working principles for FITs. These principles have been agreed as the result of the combined experience of the North Atlantic FANS Implementation Group, South Pacific FANS Interoperability Team, Pacific FANS Interoperability Team, the FANS Action Team for the Bay of Bengal, and the ATN implementation in Maastricht ACC.

**APPENDIX E****6.2 Problem Identification and Resolution**

6.2.1 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 interim procedures to mitigate the problem in some instances. This is shown in the diagram below.



6.2.2 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.

6.2.3 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 ARINC and SITA (occasionally other service providers, such as AVICOM and AEROTHAI will be involved), but in future, with ATN development, additional providers (which should comply with EUROCAE ED-111), will become involved and airborne recordings should become available (as per EUROCAE ED-112). 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, (sometimes for several days prior to the event if the problem appears to be an on-going one).

6.2.4 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; and
- SATCOM activity logs.

6.2.5 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 matter, as much of it is subject to limited retention.

6.2.6 Once the data has been collected, the analysis can begin. For this, it is necessary to be able to decode all the message types involved. Obviously, a tool that can decode all the ATS data link messages of the type used in that region is necessary. These tools would 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; and
- FIS or ARINC 623 messages used in the region.

6.2.7 Once the messages have been decoded, the analysis requires a thorough understanding of the complete message traffic, including:

- media management messages;
- relationship of ground-ground and air-ground traffic; and
- message envelope schemes used by the particular data link technology (ACARS, ATN, etc).

6.2.8 It is also important for the analyst to have a good understanding in how the aircraft systems operate and interact to provide the ATS data link functions, as many of the reported problems are airplane system problems.

6.2.9 All 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.

6.2.10 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.

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

6.2.12 The CRA's responsibility does not end with determining the cause of the problem and identifying a fix. As part of that activity, procedural methods to mitigate the problem may have to be developed while the solution is being coordinated (software updates to a fleet may take a considerable period before all aircraft have the fix).

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